5th CINEC INTERNATIONAL RESEARCH SYMPOSIUM PROCEEDINGS (CIRS) - 2024

Sustainable Future :
Harnessing Humanity Through Creativity and Innovation

"Per aspera ad sapientiam"
Through Hardships to Wisdom



CINEC CAMPUS
Beyond A Graduate

Book of Abstracts

5th CINEC INTERNATIONAL RESEARCH SYMPOSIUM

(CIRS)-2024

Sustainable Future: Harnessing Humanity Through Creativity And Innovation

"Per aspera ad sapientiam"

-Through hardships to wisdom-

6th December 2024
CINEC Campus, Malabe
Sri Lanka

Proceedings

Faculty of Computing
CINEC Campus, Malabe

5th CINEC INTERNATIONAL RESEARCH SYMPOSIUM PROCEEDINGS (CIRS)-2024

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1. High education – Congresses
2. Private Universities and colleges- Congresses

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PREFACE

Preface

The 5th CINEC International Research Symposium (CIRS) is organized and hosted by The Faculty of Computing at the CINEC Campus in Malabe, Sri Lanka. The event took place on December 06, 2024, at the CINEC Klaus E Orlendorff main auditorium. CIRS, the Annual International Research Symposium 2024 encompasses the theme of "Sustainable Future: Harnessing Humanity Through Creativity and Innovation", which is an umbrella that comprises environmental, social and economic initiatives that are not just focused on short-term benefits but designed to build solutions for a more sustainable and resilient future.

CIRS 2024 features national and international research abstracts categorized under eight sub themes reflecting the central theme emphasizing the vision “Per aspera ad sapientiam”- “Through hardships to wisdom”.

Track 01 Faculty of Computing	*Empowering the future: Innovation and Creativity through IT*
Track 02 Faculty of Health Science	*Advances in healthcare in Sri Lankan economic revitalization*
Track 03 Faculty of Management & Social Sciences	*Leveraging Creativity & Innovation for Sustainable future: the role of Management & Social Sciences*
Track 04 Faculty of Engineering &Technology	*AI & Engineering: Transforming Industries, Enhancing Efficiency & Building a Sustainable Future*
Track 05 Faculty of Humanities & Education	*Sustainable Future in the Study of Humanities & Education*
Track 06 Faculty of Marine Engineering	*Sustainable Future of Shipping through creativity and accident prevention*
Track 07 Faculty of Science	*Innovative Scientific Solutions for a Sustainable Future*
Track 08 Faculty of Maritime Sciences	*Sustainable Future shipping through creativity and accident prevention*

A heartfelt tribute to all the faculty staff and the representatives of CINEC; Faculty of Engineering and Technology, Faculty of Health Sciences, Faculty of Science, Faculty of Maritime Sciences, Faculty of Marine Engineering, Faculty of Humanities and Education, Faculty of Management and Social Sciences. Their dedicated contributions were crucial in making CIRS 2024 a resounding success. Special thanks also goes to all the talented presenters and participants for the diverse scholarly realms unraveled through concurrent panel discussions of the CIRS on the 06th of December 2024.

We all stood as one, united, striving for the vibrant purpose of ensuring the symposium to inspire the intellectual capacities, while adding to the treasure house of the Academic scholarship, providing a priceless opportunity for university students of both national and international scope.

Organizing Committee

05th CINEC International Research Symposium



The Message from the President of the CINEC Campus

Capt. Ajith Peiris

As the President of CINEC Campus, it is both an honor and a privilege to convey my message to the 5th CINEC International Research Symposium 2024 (CIRS 2024), hosted by the Faculty of Computing. I extend my congratulations to all local and international researchers who are contributing to this distinguished event by presenting and sharing their knowledge.

This year's theme, "Sustainable Future: Harnessing Humanity through Creativity and Innovation," is both forward-thinking and highly relevant. It underscores the vital role of creativity and innovation in addressing global challenges and building a sustainable future. Such a focus is instrumental in advancing the 17 Sustainable Development Goals (SDGs), especially in fostering education, environmental sustainability, and inclusive growth.

The Faculty of Computing has taken a significant step by organizing this landmark symposium, which has consistently grown over the years to become a platform of national and international recognition. By hosting the CIRS for the fifth consecutive year, CINEC reaffirms its commitment to fostering an environment that encourages intellectual growth, innovation, and collaboration.

CIRS 2024 offers a unique opportunity for researchers, academics, and industry professionals to share groundbreaking insights, generate new ideas, and contribute to existing knowledge. Beyond academic enrichment, the symposium strengthens networks within research communities and serves as a catalyst for policies and strategies that drive sustainable development.

I am confident that all participants will greatly benefit from this experience by advancing their knowledge and expanding their professional horizons. On behalf of CINEC, I wish everyone the very best in their endeavors and hope this symposium inspires meaningful contributions to a sustainable future.

My heartfelt appreciation goes to the Faculty of Computing for their unwavering dedication and effort in making the 5th CINEC International Research Symposium 2024 a tremendous success.

Capt. Ajith Peiris,

President / CEO,

CINEC Campus.



Message from the Consultant – Academic Affairs and Research

Dr. Ajith Madurapperuma

I take pride in sending this message to the publication of abstracts of the 5th Annual CINEC International Research Symposium (CIRS), a premier platform where innovation meets excellence.

This dynamic gathering brings together recent graduates, researchers, academics, and industry professionals from Sri Lanka as well as from around the world. The symposium is a platform for these innovators and problem solvers to share groundbreaking discoveries that they have been working on. It will also allow researchers to forge meaningful and long-lasting research collaborations. Young researchers and staff members are provided with a unique opportunity to showcase their work to an international audience, gaining valuable exposure and recognition in the global research community.

The symposium, through its double-blind peer-review process, serves as a platform to validate the work of young researchers. Over 300 submissions have been accepted after a careful evaluation—an impressive achievement for any scientific gathering. During the symposium, these young researchers will share their knowledge and experience with a wider audience, building bridges between national and international researchers. Collaborative partnerships formed during the symposium will help our researchers disseminate their work to a global audience.

Research drives progress—it transforms challenges into solutions and shapes the future of industries and communities. Through CIRS, we reaffirm our commitment to nurturing the next generation of researchers while advancing knowledge that makes a real-world impact.

Join us in this celebration of academic excellence and innovation. Your participation will enrich our collective understanding and contribute to the advancement of research that matters.

Finally, I would like to congratulate those who are making presentations, the members of the conference committee, and various subcommittees on their dedicated work that makes this symposium a resounding success. I extend my best wishes to all who present their work at this important event.

Dr. Ajith Madurapperuma

Consultant - Academic Affairs and Research



Message from the Symposium Chair

Mrs. Suranji Nadeeshani

Associate Dean of the Faculty of Computing

It is a great pleasure and honor to be the Chair of the 5th CINEC International Research Symposium (CIRS-2024) scheduled to be held on 6th December 2024 under the main theme of "Sustainable Future: Harnessing Humanity Through Creativity and Innovation."

Research is the key factor in academic growth and the future development of society. Engaging in research will not only enhance the knowledge, but will contribute to knowledge sharing and to improving the understanding of the problems of the real world that we live in. Research will enable and enhance critical thinking, creativity and collaboration which are essential to address the challenges of today and future.

I extend my deepest gratitude to president/CEO of CINEC Campus Capt. Ajith Peiris for the trust he puts on the staff of newly established Faculty of Computing to be the hosting faculty of the annual research event of the campus. I take this opportunity to thank Members of Senior Management Committee, All Deans and Associate Deans, Heads of Departments, Faculty and Department representatives, all academic staff members and non-academic staff members for their invaluable contribution to making this symposium a success.

To our keynote speaker, guest of honor and plenary session speakers thank you very much for sharing your insights and findings that drive the research forward.

Congratulations to all students who are presenting today on their great achievement. You are the future leaders of this world. We encourage you to take the maximum advantage of the network and collaboration that you have experienced today and continue the same.

I would like to extend my deepest gratitude to the organizing committee, our sponsors, and all the volunteers who have worked tirelessly to make this event possible. I wish you all a very successful and memorable experience at CIRS-2024.

Mrs. Suranji Nadeeshani,

Associate Dean,

Faculty of Computing.



Message from the Dean - Faculty of Engineering & Technology

Dr. Janaka Liyanagama

It is with great pride and anticipation that I send this message to the Annual International Research Symposium 2024. This year's symposium, centered on the theme "Sustainable Future: Harnessing Humanity through Creativity and Innovation," highlights our shared responsibility and commitment to addressing some of the most pressing challenges of our time. Through the Faculty sub-theme "AI & Engineering: Transforming Industries, Enhancing Efficiency, & Building a Sustainable Future" we look to engineering and technology to shape a future that is sustainable, inclusive, and resilient.

The Faculty of Engineering & Technology is proud to witness the diversity and depth of research presented at this symposium. Each paper, project, and presentation reflects the dedication and hard work of our students, faculty, and researchers, who are driven by a vision to contribute positively to society. Their research spans a wide range of disciplines, from renewable energy and green technology to digital innovation and sustainable urban development—all essential elements in creating a sustainable future.

This symposium also serves as a valuable platform for the exchange of ideas and the formation of new collaborations, not only within our institution but with industry, academia, and partners worldwide. Together, we can turn innovative ideas into actionable solutions that empower communities and promote sustainable development.

I extend my deepest appreciation to the symposium organizers headed by the young Faculty of Computing, and participants who have come together to make this event a success. It is my hope that this gathering will inspire new ideas, foster meaningful partnerships, and ultimately lead to solutions that benefit humanity and our planet.

Dr. Janaka Liyanagama,

Dean,

Faculty of Engineering & Technology.



Message from the Dean - Faculty of Humanities and Education

Dr. (Mrs.) Sujeewa Polgampala

Dear Distinguished Guests, Esteemed Colleagues and Dear Students,

It is my great pleasure to embrace you at CRIS 2024 Research Symposium, where we flock together as a community of thinkers, researchers, and innovators to explore the theme *"Sustainable Future: Harnessing Humanity through Creativity and Innovation."* At the heart of this symposium is the belief that human creativity guided by innovation to shape a more sustainable, equitable, and prosperous future for all. The core belief that drives this symposium is that human creativity, when coupled with innovation, can shape a more sustainable, equitable, and prosperous future for all.

As academics, we are charged with the responsibility not only to expand the boundaries of knowledge but also to apply that knowledge towards solving pressing challenges of our time. Whether it is addressing environmental sustainability, advancing social equity, or fostering technological innovation, our role as scholars is to bridge the gap between theory and practice in ways that have a lasting impact on society. This symposium postulates a platform for interdisciplinary collaboration and the exchange of ideas that will spark new research and inspire innovative solutions. I encourage each of you to approach these sessions with an open mind, a spirit of inquiry, and a willingness to explore diverse perspectives.

I look forward to the vibrant discussions, groundbreaking presentations, and innovative solutions that will emerge over the course of this symposium. While harnessing humanity through creativity and innovation not only deepen our understanding of the issues, we face but also inspire bold and transformative action for a sustainable and innovative future.

Let us harness our collective talents, embrace diverse perspectives, and work together to create lasting change through inspiring discussions, groundbreaking presentations, and innovative solutions that will arise during this symposium.

Thank you for your participation, and I wish you all a productive and stimulating symposium.

Dr. (Mrs.) Sujeewa Polgampala,

Dean,

Faculty of Humanities & Education.



Message from the Dean - Faculty of Science

Prof. Samantha Weerasinghe

It is my pleasure to welcome you to the CINEC International Research Symposium 2024 (CIRS 2024), which centers on the theme "Sustainable Future: Harnessing Humanity through Creativity and Innovation." This symposium brings together a diverse community of researchers, academics, and industry professionals to share knowledge and exchange ideas that address some of the most pressing challenges of our time.

As the Faculty of Science, we are proud to align with the sub-theme "Innovative Scientific Solutions for a Sustainable Future." This reflects our mission to develop forward-thinking, science-driven approaches to achieve environmental sustainability and social progress. The research showcased in this abstract book demonstrates the incredible creativity and dedication of our contributors and their commitment to meaningful impact.

I wish to thank all participants for their valuable contributions and the organizing committee for their hard work in bringing this symposium to life. I hope this event inspires new collaborations and sparks innovative solutions as we work together toward a more sustainable and inclusive future.

Wishing you a successful and engaging symposium.

Prof. Samantha Weerasinghe,

Dean,

Faculty of Science.



Message from the Dean – Faculty of Maritime Sciences

Capt. Prasanna Sedrick

It is with immense pride and enthusiasm that I extend my heartfelt congratulations to all participants and specially the Navigation Officer Cadet students of the BSc in Maritime Operations degree program for their remarkable contribution to the CINEC International Research Symposium (CIRS) 2024. The submission of 33 abstracts by our cadets exemplifies not only their dedication to academic excellence but also their commitment to advancing knowledge in the maritime domain.

As we stand at a critical juncture in the global landscape, the need for sustainable solutions has never been more urgent. Climate change, resource depletion, and social inequalities are among the challenges that require collective action and innovative thinking. At CINEC, we believe that creativity and innovation are essential tools in shaping a future where humanity thrives in harmony with the environment

This year's symposium theme, *"Sustainable Future: Harnessing Humanity through Creativity and Innovation,"* aligns perfectly with the ethos of maritime operations, a field that demands sustainable practices and innovative solutions to meet global challenges. The participation of our Marine Students and Officer Cadets in this prestigious forum underscores the Faculty of Navigation's commitment to nurturing critical thinking, creativity, and research excellence among its students.

As future leaders of the maritime industry, your contributions to CIRS 2024 will undoubtedly inspire new perspectives and innovative ideas that advance both academia and industry. I commend your hard work and encourage you to continue striving for excellence in research and practice, as your efforts today pave the way for a brighter, more sustainable tomorrow. Wishing you every success at the symposium and beyond!

Capt. Prasanna Sedrick,

Dean,

Faculty of Maritime Sciences.



Message from the Dean – Faculty of Marine Engineering

Chief Eng. Arjuna Ranasinghe

It is with great pleasure that we welcome you to the 5th International Research Symposium, where we gather to explore the theme *"Sustainable Future: Harnessing Humanity through Creativity and Innovation."* This year's theme resonates deeply with the challenges and opportunities of our time, as the world seeks sustainable solutions to pressing global issues. At CINEC, we are committed to fostering an environment that nurtures research and innovation while prioritizing sustainable development. This symposium is a testament to our dedication to advancing knowledge that can positively impact communities worldwide. Through the exchange of ideas and interdisciplinary collaboration, we hope to inspire new pathways toward a more inclusive and resilient future.

Also, it is a distinct honor to welcome students and lecturers of maritime faculties to the 5th International Research Symposium, where we delve into the critical theme, *"Sustainable Future of Shipping through Creativity and Accident Prevention."* The maritime industry is the lifeblood of global trade, connecting nations and enabling economic prosperity. Yet, as we chart our course into the future, we face unprecedented challenges—climate change, environmental degradation, and the imperative for safer and more efficient operations. Addressing these demands requires not only advanced technologies but also innovative thinking and a steadfast commitment to accident prevention.

Sustainability in shipping transcends reducing emissions and conserving resources; it also means fostering a safety culture that minimizes risks to life, property, and the environment. Creativity plays a pivotal role in developing novel solutions—from alternative fuels and energy-efficient designs to smarter navigation systems and predictive maintenance techniques. Integrating such innovations ensures that maritime operations remain resilient, sustainable, and secure. However, Research methodology is not that much popular among the Maritime education and training, but we have the privilege and responsibility to shape this transformative journey. This symposium serves as a platform to exchange ideas, showcase groundbreaking research, and inspire collective action toward a safer, greener future for the shipping industry.

I extend my heartfelt gratitude to the participants, presenters, and organizers for their contributions to this timely and impactful dialogue. Together, let us steer the maritime industry toward a horizon of sustainable growth, technological ingenuity, and unwavering safety standards. Wishing you a successful and enlightening symposium.

Chief Eng. Arjuna Ranasinghe,

Dean,

Faculty of Marine Engineering.



Message from Dean – Faculty of Health Science

Senior Prof. (Mrs.) Menik Hettihewa

Dear Esteemed Colleagues, Researchers, Students, and Guests,

It is with great pride and enthusiasm that I welcome you to our annual Research Symposium. This event celebrates the collective dedication, intellectual curiosity, and innovative spirit that define our institution. Today, we come together to explore and honor the extraordinary work being done across disciplines, from the most fundamental research to cutting-edge discoveries that promise to shape our future.

CINEC as a non-state University, has long been committed to fostering an environment where inquiry, collaboration, and creativity thrive. The research showcased today reflects not only the individual efforts of our scholars but also the vibrant community that supports and encourages intellectual exploration. The projects you will encounter in this symposium are a testament to the power of interdisciplinary collaboration and the remarkable potential of our academic community. As we share insights, discuss findings, and challenge existing paradigms, let us remember that research is not just about answering questions—it is about asking new ones, pushing boundaries, and imagining what is possible. Each of the presentations today contributes to our shared mission of expanding knowledge, improving lives, and advancing society.

I want to extend my deepest gratitude to all of the researchers, faculty, staff, and students whose hard work and vision have made this event possible. I also thank our sponsors and partners for their continued support of our research endeavors. Together, we are not only advancing academic excellence but also making a meaningful impact on the world.I encourage you to engage deeply with the work presented here, to network with fellow researchers, and to embrace the opportunity to exchange ideas and inspire one another. The future of research is bright, and together, we are shaping it.that will emerge from this symposium.

Warm regards,

Senior Prof. (Mrs.) Menik Hettihewa,

Dean and Senior Professor of Pharmacology,

Faculty of Health Sciences.



Message from the Dean – Faculty of Management and Social Sciences

Chair Prof. Lalith Edirisinghe

It is with great pleasure that I extend my heartfelt congratulations to the organizing committee and participants of the CIRS 2024 Annual Symposium.

This year's theme, *"Sustainable Future: Harnessing Humanity Through Creativity and Innovation,"* resonates deeply with the global call for transformative solutions that address pressing challenges while fostering a brighter tomorrow. In an era where creativity and innovation are indispensable tools for achieving sustainability, this symposium offers a timely platform for the exchange of ideas, research, and collaborative endeavors that can shape the future for the betterment of humanity.

I applaud your dedication to bringing together a diverse array of thinkers, innovators, and change-makers to explore solutions that align human ingenuity with sustainable practices. Such initiatives not only inspire meaningful dialogue but also ignite the spirit of innovation required to overcome the complexities of our time.

May this symposium serve as a beacon of progress and pave the way for groundbreaking advancements. Congratulations once again, and I wish you all a highly successful and impactful event.

Chair Professor Lalith Edirisinghe, PhD

Dean,

Faculty of Management and Social Sciences.

Head, Technology Transfer-World Bank

Expert Consultant- United Nations Secretariat

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KEYNOTE PLENARY SPEAKERS AND TECHNICAL SESSIONS



The Keynote Speaker

Chair Senior Professor of Chemistry K. M. Nalin de Silva

K. M. Nalin de Silva is the Chair Senior Professor of Chemistry at the University of Colombo, Sri Lanka. He obtained his B.Sc. (Chemistry, First Class) from the University of Colombo, Sri Lanka and Ph.D. from the University of Cambridge, UK. He has gained postdoctoral experience from the University of Cambridge and Louisiana State University, USA. He worked as the Science Team Leader in Sri Lanka Institute of Nanotechnology (SLINTEC) from 2012-2019. He has published over 100 Science Citation Index papers has four US patents and four SL patents. His present index is 38. He won the Presidential Research Award for ten consecutive years and a National Research Award presented by National Research Council (NRC) and National Science Foundation (NSF), Sri Lanka. He was also named 'Young Scientist of the Year' in 2004 by The World Academy of Science (TWAS). He received the Vice Chancellors Award for Research Excellence in 2017, 2020 and 2023. He was a member of the National Nanotechnology Committee and Chairman of the National Nanotechnology Research Panel at NSF. He also served as the Chairman of National Basic Sciences Research Committee and National Committee for Technology at the NSF. His main research focus areas are advanced material for healthcare, water purification, textiles and apparel, natural resources and Nanobiotechnology. He is the Chair of Chemistry and is the Head of the Department. He was ranked among the world's top 2% of Scientists in 2022. He is a Fellow of the Royal Society of Chemistry (FRSC), UK.



Guest of Honor

Senior Professor Ranjith Dissanayake

Prof. Ranjith Dissanayake is a Professor at Curtin Colombo and former a Senior Professor in Civil Engineering at the University of Peradeniya. He is a Fulbright Scholar in the USA, an Endeavour Fellow in Australia, and JASSO Research Fellow in Japan. He was awarded the Young Scientist Award in 2007 for Excellence in Scientific Research by the National Science and Technology Commission (NASTEC) of Sri Lanka. He received the Overseas Prize of the Institution of Civil Engineers (ICE) in the UK in 2007 and the Australia Alumni Excellence Award in 2012. He is the President of the Institution of Engineers, Sri Lanka (IESL), the immediate past Chairman of the Green Building Council of Sri Lanka (GBCSL), and a Vice President of the Chamber of Construction Industry (CCI). He is also the former Secretary to the State Ministry of Rural Roads and the State Ministry of Urban Development. He is the founder of gap HQ, the base of operation of several companies, including Lego International (Pvt.) Ltd, ICB (Pvt.) Ltd, Lanka AAC (Pvt) Ltd, GAP (Pvt) Ltd, and Wrangler Solutions (Pvt) Ltd. He is co-chairing the 15th International Conference on Sustainable Built Environment at Kandy and the 2nd International Conference on University-industry Collaborations for Sustainable Development at Colombo.



Special Guests from Keele University, UK

Professor Athula Sumathipala

Prof. Sumathipala is an internationally recognized, UNESCO validated, expert in bioethics. He is an Emeritus Professor of both The Kings College, London and Keele University, UK. At present, he is the Chairman of the National Institute of Fundamental Studies, Sri Lanka and Director of the Institute for Research and Development in Health and Social Care, Sri Lanka. Prof. Sumathipala has wide-ranging expertise and experience in leading scientific research in UK, Sri Lankan and broader South Asian contexts. In addition to research ethics, he is internationally recognized in the fields of mental health and twin research.

He was a member of the International Advisory Committee of the Centre for Biomedical Ethics at the National University, Singapore. In 2006, Prof. Sumathipala was invited to join the International Advisory Committee for the International Ethics Training program, run by the Indian Council for Medical Research and funded by the National Institute of Health, USA. He was a member of the WHO working group on "Ethical issues in Research and surveillance: Epidemics, Pandemics and Public Health Crisis" (2011-2013), member of the planning committee of the Global Forum of Bioethics in Research (GFBR) conference themed "Data ethics and bio-banking in health research", held in Cape Town, South Africa in 2018 and also served as one of the two advisors of the Wellcome Open collection of the series outlining the discussions and outcomes from each session presented at the meeting. He was an external reviewer for the Nuffield Council on Bioethics - Research in Global Health Emergencies report published in 2020 by the Nuffield Council UK.

He has been an invited speaker at major international ethics events: European Union Cooperation of Science and technology (EU/COST) workshop on Humanitarian Action and Ethics entitled "Children and disasters: children as a special vulnerable group who should not be forgotten", Paris, 2016; plenary speaker at the Disaster Bioethics Symposium held by the Brocher Foundation, Geneva, Switzerland, 2011; plenary speaker, "Disaster Research and Ethics" at the International Workshop on Research Ethics held by the Indian Council of Medical Research, Chennai, India, 2006; invited speaker, International Conference and

Workshop on Fundamentals of Research Ethics, Centre of Biomedical Ethics and Culture, Karachi, Pakistan, 2005; plenary speaker at the Indian Journal of Medical Ethics conference, Mumbai, India, 2005; invited speaker, "Perspectives of a researcher from a Low and Middle Income Country" at the Nuffield Council on Bioethics Workshop on Ethics Related to Healthcare in Developing Countries, Cape Town, South Africa, 2004.

He has also conducted research into ethical issues, has significantly contributed to peer review in ethics journals, and also to textbook chapters published by the Oxford University Press and the Cambridge University Press.

Prof. Sumathipala is a product of the Faculty of Medicine, University of Colombo. After passing out in 1980, he proceeded to obtain his MD in Family Medicine from the Post Graduate Institute of Medicine, University of Colombo. In 1996, Prof. Sumathipala qualified as a Member of the Royal College of Psychiatrists. He received his PhD from the University of London in 2004.



Special Guests from Keele University, UK

Dr. Alan Richardson

Alan Richardson is a reader in Pharmacology at Keele University, UK. Following a PhD and post-doctoral work in pharmacology at Cambridge, he completed his post-doctoral training at the University of Virginia, USA. Following several years leading drug discovery programs in industry (Johnson & Johnson, Belgium and OSI pharmaceuticals, Oxford) he returned to academic research at the Institute of Cancer Research in London. At Keele School of Pharmacy, he lead teaching of pharmacology and oncology. His research interests focus on discovering new therapeutic targets and drugs for the treatment of ovarian and breast cancer. Significant career achievements include identification of the biological function of focal adhesion kinase, identification of Akt3 as a target in cancer, demonstration that BH3 mimetics sensitize ovarian cancer cells to chemotherapy and lastly how statins could be used to treat cancer. He is currently researching the role of branched-chain amino acid metabolism in cancer.

Faculty of Computing

Empowering the future: Innovation and Creativity through IT

Technical Session 01



Plenary Speaker/ Session Chair
Dr. (Ms.). Navodi Mekhala Hakmanage
PhD. (University of Kelaniya)
B.Sc. (Special) in Statistics (Kelaniya, Sri Lanka)
Lecturer



Panel Member
Mr. Bhanuka Fernando
Managing Director
VisCount Techtronic Pvt. Ltd M.Sc. in IT, B Sc. (Hons) in Computing &IS, MCSE.



Panel Member
Mrs. Eshandi Aththanayaka
BSc (Hons) in Information Technology Specialized in Cyber Security
MSc in Cyber Security (Reading)
Lecturer in IT
Faculty of Computing
CINEC Campus

Technical Session 02



Plenary Speaker/ Session Chair
Ms. Chamini Aththanayaka
B.Sc. (Hons) in Computer Science
Lecturer in IT
Faculty of Computing
CINEC Campus



Panel Member
Mr. Darshana Hettiarachchi
MBA-IT(UoM), BSc (Hons)(UoW-UK), BA(UoK)
Information Technology Manager
Bogawantalawa Tea Estates/ BPL Teas Ltd

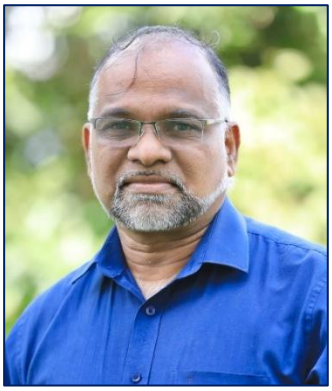


Panel Member
Ms. Rangi Wathsala Dahanayake
MSc. in Computer Science (Business Computing)
BSc. in Software Engineering
Lecturer in IT
Faculty of Computing
CINEC Campus

Faculty of Engineering & Technology

AI & Engineering: Transforming Industries, Enhancing Efficiency & Building a Sustainable Future

Department of Mechanical and Automotive Engineering



Plenary Speaker
Professor Primal Fernando
B.Sc.Eng(UOP), M.Eng, Ph.D.(KTH)
Professor in Mechanical Engineering,
Specialization in Thermodynamics and Refrigeration,
Department of Mechanical Engineering,
Faculty of Engineering, UOP

Technical Session 01



Session Chair
Dr. Geethal Siriwardana
B.Sc.Eng. (UOR), M.Eng. (UOM), PhD (USJ), AMIE (SL)
Lecturer (Department of Mechanical Engineering) - USJ



Panel Member
Mr. Yasun Sampath
B.Sc.Eng. (Hons) (KDU), M.Phil. (Reading) (USJ)
Lecturer - Department of Mechanical Engineering - USJ



Panel Member
Dr. Charita Darshana Makavita
B.Sc.Eng. (Hons) (Moratuwa), M.Sc. (Moratuwa), Ph.D. (UTAS)
Lecturer (Department of Mechanical Engineering) – USJ
Senior Lecturer (Department of Mechanical Engineering)



Panel Member
Mr. Asantha Gamunukumara Sumanarathna
BSc Eng, MScEng (Australia), CEng. MIESL.
Senior Lecturer Grade II in Mechanical Engineering (Department of Mechanical & Automotive Engineering – CINEC Campus

Department of Electrical & Electronics Engineering

Technical session 01



Plenary Speaker/ Session Chair
Dr. Akila Wijethunge
B.Sc. Eng Hons (UoP), PhD (Up), MIESL, MIEEE
Senior Lecturer,
Faculty of Technology,
University of Sri Jayawardenapura



Panel Member
Eng. Anupama Silva
B.Sc. Eng, M.Sc, MBA, CEng, PMP, CSM, MIESL, MIET
Chief Technology Officer,
Synergy Tech Consultancy (Pvt) Ltd.



Panel Member
Mr. Srimal Punchihewa
BSc Eng Hons, PG. Dip (UoM), M.Eng, CMIESL
Senior Lecturer,
Department of Electrical and Electronic Engineering,
Faculty of Engineering and Technology,
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Technical Session 02



Session Chair
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B.Sc. Eng Hons (UoM), M.Sc. (UoM), AMIESL, MIEEE
Lecturer,
Faculty of Technology,
University of Sri Jayawardenapura



Panel Member
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B.Sc. Eng Hons (UoM), M.Eng. (UoM), PhD (Reading) (UoM), MIESL
Former Head,
Civil Aviation Training at Airport and Aviation Services



Panel Member
Eng. Wipula Wimalshanthi
B.Sc. Eng Hons (UoP), M.Eng (UoM), CEng, MIESL
Senior Lecturer,
Department of Electrical and Electronic Engineering,
Faculty of Engineering and Technology,
CINEC Campus

Department of Civil Engineering

Technical Session 01



Plenary Speaker/ Session Chair
Prof. U. G. A. Puswewala
BSc Eng (Moratuwa), MEng. (AIT, Thailand), PhD (Manitoba, Canada), CEng, FIE(SL)
Department of Civil Engineering,
Faculty of Engineering,
Sri Lanka Institute of Information Technology.



Panel Member
Dr. T. G. P. L. Weerasinghe
PhD (Melbourne), M.Sc. (Moratuwa), B.Sc. Eng. Hons. (Moratuwa), AMIE(SL)
Lecturer, Department of Civil Engineering,
Faculty of Engineering, Universiry of Moratuwa.



Panel Member
Ms. T.A. Nimali Sugandika
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CINEC Campus.

Technical Session 02



Session Chair
Dr. D. P. L. Ranasinghe
B. Sc. Eng (Hon) (Civil & Environ) (SL), M. Sc. (Coastal Eng) (SL), PhD (Coastal Eng) (Japan), CEng, MIE (SL)
Specialist in Coastal/ Water Resources Engineering,
Lanka Hydraulic Institute,
John Rodrigo Mawatha,
Katubedda,
Moratuwa.



Panel Member
Dr. T. G. P. L. Weerasinghe
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Panel Member
Dr. K. H. S. M. Sampath
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Lecturer, Department of Civil Engineering, Faculty of Engineering, University of Moratuwa.

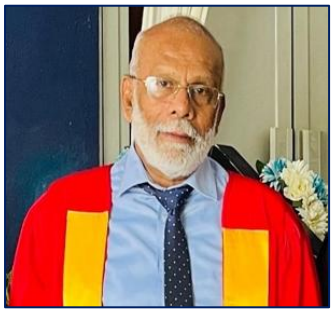
Faculty of Health Sciences

Advances in healthcare in Sri Lankan economic revitalization



Plenary Speaker
Mr Appasaheb Kabadagi
Chief Operating Officer, Synergy Pharmaceutical Co-operation (Pvt) Ltd

Technical Session 01



Session Chair
Prof. Mahinda Wikramaratne
Senior Lecturer/ Consultant,
Ph. D., B.Sc. Special in Chemistry.



Panel member
Dr. Piyumi Wasana
Senior Lecturer,
PhD, BSc (Hons), M IChemC



Panel member
Dr. Ureshani Karunarathna
Senior Lecturer (Grade II),
Ph.D. (USJ), M.Phil. (USJ), BSc Hons in Zoology (USJ).

Technical Session 02



Session Chair
Ms. Pubudini Weerasooriya
Lecturer in Molecular Life Sciences
PhD (Reading, USJ), MSc in Molecular Life Sciences (UOC), BSc in Biochemistry, Biotechnology and Microbiology (UOM, India)



Panel member
Ms. Rajika Jinadasa
Lecturer in Biomedical Sciences
B.Sc. (Hons) in Medical Laboratory Science (UoR)
M.Phil in Biochemistry (Reading)

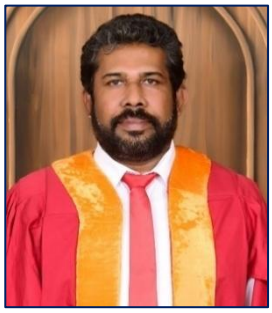


Panel member
Ms. Hiroshani Kulathunga
Visiting Lecturer
B.Sc. (Hons) in Medical Laboratory Science (UoR) PhD (Reading, USJ)

Faculty of Humanities and Education

Sustainable Future in the Study of Humanities & Education

Technical Session 01



Plenary Speaker/ Session Chair
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Ph.D. in Linguistics (UOK)
M.Phil. in Linguistics (UOK)
M.A. in Linguistics (UOK)
M.A. in Drama and Theatre (UOK)
B.A. English (UOJ)
Senior Lecturer
Buddhist and Pali University of Sri Lanka



Panel member
Ms. Piyumi Gamage
MA in TLSC
BA in English – OUSL
Lecturer
CINEC Campus



Panel member
Ms. Kalani Dissanayake
MA in Linguistics (UOK)
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CINEC Campus

Technical Session 02



Plenary Speaker/ Session Chair
Dr. Sameera Jayawardena
PHD, MA in Linguistics, PGD in TESL, BA in English
Career Advisor and Lecturer
University of Sri Jayewardenepura



Panel member
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MA in Linguistics (UOK)
BA in English and French (UOJ)
Diploma in International Relations (BCIS)
Lecturer
CINEC Campus



Panel member
Ms. Kaumadee Perera
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Faculty of Humanities and Education

Sustainable Future in the Study of Humanities & Education

Technical session 03



Plenary Speaker/ Session chair
Dr. Vivimarie Vanderpoorten
PhD Ulster University Northern Ireland UK
Senior Lecturer
Open University of Sri Lanka



Panel Member
Mr. Lasantha Priyankara Basnayake
MA (Linguistics), BA (English)
Associate Dean/ Senior Lecturer
Faculty of Humanities and Education
CINEC Campus



Panel Member
Mr. Deepal Warnakulasooriya
MA, (Master of Arts) in Mass Communication (UOK)
LLB (Bachelor of Laws) Open University
Visiting Lecturer
CINEC Campus

Technical session 04



Plenary Speaker/ Session Chair
Dr. J. K. S. Pathirana
Doctor in Professional Study in Leadership, MA in Teacher Education, Bachelor of Education
Retired Senior Lecturer
National Institute of Education
Maharagama



Panel Member
Ms. Veronica Kurukulaarachchi
Masters in Labour Relations & Human Resource Management
PGDE, PGD in Personal Management, PGC in Professional Management
B.Sc. (Sp.) in Business Administration
Deputy Head of the Department/ Senior Lecturer
CINEC Campus



Panel Member
Visharad Sudath Samarasinghe
M.Sc. (Curriculum and Instructions)
Post Graduate Diploma in Education
Bachelor of Fine Arts Degree in Music
Former Deputy Director General
National Institute of Education
Maharagama

Faculty of Humanities and Education

Sustainable Future in the Study of Humanities & Education

Technical session 05



Plenary Speaker/ Session chair
Dr. Sujeewa Polgampala
PhD in Education, MSc. In Science Education, Master in Public Administration in Education Management, Post Graduate Diploma in Education, Management, B.Sc. TESL, English Trained
Dean
Faculty of Humanities and Education
CINEC Campus



Panel Member
Ms. Gayani Weragama
M.Ed, Post Graduate Diploma in Education, B.Sc. (Honours)
Lecturer
CINEC Campus



Panel Member
Mr. Sasanka Amarasiri
Master of Science Enterprise Application Development (Merit), Master of Business Administration (Finance), Postgraduate Diploma in Professional Marketing, Bachelor of Science (Honours) in Software Engineering, Visiting Lecturer, Department of Education, Faculty of Humanities & Education

Faculty of Science

Innovative Scientific Solutions for a Sustainable Future

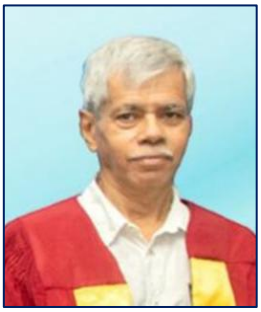
Technical Session 01



Plenary Speaker/ Session Chair
Dr. Nimshi Fernando
BSc chem sp(USJP) PhD in Materials Science (UOC)
Senior Lecturer/Head of the Department,
Department of Chemistry,
Faculty of Science.
CINEC Campus



Panel member
Dr. R. D. Guneratne
BSc chem sp(UOC) PhD (Cornell University)
Expert Panel Member
Department of Chemistry,
Faculty of Science.
CINEC Campus



Panel member
Prof. M.C.M. Iqbal.
Scientist Retd.
National Institute of Fundamental Studies,
Hantana, Kandy.
Sri Lanka

Faculty of Marine Engineering & Maritime Sciences

Sustainable Future shipping through creativity and accident prevention

Technical Session 01



Plenary Speaker/ Session Chair
Capt. Peshala Medagama
CoC Class I Master Mariner (Unlimited) (UK)
Vice President International Cooperation, Foreign Projects and Local Branches / Senior Lecturer
CINEC Campus



Panel member
Capt. Harindra Perera
FNI, FCILT, ACIArb. (UK),
CoC UK Class 1 Master Mariner Unlimited, Pilot Training Instructor
Panel Member
Head of the Division
Senior Lecturer
Department of Marine Simulation
CINEC Campus



Panel member
Chief Eng. Arjuna Ranasinghe
CoC Class I Marine Engineer,
BSc Marine Engineering,
Advanced Diploma in Marine Engineering
Dean / Senior Lecturer
Faculty of Marine Engineering
CINEC Campus

Faculty of Management & Social Sciences

Leveraging Creativity & Innovation for Sustainable Future: the role of Management & Social Sciences

Technical Session 01



Plenary Speaker/ Session Chair
Ms. Anushka Gunawardana
MBA (UK), BBMgt (Mkt) Sp (UOK), PG Dip in Business Management (UK), CIMA Passed Finalist
Senior Lecturer / Assistant HOD



Panel member
Ms. Ashvini Kumari Panamaldeniya
MSc in Financial Mathematics (UOC), BBA (Hons) in Accounting and Finance (UOP), ICASL (Reading), AAT Passed Finalist
Lecturer in Management



Panel member
Ms. Hiruni Poornima Maheepala
BSc in International Transportation Management and Logistics (DMU - China)
Lecturer in Logistics & Transport



Panel member
Ms. Sajani Nisansa
BSc (Hons) in Logistics and Transportation (CINEC)
Lecturer in Logistics & Transport

Technical Session 02



Plenary Speaker/ Session Chair
Ms. Dilhani De Silva
CEMBA (OUSL), BSc in Business Administration (Special) (USJP)
Lecturer/ MBA
Program Coordinator



Panel member
Mr. Sumithra Nandana Kumara
MTEHM (UOC - Reading), BSc Sp in Tourism Management (SUSL)
Lecturer in Management



Panel member
Ms. Irosha Gayani Ariyarathne
BA in English Language Teaching (GIRNE American University), MA in TESOL (University of Brittany – Reading)
Lecturer in English



Panel member
Ms. Imashi Uththara
DTEHM (UOC), BA (Hons) in Tourism and Cultural Resources Management.
Lecturer in Tourism and Hospitality Management

Technical Session 03



Plenary Speaker/ Session Chair
Ms. Poojani Rangana
MHRM (UOC), BSc in International Transportation Management and Logistics (DMU - China)
Lecturer in Logistics & Transport



Panel member
Ms. Thilini Thakshila Kumari Thalangalle
MSc in Management (USJP), BSc in Finance (Spc) (USJP), AAT passed Finalist.
Lecturer in Accounting & Finance



Panel member
Ms. Hansika Gunasekara
MSc in Financial Mathematics (UOC - Reading), B.Sc. Spc in Mathematics (UOP)
Lecturer in Mathematics



Panel member
Ms. Manishi Bhagya Gunathilake
BSc (Hons) in Logistics and Transportation (CINEC)
Lecturer in Logistics & Transport

Technical Session 04



Plenary Speaker/ Session Chair
Ms. Ayesha Wickramasinghe
MSc in Fundamental Mathematics (SDU - China), BSc Sp (Hon) in Mathematics with Statistics (WUSL)
Lecturer in Mathematics



Panel member
Ms. E. P. T. Udarinie
MPhil (UOC - Reading), BSc (Hons) in Maritime Transportation Management & Logistics (Ocean University), MILT (CILT - SL)
Lecturer in Logistics & Transport



Panel member
Ms. Hansi Abhayawickrama
MTEHM (UOC – Reading), BBMgt Honours in Hospitality, Tourism and Events Management (UWUSL)
Lecturer in Tourism and Hospitality Management



Panel member
Ms. Dashini Pavithra
MBA (UOC - Reading), BSc (Special) in Business Management (WUSL), Dip in Human Resource Management (CIPM)
Lecturer in Management

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Optimizing OFDM technology network performance using reinforcement learning for 5G and Beyond

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Abstract

Enhancing the performance, efficiency, and reliability of 5G networks is crucial for optimizing modern communication systems. 5G networks utilize Orthogonal Frequency Division Multiplexing (OFDM) as a foundational technology for adjusting and managing various network parameters to ensure optimal operations and user experience. Integrated AI tools and models in network management are already used to improve performance through dynamic resource allocation, fault detection, predictive analytics, and anomaly detection for general network optimization. However, these applications do not address optimization approaches such as load balancing, real-time analytics, and real-time bandwidth management. Therefore, this research focuses on leveraging Reinforcement learning algorithms to tackle these advanced challenges in 5G OFDM network technology. The aim is to develop an agent using reinforcement learning algorithms to learn optimal bandwidth allocation policies based on real-time network conditions, resource allocation complexity and traffic patterns. The approach of real-time analytics is applied to enhance overall network efficiency and the reliability of AI-powered systems. This AI agent will be able to automatically adjust various network parameters and maintain bandwidth using loadbalancing optimization approaches. For real-time bandwidth management, the AI agent will utilize traffic prediction and dynamic resource allocation to maintain and improve stable bandwidth under varying network conditions. Moreover, this agent will efficiently address network congestion, which often causes slower speeds in densely populated areas, by managing bandwidth in real-time. Through these innovative approaches, the research seeks to contribute significantly to the field of network optimization, offering solutions for nextgeneration network systems and improving their network performance.

Keywords – OFDM, Reinforcement Learning, Load-balancing, Bandwidth management, AI agent

Accelerating Electric Mobility: A System for Rapid Battery Swapping and Enhanced Charging Efficiency in EV Infrastructure

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Abstract

The global shift towards Electric Vehicles (EVs) is gaining momentum. However, as the number of EV count increases, one significant challenge is the time required to charge EV batteries using conventional public chargers. This is a recurring case-based scenario in user emergencies, fleet operations or long-distance travel. This Literature based case study provides a commercially viable, innovative solution to address the above-mentioned issue where a dual component system consisting of an advanced EV and a corresponding charging station with a battery replacement feature. The proposed EV is engineered to facilitate a modular battery system that allows rapid battery swapping. To support this EV concept, authors propose a special charging station system which allows quick removal and replacement of batteries and improves user convenience by minimizing the time spent waiting for a charge. The station's green design introduces an automated system with energy-efficient operations which ensures a minimal environmental impact. Findings indicate that there are only about 10,000 EV at present and from 2024 to 2028, the annual electric vehicle increment rate will be 8.54% in Sri Lanka. Normally, 7kW chargers take 08 hours and 22kW chargers take 3 hours to recharge a 60kW vehicle battery. As a normal 60kW EV battery can only run about 80km, it may cause an insufficient charged percentage of battery for long-distance travel purposes and emergencies. Our system aims to improve cost- effectiveness by reducing idle time and operational downtime, potentially increasing EV adoption. Initial testing and validation testing indicate the system's capability to significantly decrease charging time, supporting both the practicality and economic feasibility of the approach. These details outline the need for a solution that addresses the practical limitations of current EV charging infrastructure. This conceptual solution represents a forward-thinking advancement in electric mobility, combining technological innovation with commercial practicality to meet the needs of modern transportation.

Keywords: EV, Battery Replacement, Charging stations, Portable EV Battery

Enhancing Maternal Care through Mobile Apps and Virtual Support

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Abstract

Pregnant mothers are always consulted by midwives even after delivery. This project aims to develop a mobile app to track the records of health metrics and vaccinations of mothers and newborns, allowing them to communicate with midwives. In rural areas, where accessing clinics is challenging, mothers can make records themselves. The application provides instructions and information about the development of the baby based on the month of pregnancy or the newborn's age, along with special instructions if needed, ensuring that each user receives relevant guidance. The app functions as a knowledge-sharing platform, enabling midwives to share articles and communicate effectively through a chat feature. Midwives can also schedule clinics for mothers through the app. Data collection was carried out through meetings with midwives to gather requirements and information. The project followed the Waterfall model for software development, allowing clear stages in the development process. Modern technologies such as VS Code, Git, and Expo were used to build cross-platform applications, with the frontend developed using React Native. Firebase was utilized for authentication, cloud storage, and Firestore database management with secure data handling. Unit testing and white-box testing were employed. The main purpose is to reduce maternal and infant mortality and improve the quality of healthcare services. The platform empowers mothers to monitor their health and maintain records. Users are able to quickly familiarize themselves with the features and functionalities. The project combines health tracking, education, scheduling, and communication into a single platform. A key focus of the solution is on providing a great user experience, ensuring that mothers can log in, access information, and receive support from midwives when needed. The app will also include real-time data analytics and personalized health alerts based on user inputs in future versions to enhance its effectiveness. The platform's social impact is significant, as it addresses critical gaps in traditional maternal care, promoting healthier pregnancies and better-informed mothers, ultimately reducing health risks.

Keywords: maternal health, mobile applications, virtual support, health tracking, midwifery communication

Cashless payment method system by using smart card for expressway transport service in Sri Lanka.

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Abstract

The expressway transport system has become the most convenient and most used transport service in Sri Lanka for both short and long distances. But for this system, there is no flexible payment method in Sri Lanka yet. The aim of the system is to facilitate the smooth ticket buying experience and efficient service by using smart payment card, if they don't have enough money or changes. Not only that users can ensure their security by using the system than using manual system. The passengers can select their short or long-distance section wise and pay easily. This improves passenger security by eliminating cash transactions, and has been tested on specific routes and evaluated by passengers and transport service providers. The data were collected as a google form, interviewing bus drivers and passengers. The case was conducted by obtaining the target participants who used the expressway transport as their transport service. The data were represented all provinces of Sri Lanka. 90% of participant has technical knowledge, among them 85% of participant prefer to engage with this system. Most of them are young and middle-aged. 75% of participant prefer to pay their amount as section according to the particular distances of their journey. 95% of passengers had faced huge health problems during COVID-19 period also because of using the currency notes and coins during their traffic on expressway. This is one of the reasons for the passengers prefer the system. A smart card system for expressway transport services is being developed, offering cashless payments. The system features a user-friendly interface for easy payment selection, and a comprehensive report on participant preferences and security features. According to the analysis our system can help to easily navigate expressway transport service in Sri Lanka. The analysis suggests that implementing a cashless payment system using smart cards in Sri Lanka's expressway transport services can improve convenience, security, and efficiency, reducing manual ticketing errors and adapting to future technological advancements.

Keywords: Expressway, Smart card, Passengers

Rail Safe: A Dual-Safety Automated Train Braking System for Enhanced Railway Security in Sri Lanka

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Abstract

The rising incidence of suicides and accidents involving trains presents a critical safety challenge globally, including in Sri Lanka. These incidents not only lead to tragic loss of lives but also cause significant disruptions to railway operations. A notable gap in existing railway safety measures is the absence of an effective early warning system for train drivers to detect individuals or obstacles on the tracks. This study proposes a novel, sensor-based system to prevent such accidents by providing an automated response mechanism. The system integrates LIDAR, ultrasonic, and infrared sensors, positioned at the front of trains, to detect any person or object on the tracks. Upon detection, the system triggers an alarm when the train is 100 meters from the obstacle, alerting the driver. If the driver fails to respond and the train approaches within 50 meters of the obstacle, the system automatically activates the brakes to halt the train. This dual-layer safety mechanism is essential, ensuring that even in cases of driver inaction, the system can avert potential collisions. Pilot tests and simulations will validate the system's effectiveness under varying track and weather conditions, assessing adaptability and reliability. The study aims to improve safety and reduce human error in Sri Lanka's railway network, potentially setting a standard for other countries facing similar railway safety challenges. While promising, the system faces limitations like initial costs and sensor maintenance. Future work will address these issues and explore integration with centralized railway control for added safety. The system's development employs C++ for hardware interfacing, Java and Golang for control systems and network communication, and Python for data analysis and control logic. Ultimately, this technology represents a proactive solution to significantly reduce train-related fatalities by minimizing human error and preventing accidents.

Keywords: Dual-safety mechanism, Sensor Technology, Automated Braking, Train Safety System, Accident Prevention

IoT-Based Tire Monitoring System for Real-Time Vehicle Safety

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Abstract

We propose a solution to check the condition of the tire. This is one of the problems that drivers face in the real world. Drivers face a lot of inconveniences because they are not aware of the real-time condition of the tires. Therefore, can be increase the possibly of an accident. Also, the appearance of the canvas of the tire can cause loss of control of the vehicle when braking. The proposed scope of the project is to design, develop and deploy a solution for check condition of the tire before damage occurs to the passengers and the vehicle. In here, we can check the condition of the tire such as whether the canvas has appeared, the air pressure of the tire, whether the tire is in good condition and whether there is a nails or something in the tire can be detected. For that, we make a circuit with using two sensors, Such as Near-Infrared (NIR) spectroscopy sensors and TPMS (Tire pressure monitoring sensor). In here Near-Infrared (NIR) spectroscopy sensors are used to find out if the tire canvas has been exposed. Not only that, If fabric (canvas) is detected in addition to the rubber, also about it. If iron spikes, iron wires, etc. are detected, it will be displayed on the dashboard as a tire punch. Furthermore, by using a Tire pressure monitoring sensor (TPMS) near the air valve to know the air pressure condition of the tire, the air pressure in the tire is measured, and if it is not at the required pressure. Then, it is indicated on the dashboard. If a vehicle does not have a display, a flashing red warning light indicates tire damage or poor tire condition. A software interface with the display of the radio contained in the dashboard of the vehicle shows the details of the tire using with IOT. In this way, drivers can drive safely.

Keywords: Tire Monitoring System, IoT-based Tire Safety, Real-time Tire Feedback, Tire Canvas Exposure Detection, Tire Pressure Monitoring, NIR Spectroscopy Sensors, Puncture Detection, Vehicle Dashboard Display, Tire Damage Warning, Air Pressure Sensor

Advanced Eye-Tracking and Depth Perception Algorithms for Glasses Free 3D Viewing

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Abstract

This research tackles the development of a glasses-free 3D viewing experience using eye-tracking technology and AI algorithms. Traditional 3D technologies require stereoscopic glasses, which are uncomfortable and hinder widespread adoption. The primary objective is to enhance user comfort by avoiding the need to wear glasses and to offer depth perception adapted to personal characteristics, aligned with real-time gaze tracking. The integration of eye-trackers with machine learning algorithms allows for changing dynamically in 3D, aligning with the line of sight of a viewer. A prototype system was developed and tested for validation; its effectiveness was targeted mainly at high-speed data processing to deal with 3D adjustments without latencies. Key challenges are the real-time processing that needs to be done so that any delay does not lead to the failure of depth perception and has a negative impact on the quality of vision. This is addressed using CNNs, along with techniques from computer vision to process eye-tracking data in rapid fashion that enables smooth 3D rendering responsive to viewer gaze. Additionally, the system is designed to track multiple viewers simultaneously, ensuring consistent visual quality for all users. The methodology involves designing and testing a prototype capable of delivering highquality 3D displays without the use of glasses. Results from initial tests show improved user comfort and a more natural depth perception, thanks to the system's responsiveness to eye movements. Discussion focuses on optimizing the algorithms for faster processing and ensuring high rendering quality improved user comfort and a more natural depth perception, thanks to the system's responsiveness to eye movements. In conclusion, this research presents a novel approach to 3D viewing. The findings suggest that this system can overcome key challenges in 3D technology, offering a significant step toward more accessible and comfortable 3D content. This work therefore represents a new, easy way of viewing in 3D, glasses-free, with solutions that address the major challenges facing 3D media technology.

Keywords: - Glasses-Free 3D, Eye-Tracking Algorithms, Depth Perception Technology

KidneySpot: Kidney Tumor Detection System

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Abstract

KidneySpot is an advanced web application designed to enhance the detection of kidney tumors, a critical aspect of improving treatment efficacy and patient care through early diagnosis. Traditional detection methods rely heavily on manual evaluation by medical professionals, which can be time-consuming and prone to human error. Addressing these challenges, KidneySpot utilizes sophisticated deep learning algorithms and convolutional neural networks (CNNs) to automate the detection process. This system analyzes diverse CT scan data to determine the presence and type of kidney tumors with high accuracy. The development of KidneySpot involved a comprehensive literature review and qualitative research, including interviews and questionnaires, to understand the limitations of existing diagnostic methods and the needs of healthcare providers. The automated system processes medical images swiftly, providing results in seconds and significantly reducing diagnostic time. Preliminary results demonstrate that KidneySpot offers notable improvements over traditional methods, including enhanced efficiency and accuracy in tumor detection. Future plans for the project include integrating KidneySpot with existing hospital management systems to streamline clinical workflows and enhance data accessibility for healthcare providers. The introduction of direct communication features will facilitate real-time dialogue between the system and medical professionals, fostering better collaborative decision-making. These developments aim to further improve the quality of care by enabling more timely and informed treatment decisions. The use of Figma for UI/UX design and Visual Studio Code for development reflects the commitment to delivering a user-centric and highquality experience in the KidneySpot application.

Keywords: Convolutional Neural Networks (CNN), Computed Tomography (CT), User Interface and UX User Experience (UI/UX design), Visual Studio (VS) Code

Empowering Farmers Through a Digital Platform for Fair and Timely Harvest Sales at Government-Regulated Prices

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Abstract

The challenges farmers face in securing fair prices for their harvests, often due to dishonest buyers, highlight a pressing need for transparent, government-regulated trading platforms. This app seeks to address this issue by providing a space where farmers can sell their crops directly to authorities and buyers at government-set prices, ensuring fair and timely payments. The primary objective is to protect farmers' incomes and prevent price manipulation, while offering real-time information on crop availability for buyers. Extensive market research was conducted, and consultations were conducted with agricultural authorities and farmers to understand their specific needs. The app uses real-time data synchronization to continually update the price per kilogram based on government directives, while allowing farmers to easily input the quantity and category of their products. After submission, authorities and buyers receive notifications, enabling them to confirm purchases with real-time updates on transaction progress. This approach ensures transparency, minimizes repeated bookings, and allows buyers to effectively plan their purchases. Technical challenges included optimizing the app for seamless functionality in remote areas with limited internet connectivity and designing a user-friendly interface for farmers with varying levels of digital literacy. The app's implementation has shown positive results, with farmers experiencing reduced challenges in selling their harvests and achieving greater profits due to fair pricing mechanisms. Buyers also reported improvements in their purchasing processes due to consistent crop availability information. By facilitating open and fair agricultural trading, this app promotes sustainable farming practices, enhances income protection for farmers, and strengthens the overall agricultural ecosystem.

Keywords - Fair pricing, Agricultural transparency, Real-time data synchronization, Farmer income protection, Government-regulated trading

Pregnancy stroke risk prediction and guidance mobile application

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Abstract

It aims to provide pregnant women and health care professionals with improved health and health care while acting as a tool to detect and reduce stroke risk during pregnancy. The stroke risk prediction and guidance mobile app is designed to provide guidance and advice based on machine learning algorithms and associated evidence. By combining these, the app works with people with their health data input to identify risks that vary from person to person and advise them on how to avoid them. Prototype methodology is used for this. It builds a rough design of the application and improves it over time. The principal results of the study include the successful development of a user-friendly interface for data input, accurate risk prediction algorithms, and the provision of tailored guidance for stroke prevention during pregnancy. Major conclusions from the project indicate the potential of mobile technology to enhance maternal health outcomes by empowering users with personalized risk assessment tools and actionable preventive strategies. Random forest is used to train the model in this mobile application. Here, the data needed to train this model was obtained by meeting pregnant women and conducting interviews and surveys. Also, this mobile application was created using things like Flutter, machine learning, and Firebase.

Keywords: Mobile Application, Prediction System, Machine Learning, Firebase

Automated Grading and Feedback Generating System for Individual Sinhala Language Exam Questions

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Abstract

Manual grading of Sinhala language tests in Sri Lanka is a time-consuming process that involves inconsistency and bias, which may affect the students' performance and self-esteem. This project is to design an automated grading and feedback generation system for individual Sinhala language exam questions using advanced NLP approaches. The system will have a web-based interface where teachers will be able to upload exam questions and the system will use NLP algorithms to compare the students' answers to the reference answers. The approach entails developing and applying methods for text analysis, comparison, and feedback computation, which guarantees fair grading. A relational database will be used to store teacher information and uploaded exam papers and the database will have strong authentication measures to ensure that only authorized persons access the information. The pilot study findings suggest that the system can save a lot of time in grading and offer constructive feedback that can improve the learning experience of the students. The conclusion emphasizes on the possibility of this automated system to enhance the grading process, lessen the burden of the teachers and enhance the quality of education in Sinhala language. The future work will be directed towards the extension of the system to support more types of questions, multiple questions grading at the same time and the incorporation of machine learning models to improve the grading and feedback quality.

Keywords: Automated Grading, Natural Language Processing, Sinhala Language, Educational Technology, Feedback Generation

MECHTOOL: A Mobile-based Application for Mechanical Hand Tool Identification, Recommendations, and Safety Guidance.

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Abstract

Identifying suitable mechanical hand tools or equipment can be challenging, especially for novice users. To address this issue, the "MECHTOOL" project introduces a user-friendly Android mobile application using artificial intelligence and image recognition to identify mechanical hand tools and equipment. The development of the "MECHTOOL" mobile application followed a prototype methodology, ensuring iterative testing and refinement based on user feedback. The CNN image classification model was chosen for the mobile application due to its superior accuracy of 98%, compared to the KNN and SVM models, which achieved accuracy rates of 64% and 68.46%, respectively. The deep learning convolutional neural network (CNN) image classification model identifies tools and equipment from smartphone gallery or camera inputs. The models were trained on a diverse dataset, allowing them to recognize mechanical hand tools and equipment with high precision. Developed using TensorFlow, Python, Android Studio, Flutter, Firebase, and Google Maps integration, the mobile application delivers an easy-to-use UI, empowering users to work faster, smarter, and safer with mechanical hand tools. The prototype methodology not only accelerated the development process but also allowed for flexible adjustments in response to user feedback, making the MECHTOOL application adaptive to real-world demands. Using the classified image, the mobile application recommends suitable equipment and tools, provides safety guidance, and facilitates access to stores offering the tools and equipment. The comprehensive features and the easy-to-use design of the "MECHTOOL" project open a new era in tool recognition, recommendation, safety, and accessibility, to help the expert and novice mechanical hand tool users in the field.

Keywords: Convolutional Neural Network, Mobile Application, Image classification, KNN, SVM, Recommendation

Development of a Multi-Language Mobile Application for Enhancing Sri Lanka's Public Bus Service - Addressing Passenger Challenges and Improving Efficiency

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Abstract

The public bus service in Sri Lanka faces many challenges, including difficulties in accessing bus locations, timetables, travel times, and fares. Passengers must struggle to find convenient ways to reach their destinations and find their lost luggage or equipment. These problems contribute to inefficiencies, time wastage, and poor service quality. To address these issues, we contribute the development of a comprehensive mobile application available in Sinhala, Tamil, and English. This app will produce real-time bus tracking, schedule management, route optimization, fare calculation, and a platform for complaint handling and shows the nearest roads that can be used to avoid the traffic jams. By creating a mobile application that has a user-friendly interface with these features, the aim is to significantly reduce passenger inconvenience while using public transport in Sri Lanka. To update the bus transport details in this application, the support of the local bus transport authorities should be obtained. That collaboration allows users to travel to their destinations hassle-free. Basics tests indicate that this solution could reduce passenger inconvenience, enhance service reliability, and streamline the overall public bus system. The proposed app represents a crucial step towards modernization of Sri Lanka's public transport structures and improving passenger satisfaction. There are many such apps, but they don't work properly i.e. they contain inaccurate information, unfriendly user interfaces cause inconvenience to the passengers using the public bus service and thus the passengers stay away from the mobile apps. Avoiding the inconvenience caused by the above type of faulty mobile app This mobile app is created for. and Computer languages such as "Java" are used to create this mobile application. GPS technology is used for this application, and the basic stage is create through "Android Studio" Platform.

Key words - Public transport service, traveling routes, lost luggage, real time bus tracking

AI base Inventory management & automation system for workshop

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Abstract

This study introduces an AI-based industrial automation system developed to optimize inventory management and tool condition monitoring in workshop environments. The proposed system integrates facial recognition for secure access, computer vision for real-time tool identification, and an Arduino-controlled setup for tool condition assessment. The dual camera mechanism captures 360-degree images to analyze tool conditions, detect defects, and calculate wear using distance sensors. This approach ensures that only safe and functional tools are utilized, significantly reducing the risk of equipment failure and enhancing overall workshop safety. The system streamlines inventory management by automatically recording tool usage, tracking stock levels, and providing detailed data through a user-friendly interface. By minimizing human intervention and errors, the AI-driven solution improves operational efficiency and reliability in industrial settings. This project aims to demonstrate the practical application of advanced technologies in automating traditional workshop processes, thereby contributing to increased productivity and safety.

Keywords: AI-based Automation, Inventory Management, Tool Condition Monitoring, Computer Vision, Arduino, Facial Recognition.

Gender identification models comparison and validation

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Abstract

Gender recognition is considered one of the most global and significant trends in the study of computer vision at the present moment as it has almost limitless potential for its application in various sectors of human life, such as security, advertisement, and interpersonal communication systems. The purpose of this work is to investigate and compare the deep learning models for the gender classification given the facial images. In particular, for the investigation of impacts of various labeling on training of a gender categorization model, the dataset was used namely UTKFaces containing age, gender and ethnicity annotations. The research involves the development and evaluation of three different models based on established neural network architectures: Here are some of the models that are commonly used: VGG16, ResNet50, and MobileNetV2. For image classification, the following models were selected: VGG16 – the most uncomplicated and quite precise; ResNet50 – includes the residual connections to help out the vanishing gradient issue; MobileNetV2 – very efficient in using the limited resources. To reduce any biases between the models, all the models trained and validated in this study were trained and validated in the same manner. Adjustment of hyper parameters was kept to the bare minimal in order to improve the models a great deal. The evaluation metrics were accuracy because it determines the variety of instances that were labeled accurately, precision to determine on how many of the subset of positive-predicted instances were actually positive, recall or sensitivity to show the ratio of the true positive values obtained to the total number of actual positives in the data set and lastly the F1 measure that constitutes both the precision and the recall values. This paper brings out a clear flow of the training process, the results that has been achieved and the differences in performances of the models. Relevant things to consider are overfitting, model's complexity vis-à-vis utilized computational capacities, and applicability of the utilized model for gender classification in practical scenarios.

Key words: UTKFaces, ResNet50, VGG16

Machine Learning System for Prediction of Skipjack Tuna Fishing Grounds in the Indian Ocean

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Abstract

This research examines the application of big data analytics to optimize Skipjack tuna fishing in the Indian ocean, addressing inefficiency of Sri Lankan fishery production. As a result, high operational costs, low-quality fish landings post-harvest losses are major consequences in the Sri Lanka's fishery sector. Extensive datasets of oceanographic parameters such as sea surface temperature, sea surface chlorophyll, sea surface height and fish skipjack catch records for 3 -year period were analyzed. We identified significant correlations of oceanographic parameters and Skipjack tuna catch rates. Empirical cumulative distribution (ECDF) function and catch weighted ECDF were used to find favorable oceanographic parameters for Skipjack fish aggregations. Based on the optimal oceanographic parameters that the most catch rates were taken, a machine learning algorithm were developed using fuzzy logic functions. The algorithm classify the images of oceanograpic parameters and integrated these to locate the most Skipjack tuna abundant areas. The developed predictive algorithm generates fishing ground forecast that pinpoint high probability hot spots for Skipjack tuna fishing with high accuracy. The implementation of this data driven machine learning approach will significantly improve catch efficiency and improved quality fish landings. Favorable oceanographic condition were obtained using the degree of differences between the empirical cumulative distribution functions (ECDF) of CPUE and catch-weighted CPUE. The differences of ECDF's were statistically significant ($p < 0.05$). High frequency catch rates were observed in the regions where sea surface temperature varied primarily between 27.5−30.0 oC, sea surface height above geoid between 0.1−0.5 m and sea surface chlorophyll concentration between 0.10 − 0.39 mgl^{-1} . It was concluded that the oceanographic parameters; sea surface temperature, sea surface chlorophylla and sea surface height can be used to predict potential fishing grounds of Skipjack tuna. This research contributes to sustainable fishery management and highlights the critical role of big data analytic and machine learning technology, addressing real world challenges in the fisheries sector. Project outcomes also contribute to mitigate climate change by reducing CO2 emission.

Keywords: Skipjack tuna, Fishing grounds, Machine learning, big data

WildLenZ: Advancing Wildlife Photography Expedition Planner

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Abstract

WildLenZ is an innovative mobile application designed to transform wildlife photography expeditions across Sri Lanka by addressing the unique challenges faced by photographers. The app offers real-time updates on wildlife sightings, weather conditions, and interactive resources for species identification and photography techniques. This fosters a well-prepared, community-driven platform where users can share experiences, tips, and feedback. WildLenZ facilitates seamless planning and organization of photography tours, leveraging cutting-edge technologies like Flutter for cross-platform development, and Google Maps API for live species mapping, and machine learning algorithms for accurate species tracking. The application's backend is powered by MongoDB and Firebase, ensuring efficient data management, push notifications, and real-time database synchronization. By integrating these advanced tools, WildLenZ provides a comprehensive solution that enhances the wildlife photography experience while promoting conservation efforts in Sri Lanka's national parks and sanctuaries. The collaborative use of Figma for UI/UX design and Android Studio and Visual Studio Code for development further underscores the app's commitment to delivering a high-quality, user-centric experience. WildLenZ revolutionizes wildlife photography in Sri Lanka by providing real-time updates, interactive guides, and seamless planning tools. Utilizing advanced technologies for mapping, data management, and cross-platform development, it enhances the photography experience while supporting conservation efforts, making it an indispensable resource for enthusiasts and advocates alike.

Keywords: Wildlife photography, Wildlife Conservation, Sri Lankan National Parks & Sanctuaries, Travel Itinerary Planner

Secure and Auaqtomated Biometric Online based Voting System for Presidential Elections in Sri Lanka

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Abstract

In the evolving landscape of political processes, the need for secure, transparent, and efficient voting systems is paramount. This study proposes a Secure and Automated Biometric Online Voting System tailored for Presidential Elections in Sri Lanka. The system leverages advanced biometric technologies, including fingerprint and facial recognition, to facilitate voter registration and verification. By integrating these technologies, the system ensures that only authenticated voters can participate, thereby preventing unauthorized access. The registration process involves capturing and securely storing voters' biometric data, guaranteeing each individual's unique and secure identification. Local authorities, such as Grama Niladhari, are equipped with biometric-authenticated accounts to enhance system integrity. Additionally, the system incorporates a two-factor authentication mechanism, sending a One-Time Password (OTP) to users' mobile phones each time they log in, adding an extra layer of security. The voting process is designed for automation, simplifying citizen participation while minimizing potential errors. The system counts votes in real time, providing immediate and accurate results. Transparency is maintained through a user-friendly interface that allows administrators to monitor voting by district and overall results, ensuring accountability. This visibility bolsters public trust in the democratic process, reinforcing the integrity and credibility of the electoral system. The system's automation streamlines the voting process, enhancing accessibility for citizens and minimizing the potential for errors. Its real-time vote-counting capabilities ensure prompt and accurate results, thereby improving the overall efficiency and integrity of the electoral process.

Keywords: Automated Voting, Biometric Authentication, Fingerprint Recognition, Facial Recognition, Electoral Transparency

Implementation of IoT-Based Meter Reading System for Sustainable Utility Management

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Abstract

Conventional utility meter reading processes, particularly those employed by organizations such as the Ceylon Electricity Board (CEB), often face challenges including human errors, delayed billing, estimated bills and higher operating expenses. These issues significantly impact efficiency and customer satisfaction. The purpose of this research is to address these issues by developing an IoT-based Automated Meter Reading (AMR) system to modernize and automate the data collection and billing processes. The system leverages ESP32-CAM modules equipped with OV5640 camera sensors to capture real-time images of meter readings. These images are transmitted over Wi-Fi to a central server where a Node.js script is executed. This script extracts the meter readings from the images by performing Optical Character Recognition (OCR) on them using the Microsoft Azure Computer Vision API.This extracted data is then validated and inserted in to a database, and made accessible to customers through a user-friendly web application. This web application allows customers and utility managers to access the real-time consumption, billing details as well as the energy usage trend through custom built-in dashboards. The solution proposed above helps increase accuracy in meter reading while significantly eliminating manual mistakes and as well as shortening billing cycles. The contribution of the automated system to rational utilization of utilities is evident since it facilitates real-time monitoring of consumption rates for energy conservation. Further improvements will look at the viability of adopting predictive analysis in the system and possible extension to other utility services. This particular AMR system is a good example of Internet of Things in enhancing the functionality of the utility sector by transforming management, cutting on costs and improving customer relations.

Keywords: Automated Meter Reading (AMR), Internet of Things (IoT), ESP32-CAM, OCR, Microsoft Azure Computer Vision

AquaMate: A mobile-based application for Freshwater Aquarium fish breed identification, disease detection and Tankmate recommendation for aquarium fish keepers

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Abstract

Caring about ornamental aquarium fish has been a hobby for centuries globally, dating back to ancient Egypt and China. Despite the history, modern aquarium fishkeeping is popular among especially young teenagers which has led to challenges for novice fish hobbyists. Lack of knowledge about ornamental fish breeds, compatible tankmates and disease identification can result in loss of life of fish and poor aquarium health. This project "AquaMate", addresses these issues by developing a mobile-based application to assist novice fish keepers. "AquaMate" utilizes two Convolution Neural Network (CNN) models to identify fish breeds and recommend compatible tankmates to ensure harmonious coexistence and detect ornamental fish diseases to aid early detection and prevent infection among tankmates. This project has been developed according to the prototype methodology and revised and improvements according to the client response. Initially, this project was developed using Support Vector Machines (SVM) and the accuracy was around 60% and after attempting with CNN accuracy was increased to 84%. This project was developed as an Android application using Flutter framework and TensorFlow Lite as the deployment method with the model training on Google Colab. "AquaMate" also integrates the Firebase authentication for user management. The scope of the system is currently limited to a specific number of fish breeds and diseases while the system represents a significant step towards empowering novice ornamental aquarium fish enthusiasts utilizing the knowledge needed for optimal fish care.

Keywords: Image Classification, Convolutional Neural Network, Mobile Application, Fish Breed Identification, Fish Disease Detection

AI-Powered Liver Care App - LivCare

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Abstract

The AI-powered liver care app, LivCare, is a sophisticated mobile tool designed to assist users in effectively managing liver health, with a primary focus on conditions like fatty liver and both alcoholic and non-alcoholic cirrhosis. Additionally, LivCare supports users in maintaining a healthy BMI and encourages balanced dietary habits. This study presents LivCare as a novel solution that blends advanced artificial intelligence with traditional herbal practices, delivering a comprehensive approach to liver health management. By using AI, the app processes userinput data, including weight, lifestyle factors, and symptoms such as jaundice and itching skin, to generate personalized recommendations for diet, exercise, and herbal supplements specific to liver health needs. Unlike other health apps, LivCare's AI learns from each user's interactions, allowing it to adjust to changing health data and provide more personalized support over time. The app provides detailed, step-by-step recommendations, highlights potential risk indicators, and advises users on when to seek early medical intervention, thereby enhancing proactive health management. For serious conditions, such as advanced stages of cirrhosis, LivCare connects users with relevant medical specialists to ensure timely and appropriate treatment. Preliminary data from user feedback indicates significant improvements in liver function and increased engagement in preventive care activities, underscoring the app's value in promoting liver wellness. By integrating insights from both modern medical science and traditional practices, LivCare establishes itself as a holistic and preventive tool that empowers users to take control of their liver health. This AI-driven approach not only addresses immediate health concerns but also supports long-term well-being by promoting sustainable, informed lifestyle adjustments. This approach allows LivCare to distinguish itself from other health management tools, offering a personalized, innovative solution for individuals seeking comprehensive and accessible liver care.

Keywords - Liver health, fatty liver, alcoholic and non-alcoholic cirrhosis, personalized recommendations, herbal supplements

Travelya: A mobile based application for Sri Lanka special location identification and location suggestion system for foreigners

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Abstract

Effective location-tracking technology is essential in today's environment of more mobility and globalization, especially for travelers visiting new places. In order to meet this need, this project will create a mobile application tailored for Sri Lanka that will help foreign visitors find and propose unique spots. Travelers may acquire comprehensive information on a range of attractions, such as historical sites, natural wonders, cultural hotspots, and delights places, with the aid of an intuitive interface that enhances the whole experience and creates stronger relationships with the local community. This program also employs machine learning algorithms to personalize destination suggestions based on user preferences, comments, and travel trends, ensuring that every user has an amazing and unforgettable experience. This project was created using the prototype technique, and it was improved and altered in response to feedback from the customer. Convolutional neural networks (CNN) were initially used in the development of this project, and after several attempts, the accuracy of the CNN version rose to 87%. This project was created as a Java application for Android, with Tensorflow Lite being used for deployment and Google Colab was used for model training. Additionally, "Travelya" incorporates Firebase authentication for user administration. This amazing technology not only makes sightseeing simpler but also promotes mutual understanding and cross-cultural engagement between tourists and locals by offering visitors personalized suggestions. All things considered, the creation of this mobile application is a major step in improving the global visitor experience, encouraging further growth in the hotel industry, and strengthening Sri Lanka's tourist infrastructure.

Keywords: Special Location Identification, Location Suggestion, Convolutional Neural Networks (CNN), Machine Learning, Mobile Application Development

Predicting ICT Students' 4-Year degree program Success from Early Grades

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Abstract

Information and Communication Technology (ICT) is a rapidly growing field and there is a high demand for professionals. As a result, ICT-related courses are in high demand in Sri Lanka. Maintaining the student's academic performance in those courses makes it possible to achieve long-term success. Maintaining the academic performance of the courses has become a problem many students face nowadays. Students doing 4-year courses were very worried about their Semester GPA. In response to this, I prepared a project to create a "Marks Manager" web-based platform under the theme "Predicting ICT Students' 4-Year Degree Program Success from Early Grades". This makes it easy to support Sri Lankan ICT students in monitoring and managing their academic progress. It provides real-time access to grades, feedback, and performance metrics and improves awareness and performance among students. The primary objective of this research is to develop a predictive model to assess success in a 4-year degree program based on the initial academic performance of ICT students. Using machine learning methods, specifically random forest algorithms, the study is analyzed to predict future study outcomes. This predictive ability enables educators to identify students at risk of underachievement early in their academic journey, allowing for timely and targeted interventions. Insights gained from this analysis aim to improve educational practices, support academic advising, and ultimately improve student retention and success rates. The findings of the study contribute to the broader goal of building a pool of talented students capable of meeting the needs and development of the ICT industry in Sri Lanka. By leveraging data from the "Marks Manager" platform, the research underscores the importance of early academic performance as a predictor of long-term success and offers practical solutions to support students in achieving their academic and career goals.

Keywords: Academic performance, Score manager platform, Machine learning, Prediction, Early intervention

An App to Enhancing Tourism Experiences through Integrated Services and User-Centered Design - CeylonVoyage

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Abstract

The CeylonVoyage app is designed to enhance tourism in Sri Lanka by offering foreign tourists a comprehensive digital platform tailored to their travel needs. The primary objectives of this project include facilitating hotel bookings, suggesting tourist attractions, providing transport options, enabling online banking, assisting in finding local guides, supporting QR-based payments, and offering language translation services. Developed with a strong backend using Node.js with Express, Spring Boot, or Django, and a cross-platform frontend using React Native or Flutter, this user-friendly application integrates MySQL databases to manage data efficiently. The app incorporates APIs like Google Maps for navigation, Stripe/PayPal for secure payments, Google Translate for seamless language translation, and Firebase Cloud Messaging for notifications. It is accessible through Android Studio for native Android, Xcode for iOS, or Visual Studio Code for cross-platform development, while UI/UX design includes engaging animations to enhance user interaction. To begin, users create an account, providing secure access to the app's features. Language translation, particularly from English to Sinhala and Tamil, is vital to bridge communication barriers between tourists and local residents, thus easing interactions across language divides. CeylonVoyage aims to streamline tourism activities for foreigners visiting Sri Lanka, fostering accessibility and convenience while supporting the country's tourism-driven economy. The app's potential impact on Sri Lanka's tourism industry is significant, offering a modern solution that promotes cultural exchange and enhances the experience of international visitors.

Keywords: Travel Management, Tourism Integration, Smart Booking, Destination Information

Developing a System for CDB Financial Bank Gold Loan Department employees to monitor their Daily Portfolio Targets.

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Abstract

In the competitive and data-driven world of financial services, effective loan portfolio management is crucial for operational efficiency and strategic decision-making. This project develops a comprehensive software solution for CDB Financial Bank's Gold Loan Department, addressing challenges such as lack of real-time data, manual entry errors, and delayed decision-making. The primary objective is to create a user-friendly desktop Learning Management System (LMS) that provides real-time updates on loan disbursements, repayments, and portfolio health. Key features include automated data entry, visual dashboards, target achievement tracking, and rewards integration. Extensive interviews with stakeholders ensured the system meets all needs. Following a structured methodology, the project enhances the department's operational capabilities and supports the bank's strategic goals of portfolio growth, customer satisfaction, and technological advancement.

Keywords: Financial Services, Loan Portfolio Management, Real-Time Data, Gold Loan Department, Data Analytics

Student Attendance Forecasting System

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Abstract

The "Student Attendance Forecasting System" addresses the student attendance forecasting issue that universities are facing. Since the current systems are either manual or semi automated it is leading to inefficiency and inaccuracies. The primary objective of this project is to create a user-friendly web application that predicts student attendance. This web application helps universities make data-driven decisions that increase student engagement and reduce dropout rates. Iterative method has been used to develop this project. Further, regression analysis used for student attendance prediction. The technology collects lecture and attendance data from the past, allowing for real-time analytics through interactive dashboards. Another aspect of the implementation that helped improves system adoption and use was the creation of an intuitive user interface, facilitating easy communication between lecturers and administrators. Unit tests, integration tests and system tests were also performed at multiple test levels to ensure system accuracy and reliability. The results showed that the system was able to accurately predict attendance patterns and provide insight into student behavior. Furthermore, it provided a proactive technique to improve student retention by identifying future dropouts. The research shows how predictive analytics can be used in education. Although the system's scalability and data completeness are limited, it still provides an effective solution for automated attendance management, with future possibilities to integrate academic performance predictions and real-time data analysis.

Keywords: Attendance forecasting, Timeseries analysis, Academic performance, Big data in education, Machine learning.

Oral Medication Dose Prediction for Diabetic Patients.

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Abstract

This research project aimed to develop a web-based system for predicting oral medication doses for diabetic patients, with a focus on enhancing personalized treatment and improving clinical decision-making. The main objective was to compare the predictive accuracy of two machine learning models: random forest and support vector machine (SVM). The models were trained using patient-specific factors such as age, BMI, and blood glucose levels, which were identified as key predictors influencing medication dosage. The random forest model outperformed the SVM model, achieving a higher accuracy of 0.985 compared to the SVM's 0.9. This high accuracy highlights the effectiveness of the random forest model in handling complex and nonlinear medical data, making it a robust tool for predicting drug dosages tailored to individual patient needs. The system's user-friendly design allows healthcare professionals to input patient data and receive personalized dosage recommendations, thus supporting more accurate and effective treatment plans. However, the study had limitations, including the exclusion of certain patient groups, such as pregnant women and those with heart or kidney conditions, and the focus on specific health metrics. These limitations suggest areas for future research, such as expanding the model to include a broader patient demographic and incorporating additional health metrics like diet and exercise habits. In conclusion, this project demonstrates the potential of machine learning models, particularly random forest, in enhancing personalized medicine. By providing accurate dosage predictions, the system offers a valuable tool for improving patient outcomes and advancing the field of medical informatics. Future work will focus on further refining the model and expanding its applicability in clinical settings.

Keywords: Diabetes, Oral medication dose, machine learning, prediction

AuraGlow – An AI-driven, Mobile-based Application for Skin type Identification, Disease detection, and Personalized Skincare Recommendation system

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Abstract

Recently, there has been interest in developing artificial intelligence-enabled mobile applications for the healthcare industry to ease the finding of cancers and diseases. Therefore, these technologies are suitable for detecting skin disease via mobile applications and affordable to anyone with a smart mobile phone. With the increasing incidences of skin cancers, people had to face some major struggles like lower awareness among the population and a lack of reliable sources to guess the diagnoses accurately. There is an immediate need for AI-driven systems to identify certain skin diseases accurately. There are large number of skin disease datasets available publicly and those are recognized and analyzed by dermatologists. Therefore, the accuracy of those datasets is high. Using these datasets, researchers have developed AI solutions, particularly deep learning algorithms to detect skin disease. In This AuraGlow project, I developed a CNN model and pre-trained VGG16 model to detect skin diseases. By comparing the accuracy of both models, the aim was to provide the most precise diagnosis. The project used ISCI and HAM10000 skin datasets to get the most accurate result. Identifying the correct skin type is very useful when it comes to detecting skin diseases. This project provides a section to identify the skin type of the users. For this purpose, there is another CNN model has been developed. This model requires skin image inputs along with answers to basic questions to accurately predict skin type. Finally, based on the detected results of the skin diseases platform generate recommendations for each personnel. This recommendation system provides the following key factors. Description of the detected disease, how to stop spreading the disease, and what solutions will ease any pain from the disease, based on the result guide the user to when to contact a dermatologist.

Keywords: Mobile Application, Deep Learning, prediction system, recommendation system, Machine Learning

AI-Powered Calculator Mobile App

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Abstract

The AI-powered calculator mobile app represents a groundbreaking advancement in mobile calculator technology by integrating artificial intelligence to enhance both functionality and user experience. This app addresses the limitations of traditional calculators by enabling users to input calculations via natural language commands and image uploads, making it a more accessible and versatile tool. The primary objective of the app is to streamline and diversify mathematical problem-solving through AI, using natural language processing (NLP) and machines learning to interpret complex inputs and deliver precise, step-by-step solutions. Methodologically, the app leverages NLP for input interpretation, deep learning for personalized recommendations, and real-time data integration for currency conversions and IP calculations. Unlike standard calculators, this app addresses a broad spectrum of math problems from basic arithmetic to calculus and differential equations while providing detailed, educational commentary on each calculation step. Additionally, it includes features like a chatbot, voice command interface, currency converter, measurement tools, and IP address calculator, all within a single platform. Users can also personalize settings such as themes, number formats, text styles, and languages to suit their preferences. Through continuous user interaction, the app employs machine learning to optimize its responses and accuracy, aiming to deliver an intuitive and personalized experience. Results demonstrate that this AI-powered calculator significantly enhances the educational value of calculators by offering not only answers but also explanations, fostering a deeper understanding of math concepts for students and professionals alike. In conclusion, this app redefines the traditional calculator's role, transforming it into an interactive, educational, and customizable tool that supports various mathematical tasks with unprecedented ease and intelligence, ultimately setting a new standard in mobile calculation technology.

Keywords: AI-powered calculator, Natural language processing, educational tools, Personalized assistance, Mathematical problem solving

Enhancing Human-Computer Interaction with Deep Learning-Based Emotion Recognition Systems

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Abstract

In recent years, emotion identification has emerged as a critical field of study for improving human-computer interactions in a variety of domains, including virtual assistants, mental health monitoring, and personalized user experiences. This study addresses the difficulty of constructing an accurate and responsive emotion identification system by incorporating deep learning techniques. The main issue is the difficulty of developing algorithms that can reliably distinguish human emotions from a variety of input sources, including facial expressions, vocal tones, and textual thoughts. To address this, we present a multi-modal emotion detection system that uses deep learning algorithms to analyze and combine these disparate input sets. To identify a wide range of emotional expressions and circumstances, we use a complete model trained on different and extensive datasets. The technology intends to improve the accuracy of emotion recognition as well as the adaptability of interactive apps. This study aims to create a powerful and adaptable emotion detection system capable of generating nuanced and context-aware replies by merging facial expression analysis, voice tone evaluation, and text sentiment analysis. The findings are expected to advance emotion identification technology and contribute to more intuitive and empathic human-computer interactions.

Keywords: Emotion Recognition, Deep Learning, Multi-Modal Analysis, Human-Computer Interaction (HCI), Machine Learning, AI, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Affective Computing, Real-Time Emotion Detection, Adaptive User Experience

Optimizing Emergency Response: AI Solutions for Faster Ambulance Dispatch and Hospital Readiness

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Abstract

The aim of this study is to reduce significant delays in ambulance dispatch and hospital preparedness in order to increase the effectiveness of emergency medical services. Conventional methods often experience unsafe time loss due to hospitals being unprepared for patient arrival and poor ambulance response times. Traffic jams and outdated procedures exacerbate these inefficiencies in cities. Our project aims to address this gap by developing an AI-driven system that optimizes ambulance dispatch based on current traffic circumstances, accident severity, and hospital resource availability. Current dispatch systems disregard changing factors like traffic and emergency intensity in favor of fixed rules and human methods. As a result, ambulances are usually delayed or misallocated, and hospitals lack the resources necessary to offer patients life-saving care when they arrive. The suggested method incorporates a mobile platform driven by AI that has a voice command activation feature, a One-Click Emergency Button for instant activation, and direct notifications to police stations, ambulance services, and hospitals. Real-time GPS tracking will be used by the platform to share exact locations and guarantee the best possible coordination. By examining supplementary inputs like voice, photos, or videos, AI algorithms will rank high-severity situations higher and recommend the shortest ambulance routes based on real-time traffic information and hospital availability. The device may save ambulance response times by up to 30%, according to preliminary simulations run using historical traffic data. Detailed patient information will also be sent to hospitals ahead of time, allowing them to set up staff and medical supplies in advance, cutting down on delays and enhancing patient outcomes. This AI technology has great potential for thoroughly revolutionizing emergency medical services by saving valuable minutes in responses, making better hospital preparedness, and most of allsaving lives. Real-time integrated data and AI-powered decision-making in this study will go a long way in raising the next generation of quicker, smarter, and more efficient emergency response systems.

Keywords: AI-driven system, Ambulance dispatch, Hospital preparedness, Emergency medical services, Real-time GPS tracking, AI algorithms, Response times, Patient outcomes

Decentralized applications (DApps) can be effectively applied outside the financial industry

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Abstract

Blockchain technology has grown to be one of the largest innovations in the realm of computing due to its presentation of a decentralized architecture for data storage and application implementation. DApps, running on blockchain platforms, gain considerable interest because they promise security, transparency, and no centralized control. While most DApps have so far been developed for use in financial services like cryptocurrencies, this research will look at the potential of DApps in non-financial sectors such as health and supply chain management. Such sectors might benefit from the increased data security, reduction in fraud, and transparency offered by blockchain technology. The major research issue to be investigated in this research is the limited understanding of how DApps can be effectively applied out of the financial domain. In particular, many developers fail to create secure and userfriendly DApps that can be adopted by other sectors such as health and logistics. It thus explores how simple, secure, and effective DApps may be built using blockchain technology for applications in the nonfinancial world. This paper also intends to discuss possible major barriers to its adoption due to increasing complexity and costs, and it points out ways to surmount them. The study will therefore be supported by a literature review and case studies in order to see how these existing DApps function in such sectors as healthcare and supply chain management. Additionally, a simple (DApp) will be developed using basic smart contracts in order to show how blockchain technology can enhance security and transparency in such sectors. This study would serve to highlight more the application of blockchain and DApps in nonfinancial areas, as well as give recommendations to developers who might be willing to build similar applications. The research would add to the growing body of knowledge concerning blockchain technology beyond digital cryptocurrency.

Keywords - DApps, Blockchain, Nonfinancial, Decentralized architecture

Remote ECG Monitoring System

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Abstract

A system is developed to assist people with limited hospital facilities for ECG monitoring and individuals in rural areas without access to a hospital, as well as to reduce the annual death count of heart attacks caused by delayed hospital admissions for various reasons. As a solution, A Remote ECG Monitoring system is designed with a lightweight, portable ECG device and Mobile App named ECG Care. Flutter, Firebase & Arduino technologies are used to build this system. ECG device is used to record and transmit ECG data to a secure cloud-based platform. Realtime & Previous ECG graphs can be viewed through mobile app for both doctors and patients. Direct chat system is developed between doctor & patient through mobile app. Built AI chat bot system in the mobile app can be accessed by both doctor & patient. This Remote ECG monitoring system is extremely advantageous because people can manage their heart health better without the need to frequently visit hospitals for check-ups. Medical attention can be sought at any time without having to leave their homes. Professionals in the medical field are allowed to have a better overview of the heart activity of patients from anywhere which aids in the initial identification of problems. It is important to note that early detection is facilitated by frequent monitoring, allowing for prompt medical action to be taken. This unattended outof-hospital cardiac monitoring technology is being turned up as handy and effective alternatives that can be used by people to observe their heart health status through constant supervising, instantly detecting any problems with it, and easily getting hold of ECG findings, which are useful not only for individual patients but also for medical providers.

Keywords: ECG Device, Doctor, Patient, Remote ECG Monitoring, Mobile App

Smart School Selector for Grade One Admissions

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Abstract

Choosing the right school for a child is a complex and often overwhelming task for parents. Smart School Selector aims to simplify this process, helping parents make confident, informed school choices without the hassle of extensive research. By gathering user feedback through surveys and interviews, we continuously improve the platform's design and functionality to ensure it meets the needs of families and provides a straightforward, stress-free experience. The system evaluates schools based on criteria like academic performance, facilities, and distance from the child's home. It also takes parent feedback into account. Using these factors, it generates personalized recommendations with a reliable scoring system. To further assist parents, Smart School Selector features a map function powered by the Google Maps API, allowing parents to view and locate the nearest schools based on their child's location, adding convenience to the decision-making process. Parents can easily create accounts, enter details about their child, and receive a customized list of recommended schools. The platform allows applications to up to three schools directly through the website, with email or SMS updates about required documents and interview schedules. A secure, user-friendly dashboard provides real-time updates on application status, automatic reminders for important deadlines, and access to parent reviews of schools to help families make informed choices. We use encryption to protect your personal information and secure logins for account safety. Your data is stored safely, and we follow strict privacy regulations. Parents can control their privacy settings, giving them control over their information. This platform is built using JavaScript, Node.js, and React, along with MongoDB as the database to store information. Our goal is to make school selection as easy and stress-free as possible, with future updates planned to refine the scoring system for even more accurate and trustworthy recommendations.

Keywords: school selection, scoring system, automated reminder, map integration, data security, JavaScript, Node.js, React, MongoDB

KidneyCare: The Smart App for Early Detection and Management of Kidney Disorders

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Abstract

Kidney disorders, once confined to specific regions, are now a major health issue throughout Sri Lanka. This increase is largely due to a lack of awareness and can lead to serious health problems if not addressed. To address this, we are introducing the 'KidneyCare' mobile application, designed to fit seamlessly into your busy life. KidneyCare features an advanced Artificial Intelligence (AI) bot that interacts with users like a real nurse. Users can speak directly to the bot, describing their symptoms, and it responds conversationally with follow-up questions. The bot then presents images related to the symptoms, allowing users to compare and verify them. The AI bot utilizes natural language processing (NLP) to accurately understand and process spoken symptoms. It also employs image recognition technology to analyze and match the images with the described symptoms, powered by deep learning algorithms that recognize patterns and provide precise assessments of the user's kidney health. For comprehensive data analysis, the application leverages **machine learning** to compare symptom data with established health patterns and indicators, ensuring both accuracy and reliability. What sets KidneyCare apart is its integration with the KidneyCare website**.** The application not only detects and evaluates symptoms but also transfers data to our website, which provides a detailed report. The website is connected with local hospitals and doctors. Once a patient is identified through the application, they are automatically registered on the website, which then facilitates referral to necessary medical centers. Relevant hospitals are immediately notified through website notifications, and essential services such as appointment scheduling and medicine procurement are streamlined. The KidneyCare application offers an advanced approach to managing kidney health by combining smart technology with a comprehensive website, helping users monitor their health and access medical care efficiently.

Key Words: Artificial Intelligence (AI), Natural Language Processing (NLP), Machine Learning, Kidney Health

TrueVision: Advanced Detection of AI-Generated and Fake Media Using Deep

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Abstract

In today's digital world, artificial intelligence (AI) has reached a level where it can generate images and videos that are nearly impossible to distinguish from real content, raising concerns about the spread of misinformation and illegal activities such as creating fake IDs or passports. To address these challenges, we developed TrueVision, a mobile-based application designed to detect whether an image or video is AI-generated. The app also helps identify counterfeit documents, offering a solution to prevent fraudulent activities. TrueVision utilizes advanced AI techniques, particularly deep learning, to analyze large datasets and identify subtle distinctions between real and AI-generated content. The app employs Convolutional Neural Networks (CNNs) for image recognition, a method highly effective in processing visual data. For videos, Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) models are used to analyze temporal patterns across frames, enabling the detection of AI-generated sequences. Built using PyTorch, TrueVision demonstrates a 15% to 25% improvement in both development efficiency and model accuracy compared to other deep learning frameworks. The app also integrates OpenCV, an open-source computer vision library, for fast and accurate image and video processing. Additionally, TrueVision incorporates Google's reverse image search technology, allowing the app to compare uploaded images, such as IDs and passports, with online content to detect manipulation or AI generation. Despite its strengths, the app has some limitations. One challenge is its dependency on internet connectivity for reverse image search, which may not be efficient in areas with poor network coverage. Frequent updates will be necessary to keep up with evolving AI techniques. However, TrueVision plays a crucial role in ensuring the authenticity of online media, helping users trust the content they view and providing a tool against digital manipulation and fraud.

Key words: Image detection, Fake passport identification, CNNs, RNNs, LSTM, Artificial Intelligence, PyTorch

An Online Fine Payment System for Instant Driving License Retrieval Sri Lanka.

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Abstract

This study introduces an innovative online fine payment system aimed at addressing the significant inefficiencies faced by Sri Lankan drivers when dealing with traffic violation penalties. Currently, drivers who commit traffic offenses outside their home provinces must travel extensively to settle fines and retrieve their driving licenses, leading to substantial time wastage and inconvenience. The primary objective of this project is to develop a seamless and efficient solution that allows users to pay fines and retrieve their licenses instantly through an integrated online platform. The proposed system operates by interfacing with police databases to capture real-time information about traffic violations. When a violation occurs, the system automatically records the details, including the driver's information, the violated traffic law, and the fine amount. Users can then access this information online and proceed with the payment using secure online payment methods. Upon successful payment, the system immediately notifies both the police and the user, allowing the driver to retrieve their license without further delay. The novelty of this system lies in its capacity to eliminate the need for inter-provincial travel and significantly reduce the time required to resolve traffic fines. This approach not only enhances user convenience but also streamlines the administrative processes for law enforcement agencies. The development of the system involved rigorous testing and validation to ensure high accuracy and reliability. Techniques such as user acceptance testing, accuracy assessments, and model validation were employed to verify the system's performance. User feedback has been overwhelmingly positive, highlighting the system's efficiency and effectiveness in simplifying the fine payment process. By providing a quick, convenient, and reliable method for settling traffic fines, this system represents a significant advancement in the management of traffic violations in Sri Lanka.

Keywords: Online payment, driving license retrieval, traffic violations, real-time processing, user convenience

Improving ATM Security with AI-Driven Headwear Detection and Tamper Sensing

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Abstract

With the advancement of AI technologies, its application across various fields has become essential in combating complex challenges. ATMs often targeted by criminals who obscure their identities using headwear or masks. Because of limitation issues traditional surveillance systems like CCTV struggle to manage these situations. While there are Existing AI integrated system for surveillance, they are not fully implemented to handle some security scenarios. This project introduces an AI-based headwear detection system for ATM environments, using a lightweight version of the YOLOv8 (You Only Look Once) object detection model, YOLOv8 Nano, which is optimized for resource-constrained devices like the Raspberry Pi 5 (4GB). Using a camera module, the system continuously monitors and detects headwear, alerting users and classifying persistent obstructions as suspicious for security personal to intervene. Additional IoT components, including a SW-420 vibration sensor to detect tampering and an HC-SR501 Passive Infrared sensor to activate detection only, when necessary, enhancing resource efficiency and real-time response. The Yolo model is trained on a gathered dataset of 300 various headwear and facial coverings like helmets, sunglasses and masks, with frameworks like ONNX and TensorFlow Lite enables optimized deployment on edge devices. The system was tested in simulated scenarios to validate the accuracy and reliability of the detection system. The Testing Resulted in getting solid performance with great false positive rate of 0.9, low missed detection rate 0.9 and a solid mean Average Precision across IoU thresholds from 0.5 to 0.95 score of 0.66. By combining AI with IoT components, this Project's main objective is decreasing fraud and theft at ATM spaces.

Keywords: Yolo Nano, ATM Security, Object Detection, TensorFlow Lite, Edge Computing

Travel planner and itinerary management system (web- based) for travelers

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Abstract

This is a research and development study concerning a new web-based travel planner and itinerary management system. The system is geared towards making travel planning easier by providing many functions that ensure the comfort of travelers. This includes Destination Search and Filtering, which will enable one to view destinations by location, interests, budget, and travel dates. It also provides for Customizable Itinerary Planning, whereby users will be allowed to create personal itineraries inclusive of accommodation, activities, and transportation. Also, the system shall provide for Accommodation Bookings, Expense Tracking, allowing users to keep track of and manage all their expenses related to accommodation, transportation, and activities. Offline functionality is also available because, through the system, access to itineraries, maps, and all other information of importance is possible even when the internet is off. In real time, the system will update them on weather conditions, among other concerned travel information. Recommendations shall also be availed to them, considering preferences and travel history of users. Hard development was performed for satisfied users with an effective system, user research-understanding the needs and pain points of the travelers, iterative design that creates an effective interface-user-friendly and intuitive and running thorough tests to understand how well the system was working and where it needed further improvement. It will also identify appropriate technologies such as programming languages, frameworks, and databases that are to be used for backend and frontend development. And also, integrate thirdparty APIs for weather information and booking of hotels and data Synchronization ensure smooth data synchronization of the system with third-party services. The system would hence achieve this objective in simplifying the process of planning a trip. Various subjects were tested for their satisfaction with the features of the system and its usability, and the tests delivered high results. Some key points which have been found include the following, Improved User Experience the system reduces the time and effort taken to plan a trip by an order of magnitude. Smarter Decision Making-Real-time updates, cost saving and personalized recommendations support users in making knowledgeable decisions. This helped in generating more effectiveness, as there would be an integration of many services related to travel in one go, and therefore, the proposed web solution will facilitate the pain points of travelers to make them more comfortable in travel.

Keywords: Travel planning and itinerary management, Destination search and accommodation booking, Expense tracking, Offline functionality, Real-time updates, Personalized recommendations

Artificial Intelligence empowered smart tourist's assistant mobile application

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Abstract

The "AI Empowered Smart Tourist's Assistant" app is a pioneering digital solution designed to elevate the travel experience for international tourists visiting Sri Lanka. Recognizing common travel challenges like language barriers, lack of accurate information, and overcrowding at popular sites, this app offers a range of advanced features to assist tourists every step of the way. Tourists can seamlessly purchase tickets online, plan routes, and receive location-based recommendations using an AI-powered chatbot, making exploration both effortless and efficient. A key highlight of the app is its AI-driven visual recognition capability, allowing users to capture images of historical landmarks or artifacts. This feature provides them with comprehensive information about each site, enriching their understanding of Sri Lanka's cultural heritage. Further, the app uses augmented reality (AR) technology to reconstruct visuals of ancient ruins, enabling users to immerse themselves in the history of these sites as if they were viewing them in their original state. To enhance accessibility, the app includes robust translation services, accommodation booking options, and transportation arrangements, transforming it into a comprehensive travel companion. This ensures tourists have all essential services at their fingertips, minimizing the need for third-party apps or in-person assistance. The app will undergo initial testing focused on usability, data accuracy, and system performance to guarantee a smooth and reliable user experience. Testing will prioritize the quality of information provided by AI chatbots, the accuracy of translations, and the app's responsiveness during peak usage times. This will ensure seamless functionality for ticket purchases, route planning, and AR features. Future updates may extend its usability beyond Sri Lanka, positioning it as a potentially transformative tool in the global tourism industry by leveraging cutting-edge AI and AR technologies.

Keywords: Artificial Intelligence empowered smart tourist's assistant application, Augmented Reality (AR), Visual recognition

BinSense: Intelligent Waste Management Solution

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Abstract

Waste creation has increased tremendously over the past few decades due to urbanization and population growth, which causes severe challenges for waste management systems globally. Effective garbage management can maintain public health, environmental sustainability, urban cleanliness, etc. Traditional waste management techniques, which are frequently defined by rigid plans and reactive tactics, are not enough to maintain complexity and the dynamic nature of today's junk era. As a result, various creative solutions that make use of technology more crucial to modernize the waste collection and disposal procedures. In the realm of waste management, an encouraging development of this research project is the Binsense Intelligent Waste Management Solution. Binsense seeks to modernize the traditional waste management strategies into a more effective, data-driven strategy by combining IoT (Internet of Things) technologies, data analytics, and real-time monitoring. A centralized dashboard that offers waste management authorities the ability to monitor fill levels by implanting ultrasonic smart sensors in garbage bins are the core components of binsense technology. Although this has various projects, it never goes down as this is a crucial problem among all the human beings. In case there is a high necessity of building a solution using IoT to get rid of this problem. By developing a dashboard to view the fill levels of garbage pits is an immense opportunity for relevant authorities to optimize routes. And successful implementation in one urban area could pave the way for scaling the system to other cities as well. In conclusion, the Binsense Intelligent Waste Management Solution presenting a transformative approach to urban waste management that not only promotes environmental sustainability but also it enhances operational efficiency and aligns seamlessly with smart city frameworks. Binsense sets a strong foundation for future advancements by leveraging advanced technology and data-driven insights, positioning itself as a pioneering force in the evolution of sustainable, smart urban living.

Keywords: Waste Management, IoT, Smart cities, Environmental Sustainability

Integration of Artificial Intelligence into Project Management Tool

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Abstract

The aim of this project is to develop the first AI-integrated project management tool, leveraging the advanced capabilities of the LLaMA 3.1 which is a large language open-source model. In today's fastpaced environment where efficiency, accuracy and data-driven decision-making are crucial as a result of Artificial Intelligence, this innovative tool is developed to address the limitations of traditional project management practices. The software enhances key functionalities, including project planning, execution, monitoring, and evaluation, by automating routine tasks such as scheduling, resource allocation, and progress tracking. This automation is expected to not only make operations faster and simpler but also significantly improve the overall efficiency and effectiveness of project management processes. Our primary objective is to optimize resource allocation, enhance estimation accuracy, predict potential risks and provide real-time insights so that empower project managers to make more informed and effective decisions. By integrating AI into these processes, the tool addresses some of the most persistent challenges in project management, offering a robust solution that traditional methods have been unable to fully resolve. This research explores into how AI can enhance the efficiency of project management tools compared to traditional approaches, while also identifying and addressing the key challenges associated with integrating AI into these systems. To achieve these objectives, a comprehensive research methodology was employed including observational studies to understand real-world applications, a data analysis for leveraging historical insights about existing project management tools and prototyping to identify user experience and interface design towards this. Additionally, social media analysis was conducted to capture unfiltered user opinions on AI integration in project management tools. The findings of this research highlight the transformative potential of AI in revolutionizing project management by automating repetitive tasks and enhancing decision-making processes, ultimately setting a new industry benchmark.

Keywords: Artificial Intelligence, Large Language Model, Project Management

Enhancing Financial Data Security in AI-Driven Cloud Platforms: A Comparative Study of Fully Homomorphic Encryption and Conventional Encryption Techniques

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Abstract

The finance industry is undergoing a profound transformation through the integration of Artificial Intelligence (AI), which is reshaping traditional business models and unlocking new growth opportunities. AI-driven tools, such as predictive analytics, machine learning, and natural language processing, are revolutionizing financial operations and customer interactions. However, the reliance on AI and cloud platforms for processing extensive and sensitive financial data introduces significant security challenges. Maintaining the confidentiality and integrity of this data is crucial to prevent breaches and safeguard against potential threats. This research investigates the application of Fully Homomorphic Encryption (FHE) as a robust solution to enhance data security in AI-driven cloud-based applications within the finance sector. FHE allows computations to be carried out directly on encrypted data, ensuring that sensitive information remains protected throughout the entire processing lifecycle. This capability is particularly critical in financial contexts, where preserving client data privacy is essential while enabling advanced AI analytics and modeling. Homomorphic encryption employs ciphertexts to keep data encrypted during processing, which is fundamental to its security model. By performing operations on encrypted data, FHE maintains data confidentiality even when exposed to AI systems. In our study, we provide a comparative analysis of FHE against traditional encryption methods, evaluating them based on data protection effectiveness, computational efficiency, and regulatory compliance. Preliminary findings suggest that FHE significantly reduces vulnerabilities and offers improved efficiency by reducing processing time and resource usage. We validated these security improvements using encryption strength benchmarks and breach reduction metrics, considering FHE's suitability for real-time financial AI applications. This paper offers valuable insights into implementing FHE algorithms for securing cloud-based AI systems and proposes a framework to address emerging data protection challenges in finance.

Keywords: Homomorphic Encryption, Fully Homomorphic Encryption (FHE), AI-Driven Cloud Platforms, Financial Data Security, Data Privacy, Machine Learning, Encryption Techniques, Big Data, Data Protection, Encryption Methods

A smart system automatically adjusts the heat of a hot water shower based on climate change and automated washroom lighting

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Abstract

In present, many people use a lot of hot water shower in their home often manually adjust hot water based on climate change. The main objective of the research is to provide a smart system, that automatically adjusts the shower's water temperature based on the current climate conditions using temperature sensors. The design utilizes an Arduino Uno Microcontroller that is connected with a temperature sensor to automatically change the hot water shower corresponding to the climate change. It also employs Bluetooth HC 05 to share the data with the Switch Board. Additionally, an ultrasonic sensor able to sense an object falling within a range of 30 cm, it will switch on the solenoid valve and open the tap automatically and Ultrasonic sensors are connected to switch board. Another is that PIR sensors are able to detect movement, automatically turn on the bathroom lights when a user enters the bathroom. Also, PIR sensors are connected to light system and It sends a signal to turn on the lights, and use Bluetooth HC 05 to communicate. As an advantage, this system effectively mixes hot and cold water in a hot water shower to match current climate conditions, thereby minimizing water waste. A challenge is ensuring the stable power supply to the sensors and modules, which can be done using a battery supply and voltage division circuit. This switchboard which can be operated wirelessly by an Android application, adjusting the hot water temperature based on air temperature and controlling other connected devices. The system will also show alert for users through the Android app, If any issues arise with hot water shower. In conclusion, this smart system is automated solution for adjusting shower temperature and controlling bathroom utilities and reducing water waste.

Keywords: sensors, Hot water shower, Smart system, Temperature

Online Medicine Delivery System

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Abstract

The rapid development of modern digital technology, many fields are rendering services online. Thus, the health sector occupies a special place. During the global crisis of COVID-19, it was also a difficult task for people to buy their medicines. As a solution, Online Medicine Delivery System (OMDS) is introduced which allows patients to easily get their required medicines at their doorsteps without going to a pharmacy. It provides a way for patients to order prescription and non-prescription medicines through an effective web and mobile application for easy access. The key features include user authentication, digital prescription management, inventory tracking, automated push notifications, integrated payment gateways and secure home delivery services. The main benefits of OMDS are increased patient convenience by reducing physical visits to the pharmacy for consultations, especially for elderly and chronically ill patients. The suggested system powered by Google maps API or Map box for real-time delivery tracking, route optimization and using geolocation technology for determining user location to assign delivery services efficiently. Fare calculation, cashless payments, transportation scheduling, and driver ratings are among the essential features. The release of this application looks to the future of how the online drug delivery system can be an entry point for a more sustainable healthcare community in the healthcare sector.

Keywords: Online Medicine Delivery System, Prescription Management, Mapbox

Introducing an automated election voting system with eye controlling and voice controlling features

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Abstract

Nowadays, the world has become more advanced with modern technology. So, Introducing the automated voting system will be a turning point for the general manual process of elections. Manual processes have difficulties such as printing and transportation cost for ballot papers, late results, accuracy failures, cheating and wasting votes etc. So, to avoid these difficulties this project is introduced and there are several research articles and resource people are resourced to build up the idea. This is a software system that can vote through a digital display by selecting the party and competitors. Before submitting votes, every voter must be verified their eligibility via a biometric (fingerprint) identification under supervision of the election department within the polling station premises. After verification, voters can vote through the digital display where in a suitable environment which protects their confidentiality. The default touch screen gives the facility to convert it into under eye controlled or voice-controlled mode by selecting as per the voters' special need. If there is no need, they can use the default touch screen. The specialty is the same display can work in three different modes. This system avoids above mentioned difficulties and facilitating to disabled persons to vote using eye or voice controlling. To ensure the accuracy of the system there are post-election validation, simulated elections, functional, accuracy, usability, performance, security, compliance, regression tests can be conducted. They check vote integrity, UI, temper detections, legal compliance and system updates etc. This paper focuses on how existing limitations cover within the proposed system and how it works etc.

Keywords- Biometric identification, eye controlling, voice controlling

Smart Parking Solutions: Development and Impact of a Real-Time Parking Space Finder Mobile Application

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Abstract

Finding parking spaces in busy areas is a major challenge due to limited space, high demand, inefficient utilization of available parking, lack of access to real-time information on available spaces contributing to traffic congestion and aggressive driving, which can lead to accidents and collisions. Events, weather conditions, and specific times of day, such as school hours or office closing times, further intensify the demand for parking. To address these issues, this study proposes the development of a Parking Space Finder mobile application aimed at providing real-time solutions for finding and reserving parking spaces, thereby optimizing parking utilization and easy traffic flow. The app features live updates on available parking spaces, navigational assistance to nearby spaces, and pricing details, allowing drivers to make informed decisions. Additionally, the app predicts parking availability by analyzing factors such as local events, weather, and time of day, further optimizing the user experience. Real-time data collection and forecasting were challenging parts of the development process requiring to be solved with advanced algorithms. The experimental design involved the integration of predictive algorithms that consider various influencing factors to forecast parking space availability. This functionality, coupled with a user-friendly interface, allows drivers to reserve spaces in advance, reducing the stress and time associated with finding parking. Moreover, the app offers an opportunity for private space owners to list their unused property as parking spaces, manage availability, set prices, and generate revenue. In conclusion, this mobile application attempts to enhance general driving conditions and reduce traffic congestion.

Keywords: Smart Parking, Traffic Congestion, Parking Availability, Driver Assistance, Parking Optimization

Investigating the Role of Artificial Intelligence in Augmenting Human Creativity

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Abstract

Human Intelligence consists of logical and creative thinking paired with cognitive ability to reason, evaluate and adapt to different circumstances. The purpose of AI (Artificial Intelligence) is to mimic human intellect to solve complex problems. According to the World Economic Forum in 2023, the demand for creative thinking skills surpasses that of analytical skills. The widespread use of GenAI (Generative AI) tools has brought forth a discussion on integrating AI into human creativity. Digital platforms enable content creation to generate a 'creator economy' that provides new sources of income through human creativity and cognitive ability to reason. Through GenAI there is a boom of AI-assisted innovation, but it is also possible for AI to monopolize creative outlets. This study evaluated five freely available Large Language Models (LLMs)—GPT-4, Gemini, Claude-2, WriteSonic, and Copy.ai—using three identical prompts to assess their creativity. The assessment employed the Alternative Uses Test (AUT), developed by J.P. Guilford, which evaluates responses based on originality, flexibility, and elaboration. Results indicated that GPT-4, Gemini, and Claude-2 demonstrated superior originality and flexibility compared to WriteSonic and Copy.ai. All five models are based on Transformer Architecture, but GPT-4, Gemini and Claude-2 focus on complex reasoning and contextual understanding across linguistic patterns, and the output is designed to align with ethics and human values. The application of WriteSonic and Copy.ai is to emphasize content creation, and their capabilities align with social media posts, blogs, and product marketing. In conclusion, the results reveal the dual nature of GenAI where it facilitates idea generation but also leads to homogenization of creative outputs if users excessively rely upon it.

Keywords: Artificial Intelligence, Generative AI, Creative Tools, Transformer Architecture

Development of a Web-Based Administrative Interface for Efficient Traffic Management and Real-Time Seat Allocation in Second-Class Railway Compartments

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Abstract

This research explores the development of a web-based administrative interface designed for authorized ticket salespersons to efficiently manage traffic in second-class seats. Managing user roles and authentication, ticketing, seat monitoring, reporting analytics, and alerts for upcoming sales, changes to seat availability, or significant updates are among the objectives of the system. Many interviews and questionnaires with train passengers and tourists have revealed a number of issues with the current railway system. Based on the analytical surveys, the suggested interface design is created. The suggested interface uses WebSockets to provide user-friendly dashboards, dynamic seat allocation, and role-based access management to enhance the workflow for sales personnel. The study highlights a layered architecture that consists of a responsive frontend enabled by React, a dependable backend driven by Springboot, and a scalable MySQL database. This makes it possible to handle peak demand and complicated scheduling with ease. The design prioritizes usability by providing an easy interface that expedites actions and reduces operational errors. Sensitive client data and financial transactions are protected by the use of security methods including encrypted data transmission and secure login protocols. Using secure authentication mechanisms and modern web technologies, this system offers an easy-to-use, dependable platform for handling second-class seat availability, reservations, and sales. Real-time updates, interactive seat maps, and automated reporting are important features that support data-driven decision-making and better passenger service. The design prioritizes usability by providing an easy interface that facilitates actions and minimizes operational errors. This research contributes to the transportation industry by addressing operational challenges, enhancing efficiency, and delivering a seamless experience for both salespersons and passengers.

Keywords - WebSockets, layered architecture, React, Springboot, MySQL

Skill Assessment Enhancing Internship Opportunities for IT Students

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Abstract

The rapid evolution of the Information Technology sector has created a growing demand for skilled professionals equipped with practical experience. Internships serve as a critical bridge between academic learning and Industry requirements, offering students an opportunity to enhance their skills in real world Environments. The process of finding and applying for suitable internships remains a significant challenge for many IT students. The purpose of this project is to bridge the gap between academic learning and industry requirements for IT students by enhancing their access to meaningful internship opportunities through mobile applications. The main feature is when the student finished the intern the company should provide valid service letter through the student registration mail. The register companies provide skill assessments, matching student with relevant internships, and offering a platform for continuous learning and professional growth. The proposed project aims to create a seamless and user –friendly interface where IT students can assess their current skill levels, progress tracking, identify areas for improvement, and find internships that align with their skill levels, expertise and career aspirations. The app will feature a comprehensive skill assessment module, developed in collaboration with industry experts, to evaluate students' proficiency in various IT domains such as programming, software development, cybersecurity, data analysis and more. This module will use a combination of multiple-choice questions, coding challenges and scenario-based assessments and practical sessions. Upon completing the skill assessments, the application will generate a report highlighting the students' strengths and weaknesses and the company can rate the students' work. In addition, features can provide access to tutorials, online courses, and coding exercises that support students in their professional growth. In conclusion, this project aims to revolutionize the way IT student approach internships by providing a comprehensive platform by enhancing their access to meaningful internship opportunities through mobile applications. This project has the potential to transform the way IT students approach internships by providing a comprehensive, integrated platform for internship matching, skill assessment, and career development. With the implementation of this application, it is projected that students' internship acquisition rates could increase by up to 40%, and skill alignment with industry standards could improve by approximately 30%, leading to more successful career placements and a stronger pipeline of industry-ready IT professionals

Keywords- Skill Assessment, Internship Matching, Career Development, Professional Growth, Networking Opportunities, Practical Experience

Real-Time Monitoring System for Blood Platelet Count: Building A Wearable System for Patients with Rapidly Changing Blood Platelet Count

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Abstract

The blood platelet count is one of the main health conditions in our human body. If the blood platelet count goes down, many circumstances will occur in our body. As dengue or cancer patients, they have rapidly changing blood platelet counts. So, it is important to keep track of those counts unless it may lead to many serious complications like severe bleeding, or spontaneous hemorrhage. The existing method for keeping track of blood platelet count is collecting blood samples by inserting a syringe into the patient's body and doing the lab test continuously (depending on the patient's health condition). This research aims for a real-time blood platelet count monitoring system. This system includes a wearable device that collects blood samples using microneedles and takes blood pictures using a microscope camera, mobile/desktop application. The application and the wearable device are connected through a wi-fi connection. That wearable device sends the microscope images of blood samples to the mobile/desktop application and the application gives the blood platelet count. Those testing results are stored in a database, and a graph is made according to the changes in blood platelet counts by the application. Whenever the blood platelet count goes down the system sends notifications as alerts. Then the immediate treatments can be given to the patient on time. The system uses image processing (thresholding, edge detection) and machine learning algorithms like conventional neural networks (CNN) to count blood platelets. As additional functions, glucose monitoring system and drug delivery method are included in the system. The glucose level in the blood can be measured by electrochemical sensors and the drugs can be delivered using a transdermal patch. This system can be replaced by the manual blood platelet counting method, which gives inconsistent results, consists of human errors, makes the patient uncomfortable, and is time-consuming.

Keywords: Microscope camera, wi-fi connection, Real-time Monitoring, Blood-Platelet Count

Transit Hub: A Web Solution for Bus Schedules and Luxury Bus Bookings in Sri Lanka

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Abstract

In Sri Lanka, access to timetables of buses is still very limited as this information resides only in their respective bus depots and has not yet been available online centrally. Without this access, it still remains very inconvenient for passengers, especially those in the highly populated Western Province. In this paper we introduce a comprehensive web application that collects and publishes scattered bus timetable information for public usage. We will commence the implementation in Western Province, where we shall test its effectiveness, taking all views for its scalability in the country. The proposed scope of the project is to design, develop and deploy a web application in order to provide easy and dependable means of accessing bus schedules. In this regard, the methodology shall involve conducting surveys and customer feedback sessions, observational studies to understand passenger needs and collecting data about bus schedules directly from documents available at bus depots. The web application will also include real-time bus schedules, a seat reservation system for luxury buses and an advanced route planning tool that suggests optimal routes according to user-input locations and destinations. Furthermore, we plan to implement a feedback mechanism within the application, through which all functionalities can continuously be improved with the help of users and their suggestions. This is a project targeting the enhancement of access and efficiency in public transportation for all residents and tourists within Sri Lanka. Such a solution should go a considerable way in enhancing the experience of public transport through its centralized resource for bus schedules, route planning and booking. Our research uniquely focuses, while centralizing information on integrating user-responsive design to adapt to the specific needs of commuters within the Western Province. These will be measured in terms of user satisfaction, on-schedule times and overall efficiency regarding route planning. Such a venture could well turn the wheels of change for public transit options in Sri Lanka and set a platform for the introduction of an efficient and passenger-friendly system of public transportation.

Keywords: Public Transit, Bus Scheduling, Web Application, Luxury Bus Booking, Route Planning, Passenger-Centered Design, User Satisfaction

Smart Consumption Meter Reading Display System for Remote Access

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Abstract

This project aims to develop an automated meter reading system to streamline the electricity billing process, reducing the need for direct access to consumer meters. Currently, meter readers must visit each residence monthly, causing delays and inefficiencies, particularly when residents are unavailable. This manual process often leads to overdue bills, power interruptions, and operational challenges for utility providers. To address these issues, the proposed system incorporates two interconnected LED displays: one inside the home for the consumer to manually enter meter readings and another outside for the meter reader's remote access. In cases where the consumer has not entered a reading, the external display signals this status, enabling follow-up actions to prevent missed reading. The system's design, tailored for Sri Lanka's needs, provides a reliable, cost-effective solution with easy installation and maintenance. It utilizes an Arduino-based setup with a keypad for data entry, transmitting readings via Wi-Fi to the external display. Key hardware components include Arduino Uno, ESP 32 Wi-Fi modules, and LCD displays, with software developed using Arduino IDE and Google Firebase for data storage and transmission. Additionally, this system could be advanced with image processing technology to further automate readings by capturing and processing images of the meter display, potentially eliminating the need for manual input altogether. This would enhance convenience and accuracy, offering an automated backup in cases where consumers forget to enter readings. Initial tests have confirmed effective data transmission and remote display functionality, demonstrating that this system could significantly improve meter reading accuracy, efficiency, and consumer convenience, positioning it as a sustainable solution for modern utility management in Sri Lanka's domestic market.

Keywords: methodology, objectives, displays, software, testing

Full wedding planning web application in Sri Lanka

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Abstract

A wedding is a once-in-a-lifetime event and one of the most significant moments in a person's life. Therefore, it should be meticulously organized. Couples often find themselves exhausted while searching for the right service providers to make their wedding special. Finding the most suitable service providers within their budget is not only challenging but also time-consuming. This is where our one-stop wedding website comes in as a comprehensive solution to these issues. This comprehensive online platform allows couples to easily find and book every service provider they need for their wedding, such as salons, wedding halls, floral decorators, and jewelers. Couples can search for providers anytime and from anywhere. Because of that the process becomes effective and efficient by reducing the time and effort required to plan a wedding. With more service providers to choose from, couples might find better deals by comparing options and selecting packages that fit their budget. In this way, customer satisfaction can be achieved through quality service. The data to be collected through market research, surveys, and interviews identifies the primary challenges couples face during wedding planning and helps to refine the platform's features, focusing on searchability, ease of booking, and the efficiency of comparing service options. The platform benefits service providers by expanding their reach to natural audience. By consolidating wedding planning into a single, user-friendly platform, we simplify the process and address the complexities and inefficiencies of traditional methods, offering a more organized, efficient, and accessible solution for both couples and service providers. The final product shows promising results in simplifying wedding planning, allowing users to seamlessly access a wide range of services, reducing planning time, and improving satisfaction.

Keywords: Wedding, service providers, website

Decentralized Data Storage Network for Medical Researchers

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Abstract

This is a security concern in the case of patient-sensitive data when data is used for medical research. So, we introduce new ways of deploying a decentralized data storage network for medical researchers using blockchain technology to secure sensitive patient data. The primary goal of deploying a decentralized data storage system is to enhance the security and privacy of patient-sensitive data in medical research. The adoption of data decentralization is a major milestone in the development of security and privacy features of medical research. In this way, this new approach not only answers the imperative demands in the field of data protection but also places a common turn in front of how data can be stored, managed, and used. This network would promise, via blockchain technology, that the data records would be unalterable; hence, it would offer a very transparent and tamper-proof service for which medical researchers can trust. We could use blockchain technology for the data storage network. It's a way of recording information so that it is not possible or at least difficult for the system to be changed, hacked, or manipulated. Decentralized ledger technology—Blockchain in itself—is resistant to unauthorized tampering and can be ideal for maintaining sensitive patient data. Ledger technology can easily conduct transactions amongst computers within the network. In addition, every transaction is approved by the owner via a digital signature, which authenticates the transaction, hence protects it from manipulation. Therefore, information contained in this digital ledger is highly secured, since the digital ledger is basically a Google spreadsheet shared among hundreds of computers within a network where transactional records are stored based on actual purchases conducted. The interesting spin is in the fact that everybody can view the data, but nobody can corrupt it. Moreover, the utilization of smart contracts in this decentralized system allows for automated secured transactions, hence permitting researchers to access and share data without violating privacy or breaking regulatory requirements. The proposed system uses smart contracts, federated learning, and decentralized identity frameworks to enhance the security and ethical management of patient data in medical research. Smart contracts automate actions based on predefined conditions, enabling secure data management without ethical compromise. Federated learning allows multiple nodes to analyze data collaboratively without centralizing raw data, thus preserving patient privacy. Decentralized identity frameworks give patients more control, allowing them to decide who can access their data. This approach strengthens data security and regulatory compliance, addressing key privacy challenges in medical research while fostering ethical, patient-centered data handling. An important thing is that anyone cannot misuse the data under the guise of medical researchers. Decentralization, with these sets of advanced techniques, not only provides increased data security and ethical usage of patient information but also offers adaptability, creating a more productive collaboration environment for the researchers. Hence, the results of the medical research are more effective and innovative.

KeyWords – Decentralization, block-chain, security, network

Leveraging AI for mental health: Utilizing Llama 3.1 to detect and prevent mental health crises among social media users

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Abstract

Mental health crises have affected millions of people around the world, with social media users being among the most impacted. Annually, 700,000 people die by suicide, with the main reasons being mental health challenges and although many people suffer from the mental health crises such as stress, depression, and anxiety. As society evolves with technology, Artificial Intelligence (AI) has the potential to address these challenges. This research emphasizes to utilize the advanced capabilities of Llama 3.1, an open-source Large Language Model (LLM), to develop a comprehensive system designed to detect and prevent mental health crises among social media users. There are five innovative data gathering methods for this proposed system: social media analysis, wearable devices, communication patterns, smartphone usage patterns, and environmental factors. Additionally, the proposed system is combined with a three-level prevention strategy to help people suffering from mental health crises. In Level 1, users receive a notification from Llama 3.1, which informs about his mental state and recommends chatting with the AI psychologist; in Level 2, Llama 3.1 involves family support and network connections; and in Level 3, it triggers immediate intervention when the user's condition becomes critical. The system's integration of AI-driven analysis and multi-level intervention strategies not only focus on improving mental health outcomes but also aims to set a new standard in proactive crisis management within digital and social media environments. Real-world social media data can be used to validate this system by integrating them with an extensive testing simulation. In conclusion, the proposed system aims to leverage enhanced capabilities of the Llama 3.1 LLM to address identify mental health challenges, reduce the occurrence of the critical situations arises from mental health crises, and a decrease in suicide rates by providing early detection and timely intervention.

Keywords – Llama 3.1, Mental health, Large Language Model, social media, Prevent suicide

Autism Identification and Diagnostic System Using Machine Learning Algorithms and Artificial Intelligence

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Abstract

Diagnosing Autism Spectrum Disorder (ASD) is difficult because it often depends on subjective opinions and symptoms can vary widely. According to the current medical reports about 1 in 100 children has autism. ASD is a problem that affects a child's nervous system and growth and development. This paper suggests creating a new system called the Autism Identification and Diagnostic System (AIDS), a novel approach which integrates advanced machine learning algorithms with real-time behavioral data collection to help identify autism in children more accurately and earlier. Autism Spectrum Disorder can be identified facial expressions, features, eye contact and monitoring their behaviors. The proposed system uses advanced technology to collect information about children's behavior through wearable sensors and cameras. These sensors measure parameters like heart rate and skin responses, which can indicate how children feel. The cameras observe behaviors such as eye contact and social interactions. All this information is combined and analyzed using a deep learning model trained on numerous ASD cases. The proposed system aims to provide clear and measurable data for diagnosing ASD, which could reduce the need for subjective evaluations by doctors and improve the chances of catching autism early. By combining physical and behavioral data, the system can offer a better understanding of a child's situation, making diagnoses more accurate. Early studies indicate that AIDS could simplify the diagnosis process, assist doctors with solid information, and lead to quicker support for children who may have ASD.

Keywords: Autism Spectrum Disorder (ASD), Machine Learning Algorithms, autism

Enhancing Prosthetic Functionality:with Object Recognition and Adaptive Haptic Feedback Using Machine Learning

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Abstract

This research aims to enhance the user experience of prosthetic hands through object recognition and adaptive vibration feedback. Modern prosthetic hands, while functionally effective, but lack the natural, intuitive experience users seek, and there is a hard learning curve for the user. To address this, I propose a system using a camera module to visually identify objects and classify their properties, such as softness or hardness, into few different levels, enabling the prosthetic hand to adjust grip force accordingly. It is a hybrid approach where the user can command the hand through an EMG sensor, while the rest of the functions are automated. The methodology involves collecting a diverse sample of objects with different materials and hardness, training a machine learning model for accurate classification, and using that data for decide grip force. Using Force sensors define the ideal grip force. Evaluation includes accuracy metrics in object recognition, response times in grip adjustment, and user feedback on vibration feedback. In this prototype, three distinct vibration patterns indicate the properties of objects. By enhancing sensory and functional capabilities, this research not only advances prosthetic technology but also aims to improve the user's quality of life.

Keywords: Machine Learning, Prosthetic Hand, Object Recognition, User Experience, EMG

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Effect of Trees on the Stability of a Soil Slope: A Conceptual Study

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Abstract

The manner in which large root-structured trees influence slope stability is different from that of typical grass vegetation. Deep tree roots impart a relatively large amount of cohesive strength to the soil compared to shallow root structures of grass vegetation. Nevertheless, these large root-structured trees can have a detrimental effect on slope stability, due to their substantial self-weight. The aim of this study was to investigate the cumulative impact of tree weight, soil reinforcement due to tree roots, and spatial location/distribution of trees on slope stability by employing two modelling approaches in the GeoStudio software application. Approach 01 focuses on modeling the weight of the tree as an external load and approach 02 focuses on modeling the weight of the tree uniformly distributed over the root domain. All three components of a slope, such as face, crest, and toe were analyzed in this study using both approaches. Out of these two approaches, approach 01 obtained a relatively low factor of safety values in general, and hence can be considered the most conservative approach. It was found that, when the location of the tree moved upwards along the slope face, slope stability tended to reduce. Results also indicate that stability of the slope has improved when the trees are placed on the toe and the stability tends to decline when the trees are placed on the crest. Further, it was also revealed that having multiple trees in the slope face and toe improves the stability of the slope while the opposite occurs when multiple trees are placed on the crest. Additionally, overall findings also indicate that the influence of root cohesion surpasses that of tree weight in stability analysis. To enhance the practical applicability of this research, future studies are recommended to incorporate the effects of wind forces.

Keywords: Slope Stability, Tree Root Cohesion, GeoStudio Software, Factor of Safety, Spatial Distribution of Trees

Assessment of Stresses and Deformations of Pre-Stressed Concrete Beams

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Abstract

The prestressing method is introduced to give additional strength to concrete structures to withstand the higher loads acting on structures. Prestressing mainly deals with two methods, known as pre-tensioning and post-tensioning. Currently, the prestressing technique is widely used in the industry. Therefore, it is better to have a clear understanding of the long-term behavior of stress and strain of the prestressed concrete elements, when dealing with the serviceability stage. Different methods have been introduced to calculate the stress and strain of prestressed structures by various researchers in recent times. In this research, a state-of-the-art technique is adopted to analyze the stress and strain behavior of the prestressed concrete beams in different stages using a matrix approach. This research aims to popularize this matrix method by demonstrating and applying it to a large variety of structures to show its true potential. In this method, a user-defined arbitrary reference point is used to analyze the prestressed sections, and it should be a symmetrical section about a vertical axis to eliminate torsion. All required equations, derivations, and procedures are described in the methodology section to analyze both fully and partially prestressed sections. Further, this method is extended to analyze the behavior of creep and shrinkage of concrete, together with the relaxation of pre-stressing steel. It is also applicable for many load cases and load combinations and time intervals. To implement this approach, it is necessary to use creep factors, free drying shrinkage strains, and reduce relaxation. The analysis is done for both pre-tensioning, post-tensioning sections, and composite sections for different time intervals, and results are presented with scaled diagrams to show the changes in stress and strain in different time intervals. Therefore, this matrix approach is an accurate and unique method to analyze different types of sections for various time intervals.

Keywords: Matrix Approach, Prestressed Concrete, Reference Point, Curvature, Symmetrical Section

Biochar Application Potential for the Removal of Cyanotoxins from Contaminated Lake Water

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Abstract

Beira Lake in Colombo, Sri Lanka is presently eutrophicated due to the presence of Cyanotoxins, specifically with Microcystis sp. The release of Microcystin-LR from algae blooms in Beira Lake is mainly influenced by industrial and domestic effluents and stormwater discharges from the surrounding environment. Thus, the objectives were to monitor the Cyanotoxin content in Beira Lake using literature and create a prototype. A filter system is introduced as a prototype with biochar and sand used in a 1:1 ratio. The height and diameter of the filter column are 1" and 2" respectively and biochar and sand are packed in it alternately with a height of 2". A filter column without any media and a column with only sand was used for the controller and the all-filtration process was done with flow rates of 5, 10, and 15 ml/min. To collect the contaminated water sample, an area with a high algae population was selected in Southwest Beira Lake showing a value of MC-LR 2198.00 ± 0.14 ppb. To control the light, air, and ambient temperature components, the collected lake water was put in brown glass bottles, sealed, and brought in an ice box. To monitor the reduction of Microcystis producing Microcystin-LR, measurements were made according to a test plan of 30 samples under the stipulated flow rates. It was observed that in the filtration done under a low flow rate of 5 ml/min, Microcystis was successfully reduced compared to other flow rates. When compared with the controller column without filter media, its efficiency was shown to be more than 96% and compared to the column with only sand, it was observed that the efficiency of the biochar and sand filter column was higher. This system, made to a lab-scale model, shows more efficiency in removing Microcystis. It is therefore concluded that this economic novel system is an effective solution for the removal of Cyanotoxin from the lake water.

Keywords: Beira Lake, Cyanotoxin, Microcystin-LR, Microcystis sp

Assessing Toxicity and Microplastic Removal by Anthracite Water Filtration in Water Treatment: A Case Study in Ambathale Water Treatment Plant

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Abstract

The Kelani River in Sri Lanka facilitates 80% of the water demand in Colombo and 550,000 m^3 of the drinking water requirement in Greater Colombo. It drains across the most urbanized cities in the country, where waste from industrial zones is discharged to the river causing it to be affected by microplastics and toxic substances. Thus, assessing the water quality is crucial to ensure an effective water treatment process. The treatment process at the Ambathale Water Treatment Plant (AWTP) currently consists of screening, aeration, coagulation and flocculation, sedimentation, rapid sand filtration, and chlorine addition. Investigating the extent of pollutants and removal methods is vital to remove the above pollutants. Anthracite is a coal substance used to treat drinking water through adsorption. Samples for the microplastic identification and the toxicity assessments were collected from the Ambathale intake, from AWTP, and samples from the prepared anthracite filtration setup under two flowrates as 1 L/min and 1.5 L/min. Microplastic identification was conducted according to the NOAA's method while *Allium cepa* bioassay was applied as the toxicity indicator. The microplastics were identified as 920 $\pm$ 254 particles/m^3 in intake, 520 $\pm$ 69.28 particles/m^3 in treated water and 280 $\pm$ 40 particles/m^3 in water treated by anthracite under the lower flow rate. Considering the toxicity conditions, the Mitotic Index (MI) increased from 37.23% to 43.2% with anthracite filtration under a lower flow rate. The percentage of aberrations causing the genotoxicity was reduced from 3.73 ± 0.21% to 1.06 ± 0.49 relative to the intake sample. According to the above analysis, an anthracite filtration unit can be suggested for AWTP under a 1 L/min flow rate. Further developments to anthracite filters by testing with different filtration rates are warranted for enhancing the quality of drinking water.

Keywords: Kelani River, water treatment, microplastics, toxicity, anthracite, filtration

Application of Crumb Rubber Mortar in Plasterwork

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Abstract

Developed countries are concerned about recycling used tires. Crumb rubber can be produced from used tires in a wide variety of particle sizes and quality levels. Applying some quantities of crumb rubber as a partial replacement for fine aggregates for plasterwork is an eco-friendly option for reusing this material. The aim is to evaluate the effectiveness of crumb rubber as a partial replacement for fine aggregates in plasterwork. The objectives are to establish correlations between compressive and splitting tensile strength, and water absorption with different proportions of crumb rubber mortars and to evaluate the overall effectiveness of crumb rubber mortars for plaster applications. It is stated in the literature review that crumb rubber is added to the plasterwork with other chemicals. In adherence to a 1:4 ratio for cement, mortar mixes were prepared with 2 crumb rubber sizes (10 mesh and 30 mesh) additions of 0%, 5%, 10%, and 15% in partial substitute of fine aggregates mixed according to the water-cement ratio (0.68). The effectiveness of these mortar mixtures incorporating crumb rubber was evaluated based on compressive strength, tensile strength, and water absorption properties after 24 hours, 7 days, and 28 days. A comparative analysis with the control sample should confirm the objectives of the research. As the crumb rubber content increases, the compressive and splitting tensile strength decreases, and the water absorption increases. A higher mesh size reinforces these trends. Optimum results are achieved with a 5% rubber content at a 10-mesh size, which offers improved properties compared to the control sample.

Keywords: Crumb Rubber, Fine Aggregates, Plasterwork, Mortar Mixes

Analysis of Bamboo Walls - A Sustainable Bio-Engineering Method to Stabilize Slopes

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Abstract

Slope stability remains a critical challenge worldwide, and vegetated bamboo crib walls present a sustainable, eco-friendly alternative to traditional concrete solutions. This study aims to evaluate the effectiveness of bamboo crib walls in stabilizing slopes through a numerically validated model. A 2D finite element model was developed using Plaxis 2D software to simulate the performance of bamboo crib walls. The model was validated against experimental data from an existing study, with a factor of safety within a 4% margin of error. A parametric analysis was conducted to examine the influence of three key factors on slope stability: soil properties, crib wall geometry, and the impact of vegetation growth or bamboo deterioration over time. The analysis revealed that increasing the soil friction angle, cohesion, and crib-fill soil unit weight improved the factor of safety by approximately 9%, 9.7%, and 2.65%, respectively. Additionally, increasing the width and embedment depth of the bamboo crib wall enhanced slope stability. A cost comparison between bamboo and concrete crib walls was also conducted, revealing that while bamboo crib walls result in a slightly lower factor of safety (a 5.3% reduction), they are significantly more cost-effective. The material and construction costs of bamboo walls are 30 - 40% lower than those of concrete walls, making them a more economically viable solution for long-term slope stabilization in regions with limited resources. The findings suggest that while bamboo walls may offer a slightly reduced factor of safety compared to concrete, their lower cost and environmental benefits make them an attractive option for sustainable slope stabilization. Key design parameters—soil properties, material characteristics, and geometric dimensions—must be carefully considered to ensure long-term stability using bamboo crib walls.

Keywords: Slope stability, bamboo crib wall, numerical model, Plaxis 2D, parametric analysis, cost comparison

Developing Numerical Correlation between Dynamic Cone Penetration Rate and Sri-Lankan Coarse-Grain Soil Index Properties

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Abstract

Investigating soil properties is crucial in the road construction industry according to the standards and specifications because the quality and characteristics of the soil directly affect its stability and durability. Field and laboratory tests are conducted to obtain soil properties of the subgrade layer. Engineers often develop correlations to predict laboratory test results using in-situ tests due to the ease and time-saving characteristics of field tests. Dynamic Cone Penetration (DCP) test is widely used to predict the California Bearing Ratio using developed correlations worldwide, even in Sri Lanka. Developing a numerical correlation for DCP rate and soil index properties, including Plastic Limit, Liquid Limit, and Plasticity Index, is essential due to the lack of previously developed correlations, and it would help to increase the frequency of the testing locations. The present research aims to develop a numerical correlation between DCP Rate and soil index properties for coarse grain soil, providing a time-saving alternative to the conventional Atterberg Limit Test and enabling the prediction of soil index properties, using field and laboratory test data. The regression analysis was performed using MATLAB software as an analyzing tool to obtain a correlation with a target coefficient of determination greater than 0.705 for each soil category, which is categorized according to the Unified Soil Classification System (USCS). Single and multiple linear, polynomial, and bivariate regressions were conducted in the present research using the curve fitting toolbox in MATLAB software. The present study provides a best-fit numerical correlation represented by a bivariate equation with a higher coefficient of determination value of 0.76 for silty sand with validated results.

Keywords: Dynamic cone penetration test, California Bearing Ratio, Coefficient of determination

Modeling and Evaluation of Alternate Load Paths in Urban Concrete Building

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Abstract

This research investigates the viability of employing Modeling and Evaluation of Alternate Load Paths in Urban Concrete Building in compliance with established guidelines. Two buildings were modeled and evaluated using ETABS 2017 software in compliance with EN 1998-1: Eurocode 2 and PSHA regulations. The aim is to assess how concrete buildings can maintain structural integrity and prevent progressive collapse when their main columns are compromised by vehicle collisions and how effective alternative load paths are in redistributing forces within this building during collisions. This research objective is to develop a concrete structural model for load path definition and identification of alternative load paths and Structural building during vehicle collisions and changes in the building due to the resulting vehicle crash and real-world case studies of vehicle collisions in buildings. Some of the main conclusions include enhanced building resilience in high seismic zones, insights from ETABS analysis for structural design optimization, and sufficient stability following column removal scenarios per Eurocode 2: En 1992-1-1. A comparison of models constructed following PSHA and Eurocode 2 criteria reveals that the former is more resilient to progressive collapse. This work clarifies the behavior of structures under different impact conditions. A comparison with the World Trade Center incidents emphasizes the importance of alternative load transfer methods to preserve the structural integrity and safety of buildings. The columns above the removed columns exhibited lower DCR values, indicating that they were not significantly affected by the removal, indicating strong load redistribution. The ability of a building to withstand unforeseen events can be strengthened through proactive construction design, innovative maintenance strategies, and stakeholder engagement. Long-term research is needed to improve system resilience and protect individuals and their property from evolving risks.

Keywords: Alternate Load Paths (ALP), Demand for Capacity Ratio (DCR), Probabilistic Seismic Hazard Analysis (PSHA)

Assessing the Impact of Urbanization on Flood Occurrences around Kaduwela Municipal Council and Kolonnawa Urban Council

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Abstract

Urbanization is a primary driver of increased flood risk. The rise in impermeable surfaces and lack of proper drainage systems can lead to flood hazards. In the Grama Niladhari Divisions within the Kaduwela Municipal Council (KMC) and Kolonnawa Urban Council (KUC), some of the fastest urbanizing regions in Sri Lanka due totheir strategic locations, significant flood impacts were observed in the years 2010and2016. Utilizing satellite imagery and Geographic Information System tools, Land Use and Land Cover (LULC) maps were delineated for the years 2010 and 2016, as well as for 2016 and 2023. Relevant data for the LULC maps were gathered from satellite images. Landsat 8 Collection 2 Level 2 was used for 2016 and 2023. Since Landsat 8 has been operational only since 2013, Landsat 5 was used for the year 2010. Using these satellite images, changes in land cover, including water bodies, built-up areas, vegetation, barren lands, and wetlands, were identified. A supervised classification approach was employed to distinguish these land changes. The Maximum Likelihood Classification algorithm was applied with user-provided training samples, resulting in classified images for each year. These images were classified into five different land cover categories: water bodies, built-up areas, vegetation, barren lands, and wetlands. Values were then assigned to each class, and polygons were delineated around the sample boundaries, producing a polygon output. An accurate assessment was conducted for the validation of the classified images. The Kappa coefficient obtained was above 85%, indicating a strong match between the classification and reference data. The data allowed for a comparison of LULC changes from 2010 to 2016 and 2016 to 2023. This analysis illustrates the extent of urbanization over time. The study highlights changes in LULC within KMC and KUC in 2010, 2016, and 2023. These findings provide valuable information for policymakers and urban planners, supporting the development of innovative and sustainable urbanization solutions.

Keywords: LULC, GIS, Image Classification, Maximum Likelihood Classification

Effectiveness of Various Structural Forms in Medium-rise Buildings Subjected to Lateral Loads

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Abstract

Sri Lanka's diverse topography necessitates careful consideration of wind loads in structural design, especially for medium-rise buildings exposed to varied wind zones. This research addresses a critical gap in designing these structures to effectively resist lateral wind forces, which significantly impact stability and safety. By analyzing current design practices and identifying their limitations, this research aims to determine a structural design that balances stability and cost-efficiency in 10-story reinforced concrete (RC) buildings, with specific objectives to assess lateral stability, minimize inter-story drift, and evaluate cost-effectiveness under varying wind conditions. Four structural models were developed in ETABS software as Finite Element Models (FEM): M1 (bare frame structure), M2 (frame with internal partition shear walls), M3 (frame with L-shaped shear walls at four corners), and M4 (frame with both L-shaped corner and partition shear walls). Each model was subjected to dead, live, and wind loads, based on local conditions specified by Sri Lanka's Zone Three wind-loading maps, which include variable wind speeds and directions. The methodology involved simulating load combinations to capture real-world structural responses, focusing on parameters such as top-story displacement, inter-story drift ratios, and member forces. The results reveal that the M3 configuration, with L-shaped shear walls, offers effective drift control and lateral stiffness while reducing structural weight and material costs, achieving a strong balance of performance and affordability. Although M4 provides even greater stability, the additional material and labor costs suggest an overdesign for medium-rise applications. The study concludes that the M3 design optimally addresses the challenges of wind-induced forces, providing valuable insights into the design and construction of resilient, cost-effective structures suited to urban environments facing high wind loads.

Keywords: Medium-Rise Buildings, Lateral Loads, Shear Walls, Structural Stability, Cost-Effectiveness

A Modular Automated Guided Vehicle Platform for Embedded Systems Education

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Abstract

The rapid evolution of embedded systems and robotics necessitates versatile and accessible educational tools. This research introduces a Modular Automated Guided Vehicle (AGV) designed as a flexible, scalable platform for embedded systems education. Unlike conventional static setups, this AGV features modular, interchangeable components that allow for a diverse range of experiments, including sensor integration, motor control, and obstacle navigation. To further enhance adaptability, the design includes 3D-printed slots and custom PCBs with JST connectors, enabling quick assembly and reconfiguration. The AGV's modular nature also facilitates experiments in path planning, obstacle detection, and avoidance, allowing students to learn the fundamentals of AGV behavior and customize their learning experience by swapping modules that represent different AGV functions. The system is controlled by an ATmega32A microcontroller programmed in Embedded C, with observable improvements in assembly efficiency and expanded learning opportunities compared to traditional Embedded systems teaching methods. Testing demonstrated its effectiveness in bridging theoretical knowledge with practical skills, providing an efficient and impactful hands-on educational experience. This platform offers a cost-effective, adaptable solution that meets the growing demand for real-world experimentation in engineering curricula, empowering students to understand and apply complex engineering principles in embedded systems. The successful implementation of this AGV highlights its potential to advance embedded systems education and enhance the quality of engineering programs.

Keywords: Modular AGV, Embedded Systems Education, Robotics, Experimental Learning

A Standalone Off-Grid Renewable Energy Solution for Powering Mobile Base Transceiver Stations in Remote Areas in Sri Lanka

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Abstract

A major obstacle to the telecommunications industry's deployment of Base Transceiver Stations (BTSs) in remote areas is the lack of on-grid infrastructure for powering-up. These BTSs have traditionally been powered by diesel generators, contributing to air pollution while introducing high operating and maintenance costs. The proposed method incorporates an adaptive power management technique to provide an optimal solution with a reduced carbon footprint and high Quality of Service (QoS). The solution proposes a hybrid system which utilizes solar powered renewable energy system integrated to a diesel generator and a battery backup. Introduced adaptive power management technique incorporates a Maximum Power Point Tracking (MPPT) charge controller which switches between seven operating modes for efficient power management. In addition, a call queuing method is explored to further reduce the power consumption of the BTS. Call queuing is a technique where incoming calls are temporarily held in a queue when the BTS is at full capacity. This allows the system to prioritize calls and allocate resources efficiently. In addition, the techno-economic analysis carried out confirms that the proposed hybrid system architecture is more cost effective and environment friendly compared to using traditional BTS powering options. By actively managing user activity and strategies utilizing sleep or off modes, the system can achieve substantial power savings with better QoS. Results confirm that on average, the call queue power management technique could potentially achieve a total power saving of 4.56%. Specifically, in remotes areas in Sri Lanka, this method is a good approach to reduce the power consumption as the number of users are very less.

Keywords: Hybrid Power System, Base Transceiver Stations, Renewable Energy, Maximum Power Point Tracking

Smart Medibox and Monitoring System

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Abstract

Medication adherence is a critical challenge, particularly for elderly populations and individuals with chronic conditions, where missed doses or incorrect intake can have serious consequences. To address this issue, our project introduces a "Smart Medibox" and monitoring system aimed at improving medication management. The Smart Medibox features electronic compartments that automatically dispense medication at scheduled times while providing timely reminders via customizable alerts. This system stands out from existing solutions due to its cost-effective design, making advanced medication management accessible without compromising essential features. The system is powered by an ESP32 microcontroller, which controls the timing, management, and connectivity functions of the device. Integrated DHT11 temperature and humidity sensors, along with a heart rate sensor, ensure precise monitoring of both medication storage conditions and patient health metrics, reducing the likelihood of human error. Additionally, the monitoring system records medication intake data in real-time, accessible remotely by caregivers and healthcare providers through Wi-Fi connectivity, enabling timely interventions. The design methodology focused on hardware and software integration using the ESP32 platform, with sensor data processed and analyzed to ensure accurate adherence tracking and reliable operation. The Smart Medibox system achieved around 85% accuracy in adherence tracking during testing, demonstrating reliable functionality in both dosage management and patient monitoring. The temperature and humidity inside the medication compartments were maintained within ±2°C and ±5% RH, respectively, ensuring optimal storage conditions. However, taking accurate measurements with the DHT11 sensor presented a challenge, and minor calibration adjustments were required for the heart rate sensor across different user profiles. Additional connectivity options and expanded integration with healthcare systems are also envisioned, further enhancing personalized care.

Keywords: Smart Medibox, Monitoring System, Medication Adherence

Comparative Analysis of Orthogonal and Non-Orthogonal Pilots in Cell-Free Massive MIMO for Optimal Performance

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Abstract

MIMO technology uses multiple antennas for enhanced wireless communication performance. This work addresses reduced data rates in wireless communication caused by improper channel estimation using orthogonal or non-orthogonal pilots. The objective is to identify the most suitable pilot type in cell-free massive MIMO systems to enhance wireless connectivity and optimize data transmission. The methodology involves comparing linear receivers' performance by defining AP antennas, users, and channel models, and using linear precoding to evaluate data rates. Channel estimation is derived using the Least Squares (LS) technique by modeling received pilot signals, deriving residual functions, and calculating path loss. The data rate for cell-free massive MIMO is computed by estimating channel coefficients, calculating “Normalized Mean Square Error”, and plotting against pilot power. Finally, simulation is performed to plot and compare data rates for orthogonal and non-orthogonal pilots, analyzing system performance. The results demonstrate significant advancements in wireless communication, with the sum rate increasing from 45 to 140 bps/Hz as SNR improves. “Maximum Ratio Combining” saturates at high SNR due to noise, while MMSE outperforms at low SNR. Least squares estimation proves effective at high SNR, accurately estimating channel coefficients. Fewer users enhance rates for both pilot types, with orthogonal pilots outperforming non-orthogonal ones by eliminating interference. Least Squares estimation demonstrates robust performance at high SNR, specifically up to 40dB. This study shows orthogonal pilots improve data rates in cell-free massive MIMO by reducing interference, especially at high SNR. Least Squares estimation further boosts accuracy, making it ideal for wireless networks. Future research will explore Artificial Intelligence for better channel estimation and complexity.

Keywords: Orthogonal Pilots, Non-Orthogonal Pilots, Least Squares estimation, Massive MIMO, Normalized Mean Square Error

Vision-Based Template Identifier

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Abstract

The Vision-Based Template Identifier is a critical technology for the clothing industry, enabling real-time identification and classification of care labels using advanced computer vision algorithms. This system ensures accurate labeling, improves quality control, reduces errors, and enhances customer satisfaction by providing correct care instructions. The research addresses a significant gap: the lack of a comprehensive automated system for accurate fabric label classification, reducing human error, and ensuring compliance with diverse regulatory standards. The system is developed using OpenCV and Tesseract libraries, enabling real-time identification of care labels by matching them with their batch numbers. The code leverages Python libraries such as Pytesseract for text recognition, Pillow for image manipulation, OpenCV for computer vision, and Numpy for mathematical operations. Key functionalities include setting the Tesseract OCR engine path, defining the recognize_text function for extracting text from images, and the template_matching function for identifying template images within larger images using a confidence threshold. The main function initializes the camera and continuously processes grayscale images to identify care labels and their corresponding batch numbers. The system is adaptable, allowing easy integration of new care label types by adding new batch codes using simple conditional statements, making it suitable for industrial use. It accurately identifies care labels with batch numbers and notifies users when no template is detected. The prototype is equipped with a camera module and LED lighting, the system captures high-quality images, ensuring precise label and symbol identification. This technology enhances inventory and supply chain management through real-time data collection, reducing errors, ensuring compliance, and avoiding costly recalls, thus preserving brand integrity and operational efficiency in the global textile industry.

Keywords: Real-Time Data Capture, Computer Vision, Care Label Classification, Sustainability

Design and Development of a Portable Weather Station Capable of Measuring and Displaying Temperature and Humidity

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Abstract

This device addresses the limitations of traditional weather stations, such as bulkiness, difficulty in transportation, proneness to damage during movement, complicated operations, inaccurate data, slow real-time monitoring of data, and high-power consumption. This portable weather station has been developed to measure and report essential environmental conditions, including temperature and relative humidity (RH). This device provides the current and future need that users want for portable, precise, and easy-to-use weather observation instruments, especially in areas where a standard weather station cannot fit. This device uses a DHT11 sensor for temperature measurement with an accuracy of ± 0.5°C and humidity with an accuracy of ± 3% RH, tested through multiple calibration tests and compared to highly accurate standard references in climatic chambers. Real-time weather updates are displayed on a 128x64 OLED. It is powered by two rechargeable 3.7V batteries. The temperature range is 0-50°C, and the RH range is 20-90%. An infrared (IR) sensor detects when a user is nearby and activates the display. A push button also allows users to toggle the display on or off by pressing it for about 5 seconds. This helps to save power. This device displays only the current temperature and humidity. The weather station weighs 350g and has dimensions of 90mm in height and 100mm in length and width. The system design makes it particularly suitable for use in athletic events, agricultural practices, and other activities where knowing current weather conditions is crucial. Future developments will include capabilities like real-time data storage and transfer, which will enable users to send data to mobile apps or cloud platforms for remote monitoring. The system may also show current time and location. Further reducing the size for increased portability and field usability is planned.

Keywords: Portable Weather Station, Ambient Temperature, Relative Humidity, DHT11 Sensor, OLED Display

Contemporary Agriculture: Strengthening with the Radio Frequency Identification

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Abstract

By 2050, there will be 9.7 billion people on the planet, up from the current 7.3 billion. A greater agricultural component results from improved global food demand. Because of its unique nurture, it primarily relies on the application of contemporary technical components with the goal of enhancing production, sustainability, and efficiency. Risk and unpredictability have an impact on agriculture, which is why real-time agricultural information based on current technology is necessary. One important modern technology that has been created during the last 20 years is radio frequency identification, or RFID. By connecting via two points known as "tag" and "reader," its applications in smart agriculture ensure precise traceability from farming locations to the end user. The applications and difficulties of the RFID technique in agriculture are covered in detail in this paper. Using a qualitative methodology, the study focuses on content analysis of the body of extant literature. In agriculture, RFID essentially tracks environmental, soil, plant growth, and postharvest-related factors. The system also provides automated data and quality information, improves supply chain visibility, optimizes resources and precision agriculture, authenticates products, and more. Enhancement of traceability is a crucial component of RFID that offers advantages in an efficient, precise, and secure manner. The approach's challenges include the initial investment cost, labor and time requirements, issues with data integration and exchange, high technological requirements, privacy and security issues with the data and the detrimental effects of harsh conditions on the data. RFID addresses certain issues while pointing to the many agricultural improvements. The technology's minimum potential is still being used, and when integrated with other technologies and thoroughly researched, it will lead to more affordable, long-lasting agricultural solutions.

Keywords: Agriculture, Modernization, Radio Frequency Identification

Exploring the Viability of a Candidate Nuclear Reactor as a Solution for Sri Lanka's Energy Requirements

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Abstract

Sri Lanka faces a critical energy crisis, necessitating exploration of alternative energy sources. As traditional fossil fuels grow less viable and environmental sustainability becomes paramount, this study investigates nuclear energy's potential to support Sri Lanka's energy needs. Utilizing a Pragmatism research methodology with a qualitative inductive approach and cross-sectional time horizon, this research examines nuclear power's feasibility, identifying suitable reactor technologies and evaluating essential safety measures for public and environmental welfare. Key objectives include assessing nuclear energy's potential as a sustainable base-load option, identifying candidate reactors tailored to Sri Lanka's needs, and outlining stringent safety and security measures. Despite inherent challenges such as radioactive waste and public apprehension, nuclear power offers a low-carbon alternative that aligns with the country's sustainability goals. Diplomatic collaboration is emphasized to enhance nuclear governance compliance. To address safety concerns, the research reviews historical nuclear incidents such as Three Mile Island (1979), Chernobyl (1986), and Fukushima (2011) and explores lessons learned in safety protocols and emergency preparedness. It stresses the importance of operational safety, maintenance, and cultivating a safety culture among nuclear operators. Additionally, comprehensive strategies for risk management, waste disposal, and biodiversity conservation are outlined, with a focus on tailored protocols for coastal reactor installations. It recommends integrating nuclear energy with renewable investments, proposing a reactor capacity between 600 MW and 900 MW. Potential candidates like the Gen III+ AP1000 or Gen IV Floating Nuclear Power Plant are discussed in relation to the country's geographical constraints. Ultimately, a balanced approach combining nuclear power with robust safety protocols could sustainably address Sri Lanka's growing energy demands.

Keywords: Nuclear Power, Sustainability, Reactor Safety, Base Load, Energy Crisis

Mini Two-Wheel Self Balancing Robot

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Abstract

Wheeled robots have gained significant attention due to their efficiency and mobility compared to humanoid robots, particularly in controlled environments. This research aimed to develop and evaluate a mini two-wheel self-balancing robot leveraging an inverted pendulum model for enhanced stability and movement on inclined surfaces. The structured design of the said robot, with the aid of Proportional-Integral-Derivative (PID) control mechanism, assists it in balancing on flat and inclined planes. For the control algorithm implementation, the ATmega328P microcontroller is utilized due to its versatile and compatible properties. Key hardware components include the MPU-6050 sensor for real-time tilt and detection, the L293B motor driver for efficient motor control, and a 12V DC motor with an encoder to drive the wheels. The design considerations focused on selecting lightweight, durable, and cost-effective components to optimize both functionality and ease of use. In testing, the robot successfully balanced itself on flat surfaces but encountered challenges on inclined planes, requiring further tuning of the control parameters. The robot's balance on inclined planes was not smooth, suggesting that additional investigation is necessary to enhance its stability on inclined terrains. Despite its limitations, this study demonstrates the effectiveness of a compact, self-balancing robotic system with potential applications in educational robotics and autonomous navigation tasks in constrained spaces.

Keywords: PID, Mobility, Stability, Two-Wheel Self-Balancing Robot, ATmega328P

Design and Analysis and Verification of Pattern Reconfigurable Patch Antenna using Fractals

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Abstract

This research presents the design and analysis of a reconfigurable patch antenna capable of operating across multiple frequency bands. The novelty of this work lies in the development of a steerable patch antenna, which offers enhanced beamforming capabilities and precise control over the radiation pattern, thereby enabling more efficient and targeted wireless communication. The design methodology incorporates fractal geometry to enhance the antenna's performance and versatility. Initially, various fundamental patch shapes (rectangular, triangular, and circular) were evaluated to select the most suitable candidate for the reconfigurable design. Triangular geometries demonstrated superior bandwidth characteristics (6.5GHz, 8.4GHz- Multiband), leading to the choice of a triangular patch antenna as the foundational structure. Fractal elements, inspired by snowflake patterns, were integrated into the triangular patch antenna. Two such fractal-enhanced patch antennas were then combined to form an antenna array. PIN diodes were strategically placed within the antenna structure to enable reconfigurability. The final antenna design, incorporating dual snowflake patches and pin diodes, operates at frequencies of 2.6 GHz to 7.4 GHz, while covering a wide frequency range due to its reconfigurability. When comparing the ON and OFF states of the antenna, it was observed that in the ON state (with the PIN diodes in a forward-biased condition), the return loss increases slightly, indicating higher reflection at the input. In contrast, when the PIN diodes are in the OFF state (passive bias), the antenna exhibits a lower return loss, reaching a minimum value. The antenna design illustrating its potential for applications in scenarios requiring both frequency agility and directional control and this study contributes to the field of antenna engineering by presenting innovative design methodologies and enhancing the understanding of pattern reconfigurability in patch antenna.

Keywords: Multiband Fractal Antenna, Snowflake Fractal, PIN Diode

Solar Flower: Enhancing the Efficiency of Traditional Solar Panels in the Industry in Extracting the Best out of Solar Energy

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Abstract

Fixed solar panels are inherently limited by their stationary nature, capturing sunlight only at specific times and angles, which reduces their efficiency and energy-harvesting potential. To achieve comparable energy output, fixed panels require a larger surface area and may suffer reduced effectiveness during weather fluctuations. Furthermore, conventional solar panels often lack aesthetic integration, potentially detracting from their adoption. This study investigates the potential for enhanced solar energy harvesting through the implementation of rotating solar panels, which track the sun's movement throughout the day. By optimizing solar exposure, these panels increase energy generation, offering a more sustainable and eco-friendlier alternative to traditional energy sources, which have a substantial environmental footprint. The design integrates light-dependent resistors (LDRs) to automate the rotation and expansion of panels based on sunlight intensity, retracting them after daylight hours to preserve rooftop space. While the added mechanical complexity introduces higher costs, the trade-off is an increase in energy output. To quantify this, both rotating and fixed panels with identical specifications (wattage, efficiency) were subjected to a comparative analysis. Energy harvesting was measured under consistent conditions from 10:30 a.m. to 3:30 p.m. using a portable weather station to monitor ambient temperature, sunlight intensity, and other environmental variables. Real-time data logging facilitated the accurate comparison of energy output in kilowatt-hours (kWh). Results indicated that the rotating panels harvested twice as much energy as the fixed panels, highlighting the significant advantage of solar tracking in optimizing energy production. This study concludes that while rotating solar panels involve higher upfront costs due to mechanical systems, their enhanced energy-harvesting capabilities and contribution to sustainable energy solutions make them a viable alternative to fixed solar panels.

Keywords: Solar Energy, Energy Harvesting, Rotating Solar Panels

Analogue Mini Line Following Robot: A Study on Circuit Simplicity, Precision Control, and Real-Time Navigation

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Abstract

This project presents the design and implementation of an analogue mini line-following robot using simple and cost-effective analogue components, including two LM358 operational amplifiers, two TCRT5000 infrared (IR) sensors, two potentiometers for sensitivity adjustment, and N20 DC motors, two D882 NPN transistors for motor control. The robot is designed to autonomously follow a black line on a white background. The TCRT5000 IR sensors are employed to detect the contrast between the black line and the white surface. The sensors output an analog signal corresponding to the reflected IR light, which varies based on the surface color. These signals are then processed by the LM358 op-amps, which function as comparators to differentiate between the high and low voltage levels corresponding to black and white surfaces. A potentiometer is integrated into the circuit to fine-tune the sensitivity of the TCRT5000 sensors, allowing for precise detection of the line in varying lighting conditions. The processed signal from the LM358 is then used to drive the N20 DC motors via D882 transistors, which act as a switch to control the power supplied to the motors. The selection of the NPN transistor D882 is due to its high collective current and the transistor can provide up to 3A to the motors if required. The two N20 DC motors, which power the robots' wheels, are managed by the processed signals from the op-amps. The robot can continue along the line by altering the motor's speed and direction in response to the sensor inputs. Testing of this robot was done on a black color track on white surface and tuning the potentiometer to a suitable sensitivity to only pick up the reflected light from the emitter. It offers a practical introduction to sensor integration. analogue signal processing and motor control. The challenge in this project is implementing all the components in a limited space making the robot compact and portable.

Keywords: Compact, Analogue, Autonomous, Mini Line Following Robot, Navigation

Real Time Student Behavior Recognition System for the Physical Classroom Environment Based on Deep Learning

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Abstract

This study introduces a real-time Student Behavior Recognition System (SBRS) that leverages deep learning to support classroom engagement analysis. Using convolutional neural networks (CNNs) with a VGG16 backbone and key point regression algorithms, the SBRS monitors student behaviors such as sleeping, phone usage, talking, concentration, and gaze direction based on posture detection. VGG16 was selected for its accuracy and computational efficiency, and the model was optimized through hyperparameter tuning (learning rate of 0.001, batch size of 32) and data augmentation with Albumentations (including random cropping, flipping, brightness adjustments, gamma shifts, and RGB shifts) to address varied lighting conditions, camera angles, and human presence. A diverse dataset sourced from Kaggle, with resolutions ranging from 640x480 to 1280x720 pixels, enabled robust model training. Performance metrics included 70% accuracy, with precision at 68%, recall at 72%, and an F1 score of 70%. The system's deployment with 640x480 low-resolution cameras achieved a balance between real-time responsiveness and cost-efficiency. Challenges such as lighting variations and inconsistent human presence were mitigated through data augmentation and dropout layers. Future work aims to enhance SBRS with face recognition for automated attendance tracking and report generation, further improving classroom management. The successful deployment of SBRS demonstrates the potential of deep learning to enhance educational environments, providing educators with an effective tool for real-time student behavior and engagement analysis.

Keywords: Student Behavior Recognition System (SBRS), Deep Learning, Convolutional Neural Networks (CNN), Real-time Engagement Analysis, Pose Detection and Key point Regression

Highly Accurate Landmark Detection System for Driver Drowsiness Monitoring

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Abstract

This work aimed to develop an advanced driver monitoring system with a primary focus on driver identity detection and drowsiness monitoring. The system integrates several deep learning models optimized for performance in varied lighting conditions. Key stages of data preprocessing included labeling, dataset partitioning, and augmentation to enhance model robustness. Initially, the VGG16 and YOLOv5 models were tested for driver identity detection, but these models did not achieve sufficient accuracy for drowsiness detection. Subsequently, the Inception V3 model demonstrated superior performance, offering high accuracy in detecting drowsiness under different lighting conditions. The model's reliability enabled it to act as an alert trigger, activating an alarm when drowsiness was detected, thus forming a feedback loop for driver safety. This study also entailed designing an Android application for practical deployment, although challenges related to hardware consistency initially delayed progress. Development continued within the VS Code environment, focusing on integrating the monitoring system with the app's interface. The application is intended to continuously monitor driver drowsiness and provide timely alerts, enhancing on-road safety. The comprehensive approach undertaken highlights ongoing efforts in code debugging and final system integration, with a continuous commitment to adapting and refining the model to maximize monitoring accuracy and integration ease. Ultimately, this study concludes that Inception V3, combined with real-time feedback mechanisms, offers a promising solution for effective driver monitoring in real-world applications.

Keywords: Deep Learning Models, Lighting Conditions, Data Preprocessing, Augmentation, Drowsiness Detection

A Custom Spectral Imaging System Optimizing RGB Cameras for Efficient Spectral Data Capture in Industrial Applications

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Abstract

This study presents a novel imaging system that adapts low-cost RGB cameras for spectral data capture, reducing dependency on specialized hyperspectral devices in industrial applications. By leveraging deep learning algorithms, we transformed standard RGB images into accurate spectral representations, a step forward for industries seeking affordable spectral imaging solutions. The research specifically addresses the technical challenge of spectral data estimation by utilizing a Convolutional Neural Network (CNN)-based model, where extensive hyperparameter tuning covering learning rates, batch sizes, and network architecture optimized model accuracy and efficiency. Metrics such as Mean Absolute Error (MAE) and Structural Similarity Index (SSIM) were employed to validate the performance of our model, achieving detection accuracies exceeding 85% in controlled testing scenarios. Further, the RGB cameras were modified to improve spectral capture capabilities, focusing on lighting techniques that include diffused lighting to enhance data quality by minimizing shadows and ensuring uniform illumination. Our system was tested on fabric samples to detect defects, achieving a 15% reduction in false positives compared to baseline models and underscoring the system's practical value. These quantitative results highlight its effectiveness for non-invasive fabric inspection, meeting an industry need for rapid, reliable testing. Beyond fabric analysis, the technology demonstrates adaptability, supporting multiple spectral imaging tasks with minimal reconfiguration. This versatile approach broadens potential applications across industries, from material quality control to biomedical imaging. Upcoming studies will evaluate the system's adaptability for diverse industrial settings, positioning it as a scalable alternative to traditional hyperspectral imaging solutions.

Keywords: Spectral Imaging, RGB Cameras, Deep Learning, Hyperparameter Optimization, Fabric Defect Detection

Deep Learning Enhanced Synchronization and Stability Analysis of Optical Injection Locking Systems

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Abstract

Optical injection, the process of introducing an external optical wave into a laser cavity, enhances power output, reduces noise, and improves frequency stability. Developing advanced Optical Injection-Locked (OIL) systems is vital for next-generation photonic technologies. Traditionally, stability and synchronization assessments of OIL systems rely on analytical and experimental modeling methods that are both costly and time intensive. This study presents a novel approach using deep learning, specifically an artificial neural network, to predict stability and synchronization in OIL systems. A dataset of 4,000 samples, equally divided across four operational states (Stably Locked, Unstably Locked, Chaos Synchronized, and Free Running), was used to train and validate the model. The proposed model architecture includes a single hidden layer with 10 neurons, selected based on preliminary trials balancing computational efficiency and prediction accuracy. The neural network was trained on normalized data using Min-Max scaling, achieving 90% accuracy after 5,000 iterations with an optimized learning rate of 0.1. Upon cross-validation with calibration data, the model demonstrated 95% accuracy on unseen data, underscoring deep learning's effectiveness for this application. Future work will explore advanced architectures, such as Convolutional Neural Networks (CNNs) that process power spectra plots, as a potential method for further automating stability and synchronization predictions in OIL systems. This study highlights the potential of modern machine learning techniques to bridge the gap between theoretical models and practical implementations in photonic systems.

Keywords: Optical Injection Locking (OIL), Stability and Synchronization, Min-Max Scaling, Power Spectrum Analysis, Photonic System Automation

Deep Learning Guided Optimization of Laser Beam Steering in Free Space Communication

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Abstract

Laser beam steering is crucial in Free Space Optical (FSO) communication due to the growing demand for stable, high-speed data transfer. Traditional methods of beam steering face challenges like atmospheric turbulence and misalignments, often resulting in signal dispersion. This research introduces a novel approach by employing a Deep Learning (DL) model to optimize FSO communication. Specifically, the model predicts and adjusts Zernike coefficients and spot displacement in real time, thereby enhancing link stability under variable atmospheric conditions. Our DL model architecture, based on a Convolutional Neural Network (CNN), is trained using a comprehensive dataset derived from previous studies. Training leverages the Adam optimizer, chosen for its efficiency in handling large datasets and reducing computational load. The model achieves a mean accuracy improvement of 15% over traditional algorithms in simulating atmospheric disturbance scenarios, quantified using Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) metrics. This quantifiable performance boost validates the efficacy of the DL model in stabilizing communication links. Future research will focus on expanding the dataset to include more diverse environmental conditions and further refining the model to adapt to real-time changes. This work holds promise for the development of resilient FSO communication systems, contributing to the advancement of next-generation communication networks.

Keywords: Free Space Optics, Laser Beam Steering, Zernike Coefficient, Spot Displacement, Adam Optimizer

Arduino Robotic Arm with Soft Gripper

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Abstract

This research presents the design and development of a robotic arm equipped with a soft gripper, engineered for applications that require safe **a**nd precise handling of delicate objects. The robotic arm, inspired by the movement of the human arm, utilizes servo motors for accurate control of joint angles. The novelty of this work lies in the integration of a soft gripper, crafted using Thermoplastic Poly Urethane (TPU) material, which can manipulate fragile items without causing damage, making it suitable for industrial, healthcare, and agricultural environments. It supports lifting capacities up to 500 grams. The arm is controlled via Arduino IDE, chosen for its accessibility and ease of use. Methodologically, this study involved the systematic testing of components, such as servo motors and Arduino boards, followed by their integration into a lightweight structure made from Aluminium and 3D printed parts. The arm's performance was validated through a series of tests, demonstrating its ability to handle items within a temperature range of -40 to 110 degrees of Celcius, thus mitigating risks associated with manual handling in industrial settings. This work underscores the potential of combining electronics, programming, and mechanical engineering to develop versatile robotic systems. The results highlight the arm's capability to enhance safety and efficiency across multiple sectors, with the soft gripper marking a significant improvement in robotic manipulation technology.

Keywords: Soft Gripper, Robotic Arm Design, Arduino Programming

Analog Mini Line Following Robot

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Abstract

Developing a compact and efficient line-following robot for autonomous navigation presents challenges in accuracy and responsiveness on predefined paths. This work addresses these challenges by designing an analog mini line-following robot capable of following a black path on a white background without digital coding. Notably, the use of analog components eliminates the need for coding, simplifying the design and physical footprint compared to digital alternatives. The robot was designed to automatically follow a predefined black path on a white background using infrared sensors which resemble the eye of the robot. The array of sensors which were connected to the LM358 comparator ensures that the robot stays on track according to the information picked by the infrared sensors. The wheels are controlled by DC geared motors which are connected to the output of the comparator and transistors. The main objectives of this work are to follow the designated path and provide real-time feedback according to the information picked from the sensors with the least amount of physical footprint. Experimental results confirm the robot's ability to follow simple paths with minimal deviation, highlighting its reliability. Potential future improvements could include optimizing control parameters to increase efficiency and extending its application to obstacle detection devices, automated carriers, and small household devices.

Keywords: Analog Line Following Robot, Infrared Sensors, LM358 Comparator, DC Geared Motors, Compact Design

Determination of Suitable COST (European Co-operative for Scientific and Technical Research) Outdoor Terrain Models for Cellular Signals in Flat Urban Terrains in Sri Lanka

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Abstract

The Sri Lankan unique flat urban terrains with varying building densities and street layouts present a complex environment for cellular network planning and optimization for local cellular network providers. This research addresses this problem by finding a COST outdoor terrain model for cellular signal prediction based on their performance against real world data. However, a COST outdoor terrain model is not yet available for flat urban terrains of Sri Lanka, so the objective of this work was to identify the most suitable COST outdoor cellular models that are most appropriate for predicting and optimizing cellular signals in the specific context of flat urban terrains of Sri Lanka. This study used empirical propagation models including the COST 231 Hata Model and COST 231-Walfisch-Ikegami Model released in 1999 by COST 231 Projects. The methodology involved identifying the heavy urban flat regions in Sri Lankan western province three major district cities namely, Gampaha, Colombo and Kalutara. Then a set of field sample data was collected by a sophisticated mobile device using drive test method. Using a calculating tool, the mean Received Signal Strength (RSSI) was calculated, and graphical analytic curves were generated. After an extensive comparison between existing COST models, the COST 231 Hata Model was identified as the most suitable COST model for Gampaha and Kalutara districts while COST 231 – Walfisch-Ikegami model was recognized as the most suitable for Colombo district.

Keywords: Cellular Signal Prediction, COST Outdoor Terrain Models, COST 231 Hata Model, COST 231-Walfisch - Ikegami (WI) Model.

AI Enabled Electrostatic Adhesion Gripper for Fabric Handling

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Abstract

Electrostatic adhesion grippers are fast becoming the new reality in the protection of plains and other sensitive garments such as silk and chiffon, among others, through controlled application of an electric field. In this work, these grippers are combined with an AI-enhanced fabric defect recognition system to radically transform fabric handling and inspection. Traditional approaches compromise fabric integrity, as this solution improves accuracy and minimizes human intervention and expenses. The AI system, designed in Python with more than 20,000 images of defected fabric, perfectly identifies imperfection and vibrating and humidity sensors facilitate the flawless manipulation. Components include Dong Meng H2A High-Voltage Control Supply to provide high voltage control to ensure that the gripper is holding the concrete blocks effectively and a high-pressure pneumatic system to ensure that the dust that is produced by the grinding of the metal jaws is eliminated to increase the lifespan of the gripper. However, there are some current limitations involving the use of grippers that may require improved designs for different fabrics and garment shapes. Additional studies should be performed to determine the impact of such applications on fabric wear out and to enhance high voltage and dust control solutions for a variety of fabrics. This application of electrostatic grippers and AI-based quality assurance defines a new benchmark on garment production, adding automation and cost improvement alongside product safety.

Keywords: Electrostatic Grippers, AI Enabled Fabric Defect Detection, High-Voltage Control, Dust Management, Deep Learning in Quality Control

Development and Application of a Low-Cost Sensor-Equipped Glove for Real-Time Hand Kinematics Recognition in Robotic Control and Virtual Environments

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Abstract

In fields like biomedical engineering, robotics, and virtual reality, accurately tracking and replicating the movements of the human hand is essential for advancements and developments in the field. This study presents the development of a cost-effective, sensor-based glove design to capture hand kinematics in real-time. The glove is integrated with flex angle sensors alongside an Inertial Measurement Unit (IMU) sensor module to detect both hands and fingers' translational and rotational dynamics. The collected data by these sensors is processed using a microcontroller and then sent wirelessly for rendered real-time through 3D modelling and animation software, allowing real-time visual display of hand movements. Since the mash-up of inertial and magnetic sensors in the glove tracks the precise orientation, the need for external devices such as cameras or actuators becomes inessential. This flexibility allows the glove for a wide range of applications, such as manipulation of robotics, virtual reality interfaces, and tasks in high-risk environments where clear-cut control of hand motions is critical. This approach solves the shortcomings in prevailing techniques by advancing to an alternative which is more affordable and user-friendly whilst maintaining a high degree of precision. Moreover, in this study, technologies like multiple sensing have been incorporated into a cohesive system successfully that is applicable in the context of both real and virtual. Hence, the outcomes demonstrate that the glove can effectively capture complex hand motions under any environmental conditions, offering potential enhancements in interactions between human-computer, remote control in robotics, and enriched virtual reality experiences.

Keywords: Hand kinematics, Flex angle sensors, IMU sensor, Microcontroller, 3D modeling

Design & Development of a Control System for a Frictionless Electromagnetic Braking System

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Abstract

A braking system is the fundamental component of any automotive engineering task which besides its mission to stop motion also guarantees the safety and comfort of drivers and passengers. Electric trains were implemented by Granville Tailor Woods with the invention of a constant electromagnetic braking machine with no need for hydraulics and air brakes, providing high traffic safety and maintenance quality. This invention offers endurance that is not usual for such units, as well as easy maintenance as it tackles the problems of present braking systems. The main purpose of this research is to design and develop a frictionless electromagnetic brake system that has an electronic control unit to ensure the safety of passengers from sudden shocks or vibrations that occur during braking. This research involves designing a single-wheel brake system with a manual rig, featuring a toggle switch and an adjustable motor for dimming operations. An IR sensor measures RPM, displaying it on an LCD connected to an Arduino UNO R3 microcontroller, which manages the system's electronic components. The braking mechanism uses 5kg force electromagnets, monitored by a 49E Hall effect sensor to ensure performance. The SolidWorks software helps to record the geometry with necessary precisions that result in the correct placement of the magnets and other components, while a dimming dimmer motor controller controls the model's chain drive system. The Arduino UNO R3 board serves as a versatile platform for programming and device communication. PWM signals are sent to a specially designed circuit to control two electromagnets, enabling precise and reliable braking. This study represents a significant advancement in automotive safety and performance technology by developing a frictionless electromagnetic brake system. The application of electromagnetism and advanced control theories in this invention promises to revolutionize braking systems, offering enhanced reliability, efficiency, and safety for future vehicles.

Keywords: Electromagnetic Braking System, Frictionless Braking, Brake by Wire

Design & Development of Charcoal Powered Stirring Engine as a Laboratory Equipment

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Abstract

This project is about the development of a laboratory experimental model of a charcoal-powered Stirling engine. The engine can be simply disassembled and reassembled as a lab model to determine its power-generating capability through charcoal analysis. Stirling engines are ideal for educational purposes due to their robust design, ease of application, and straightforward assembly. The primary objective is to transform the heat energy from burning charcoal into mechanical energy, demonstrating the engine's reliability and efficiency. The project consists of initial calculations, structural considerations, material selection, and the fabrication process, including welding, machining, 3D printing, and woodwork. Kinematic modelling was done using SolidWorks, while heat and power output analyses were conducted using MATLAB. Results showed that the charcoal-powered Stirling engine effectively converted heat energy into mechanical energy, though with initial energy losses. The system's efficiency was 42.66%, slightly lower than the theoretical efficiency of 49.54% due to mechanical losses and heat rejection. The engine demonstrated the ability to convert 31,380 KJ of energy from 1 kg of charcoal, with a usage rate of 100 g per hour. The glass wool-insulated heating chamber effectively minimized heat loss, while the cooling chamber's efficiency varied with the cooling water's velocity and inlet water temperature. The project was successful in creating an efficient laboratory demonstration model, meeting the objectives of creating a cost-effective and user-friendly Stirling engine for educational purposes. Future enhancements could include integrating a real-time pressure monitoring system, and power generator, improving efficiency, and exploring additional alternative heat sources for increased versatility.

Keywords: Sterling Engine, Charcoal Engine, Laboratory Equipment

Estimation and Analysis of Heat Load and Distribution in a Closed Parked Vehicle Using Data Collection, ANSYS Fluent Simulations, and a Mobile App Alert System for Remote Monitoring

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Abstract

When a vehicle is parked under direct sunlight, its interior can reach dangerously high temperatures, posing significant risks to occupant safety and causing material degradation. This research focuses on estimating and analyzing the heat load and distribution within a closed parked vehicle under local conditions, utilizing data collection and ANSYS Fluent simulations. The study aims to provide a comprehensive understanding of how heat accumulates and spreads within the vehicle cabin, particularly identifying the contributions of glass surfaces and sheet metal to overall heat gain. In addition to thermal analysis, this research introduces a novel alert-generating system integrated with a mobile app. This system is designed to remotely monitor the cabin temperature and provide real-time alerts to the vehicle owner when temperatures exceed safe thresholds. The alert system is capable of notifying the owner regardless of their distance from the vehicle, ensuring timely intervention to prevent hazardous conditions. The simulation results, supported by empirical data, demonstrate the effectiveness of this integrated approach in predicting and mitigating excessive heat buildup. The mobile app alert system adds a crucial layer of safety, allowing for proactive measures to protect occupants and preserve vehicle materials. By combining advanced thermal analysis with modern communication technologies, this research offers a practical and innovative solution to a pressing automotive safety issue. The findings underscore the importance of monitoring and managing vehicle cabin temperatures, particularly in regions with high solar exposure, and set the stage for further advancements in vehicle safety systems.

Keywords: Heat Load, Parked Vehicle, ANSYS Fluent, Heat Distribution

Design & Development of a Hybrid Battery Thermal Management System Using Thermoelectric Plates

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Abstract

This paper presents a comprehensive study on the design, development, and implementation of a thermoelectric cooler (TEC) for temperature regulation within a hybrid battery module. The objective of this research is to evaluate and select an appropriate active cooling system from a range of thermal management solutions to maintain optimal operating temperatures for hybrid battery modules. A SolidWorks simulation was used for the design and thermodynamic analysis of the heatsinks, enabling performance evaluation before the physical prototype was fabricated. The proposed cooling system is modelled similarly to the airflow duct structure of the "Honda Fit," where the thermoelectric plate and heat sinks are integrated with the airflow duct for efficient heat dissipation. The thermoelectric cooler functions as a solid-state heat pump, with the thermoelectric plate absorbing heat from the incoming airflow and dissipating it through the hot-side heat sink, while the cold-side heat sink is actively cooled by an axial fan. The heat generated by the thermoelectric plate's hot side is continuously dissipated to ensure effective cooling on the cold side. The battery thermal management system is controlled by a W1209 temperature control module, which regulates the thermoelectric cooler and fan based on temperature readings from an NTC sensor. Experimental results indicate that the thermoelectric cooler effectively increases discharge capacity as the temperature rises from 10°C to 60°C, but discharge capacity decreases as the operating current increases from 1A to 6A. The study also highlights that internal resistance contributes significantly to heat generation, which, if not managed properly, leads to decreased battery performance and lifespan. Therefore, enhancing cooling capacity is crucial for mitigating the effects of internal resistance and improving the service life of the hybrid battery module. Overall, this research offers a novel approach to battery thermal management using thermoelectric cooling technology, contributing to the development of more efficient and durable hybrid battery systems.

Keywords: Thermoelectric Plate, Thermoelectric Cooler, Peltier Plate, Hybrid Transportation, Temperature Controller.

Design & Development of a Control System for an Automated Braking System for Clutch Balancing on Inclined Roads

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Abstract

This thesis presents the design and development of an automated braking system aimed at assisting clutch balancing in manual transmission vehicles, specifically when navigating inclined roads. The system addresses a significant challenge faced by drivers—particularly those with less experience by preventing backward roll and minimizing the risks of clutch slipping and stalling on slopes. This research builds upon existing studies and incorporates mathematical modelling to devise innovative design solutions. Key tools used include Arduino for coding, Fritzing for electrical circuit design, and SolidWorks for mechanical design and simulation. Through iterative simulations and calculations, residual errors were identified and optimized to refine the prototype's performance. The resulting prototype is a functional system that can be retrofitted into any manual transmission vehicle lacking a built-in Hill Start Assist (HSA) system. It offers a cost-effective solution to enhance vehicle safety by ensuring smoother clutch control and reducing wear on the clutch components. This research demonstrates the feasibility and practicality of such a system, with the potential to significantly improve driving safety and convenience for a wide range of manual transmission vehicles. Furthermore, the design process and findings contribute to the broader field of automotive engineering, offering insights into the integration of electronic control systems with traditional vehicle mechanics.

Keywords: Automatic Clutch Balancing, Hill Assist, Automatic Braking

Design and Development of Three-wheeler Mobility with Green Hydrogen Generators

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Abstract

The transportation sector heavily relies on fossil fuel-powered internal combustion engines, which contribute to environmental pollution and rising fuel costs. To address these challenges, the development of sustainable and eco-friendly power sources for vehicles is essential. This report focuses on the design and development of a solar-powered dry-type hydrogen fuel generator for three-wheelers, aimed at reducing reliance on fossil fuels and mitigating air pollution. The dry-type hydrogen generator was designed using 316L stainless-steel plates, acrylic sheets, rubber gaskets, and brass pipe fittings. In addition to that, a reservoir tank, ammeter, safety equipment such as a non-return valve, solar panel, and solar charging controller are needed to complete the experiment. After designing the hydrogen generator, the designed unit and other components were installed on a three-wheeler with proper arrangement. Some of the tests were conducted to evaluate road performance, eco-friendliness, and the effectiveness of the solar charging system. In the road test, when using 100 ml petrol with and without hydrogen gas separately, the vehicle was able to complete more than 0.7 Km distance using hydrogen gas during the same road condition. When following the eco test with and without hydrogen gas, it showed this additional fuel was able to decrease the exhaust volume of hydrocarbons (HC) by 54 ppm v/v in 2500-RPM and carbon monoxides (CO) by 0.04 v/v % in Idle-RPM. The solar battery charging test in minimum and maximum sunlight showed 12.3 V and 13.6 V, respectively. These results suggest that the hydrogen generator offers a promising solution to reduce fossil fuel consumption. In conclusion, the dry-type hydrogen generator presents a viable and safe alternative to traditional fossil fuel systems, offering an innovative approach to green mobility for three-wheelers.

Keywords: Dry-type HHO cell, Wet-type HHO cell, Electrolysis of Water

Development of A Force Sensing Sute for Crash Testing

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Abstract

The paper discusses the creation of a smart force-sensing cloth to investigate how the forces are being applied to the human body during car accidents and racing activities. Although crash test dummies offer valuable information, they are unable to fully mimic the effects experienced by actual individuals. This initiative aims to fill that void by developing a lightweight, wearable sensor, which can be integrated into clothing to provide real-time force measurements. The main goals were to design and build a sturdy force sensor, embed it into a breathable shirt that covers the chest, and create a wireless system for real-time data transmission and visualization. Through comprehensive research, simulations, prototyping, and testing, it was able to develop an extremely sensitive sensor capable of detecting major forces. The sensor was incorporated into a wearable shirt, and a wireless system was set up to collect and display force data. Extensive testing in racing and crash simulation settings confirmed that the suit effectively mapped and measured force distribution across the chest area. These results offer valuable insights for the enhancement of safety equipment and the improvement of crash test dummy designs. The system presents a cost-effective method for obtaining more precise data, which could lead to safer designs for seat belts and other protective equipment. Future efforts will focus on integrating sensors into additional body areas and exploring applications in robotics and sports science, to improve human safety and performance in various fields.

Keywords: Force Sensing, Crash Testing, Crash Test Dummy

Development of A Forced Induction System using Corona Discharge

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Abstract

The pursuit of enhanced performance and efficiency in internal combustion engines (ICEs) remains a significant challenge within the automotive industry, even as the shift toward electric vehicles accelerates. Despite advancements in electric vehicle technology, the necessity for traditional fuel-powered systems persists, particularly under specific conditions where electric vehicles are not yet viable. Improving the efficiency of ICEs through innovative forced induction systems is a critical objective. This research explores a novel approach to forced induction by developing a high-voltage plasma propulsion system that generates ozone via corona discharge. The system aims to enhance the volumetric efficiency of ICEs by utilizing ozone as a combustion aid and employing plasma thrust to force-feed air into the engine. This method offers a potential reduction in mechanical wear and complexity compared to traditional forced induction systems. The study involves detailed experimentation with various electrode configurations, voltage sources, and environmental conditions to optimize the electrohydrodynamic (EHD) flow and maintain stable corona discharge. The impact of factors such as air pressure, temperature, and humidity on the discharge characteristics is analyzed, emphasizing the need for a responsive control system to ensure consistent performance under varying conditions. An experimental prototype of the control system, designed using the Arduino platform, demonstrates the feasibility of maintaining optimal discharge conditions. This research contributes to the development of more efficient and durable forced induction systems for ICEs, potentially extending their relevance in the automotive industry as it transitions towards sustainable solutions.

Keywords: Electrohydrodynamic, Corona Discharge, Plasma thrust, Plasma Propulsion

Development of Road Condition Monitoring System for Automobiles

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Abstract

The quality of roads is crucial for transportation systems, also it is also critical for economic development and the safety of mobility. However, road hazards such as potholes and cracks, which occur due to factors like weathering, inadequate maintenance, and increased traffic, mainly impact the safety of vehicle transportation and heighten the risk of road accidents. Visual inspections and public complaints are the most common methods of identifying road defects, but these methods are not efficient because of time lagging for the repair of those hazards. To address these issues This research presents a smart, real-time road condition monitoring system for vehicles that use image processing technology to detect road hazards in roads. The system integrates cameras with computational algorithms to identify defects like potholes and cracks, providing immediate alerts to drivers about upcoming road conditions. This proactive approach is particularly important in developing countries like Sri Lanka because road safety and infrastructure maintenance are significantly challenged. By introducing this smart road condition monitoring system, it can monitor and recognize road defects in real-time so the driver to drive safer and reduce potential road accidents.

Keywords: Image Processing Technology, Road Condition Monitoring, Computer Algorithm for Road Hazards Detection

Design and Analysis of an Electro-Mechanical Automotive Lift with Enhanced Safety and Efficiency Features

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Abstract

This project developed an efficient, safe, and easy-to-use electro-mechanically operated automotive lift tailored to modern industry needs. The lift's design prioritized safety for vehicles, workers, and equipment while minimizing operational effort. It addressed the limitations of traditional ramps, offering solutions to improve both effectiveness and convenience in vehicle maintenance. Automotive lifts, including hydraulic, hydro-pneumatic, and mechanical types, are essential in the automotive sector, providing access to a vehicle's underside and enhancing repair processes. The design incorporated a four-button control panel featuring a POWER ON button (orange), UPWARD, DOWNWARD (with arrows), and GROUND (green), along with a display showing four height levels suited to workers of varying heights. Once the vehicle was secured, workers selected the desired height, and the lift moved automatically, accompanied by a safety alarm. The orange light signaled the lift's readiness for safe work underneath. Key features of the design included relays, magnetic solenoids, limit switches, a mobile control panel, an extended arm with manual locks, and a level ball to prevent imbalance. ANSYS analysis revealed stress distribution in the arm ranging from 282.64 MPa to 0.011 MPa, with an average of 74.239 MPa. The maximum stress exceeded the yield strength of 250 MPa, indicating the need for structural adjustments such as fillets to reduce stress concentration. After modifications, the maximum stress was reduced to 243.08 MPa. Total deformation ranged from 0 to 21.299 mm, with an average of 7.1878 mm, which was within acceptable limits. The safety factor averaged 5.938, indicating high reliability. The design utilized box bar arms to maintain manageable weight and power requirements, enhancing both safety and efficiency for light vehicle lifts.

Keywords: Automotive Lift, Electro-Mechanical, Safety Features, ANSYS Analysis, Vehicle Maintenance

Development of an Energy-Efficient and Cost-Effective Flour Sieving System for Small-Scale Food Processing

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Abstract

Sifting is an essential process in various industries, particularly in food preparation, where it serves to break up lumps and aerate flour, ensuring it blends smoothly with other ingredients. Traditionally, this process is performed manually in small-scale bakeries, households, and grinding mills, primarily due to the high cost of mechanical sifters, which can range from Rs. 60,000 to Rs. 250,000. Many small businesses find these prices prohibitive, hindering their ability to invest in such equipment. This issue has spurred the development of an innovative solution aimed at offering a cost-effective alternative to manual labour while improving efficiency. The proposed system focuses on three key areas: utilising low-cost raw materials, minimising operational expenses, and reducing human labour. The design incorporates simple mechanical components, such as levers, springs, and gear wheels, to automate the sifting process. These elements help in efficiently separating flour from waste, storing sifted flour in a designated area, and providing an effective method for waste disposal. A small electric motor powers the system, ensuring a consistent and energy-efficient operation. The motor is designed to run on minimal electricity, either from a single-phase power supply or a vehicle battery, making it accessible for businesses with limited infrastructure. By focusing on affordability and energy conservation, this system offers a practical solution for small businesses that cannot afford traditional, expensive machinery. The machine is multifunctional, capable of sifting flour, disposing of waste, and storing the sifted product in one unit, thus streamlining the workflow in small-scale food processing operations. Ultimately, this innovation enhances productivity, reduces costs, and enables small-scale entrepreneurs to improve their operations without the need for significant capital investment.

Keywords: Flour Sieving, Energy Efficiency, Cost-Effective Design, Small-Scale Food Processing, Automation Systems.

03

Faculty Of Science

A Computational Investigation of Solvation of Group II Metal Ions in Formamide and Water

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Abstract

Metal ion solvation is a significant area of study within solution chemistry, playing a vital role in numerous physicochemical processes in nature, industrial applications, and biological systems. The interaction between metal ions and solvents significantly affects the behavior and properties of solutions. Magnesium and calcium ions play important roles, particularly in living systems, and the solution chemistry of alkaline earth metal ions has therefore been attracting attention. Water is the most extensively studied solvent in this context due to its unique properties and universal presence in biological systems. Among organic solvents, formamide is of particular interest because it contains both a carbonyl group and an amino group. Ability of both solvents to dissolve a wide range of substances, combined with their polar nature and capacity to form hydrogen bonds, makes them ideal solvents for studying metal ion solvation. The solvation of group II metal ions in formamide and water was investigated through the radial distribution function (RDF), which examines the arrangement of solvent molecules surrounding the metal ion and how these dynamics influence its behavior in solution. A detailed description of the solvent structure and dynamics around magnesium, calcium, strontium, barium cations in solutions were obtained from molecular dynamics (MD) simulations using the KBFF force field framework at 300 K and 1 bar pressure over 25 ns via the GROMACS (Groningen Machine for Chemical Simulations) software package at two different concentrations per each system. Potential energies of final configurations (largest negative for Mg^{2+} and decreased down the group), first solvation shell radius obtained from RDF(smallest radius for Mg^{2+} and increased down the group) , and calculated diffusion coefficients (Lowest for Mg^{2+} increased down the group) were used to understand that the group II metal cation solvation in both solvents (formamide and water) is proportional to the charge density. Oxygen atom and hydrogen atom attached to nitrogen are more closely arranged to the metal cations and chloride anions respectively. This study highlights the potential of formamide as a non-aqueous solvent to dissolve group two metal cations.

Keywords: Molecular dynamics, Ion solvation, KBFF, GROMACS

Bound charge layering near ions in water: Moving beyond Born theory

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Abstract

This work analyzes the response of aqueous solvent to a dissolved spherical ion in terms of the bound charge, the net charge of the solvent near the solute. This provides an alternative to the standard Born continuum theory which assumes that the ion lies in a spherical cavity within a dielectric continuum and places the bound charge in an infinitely thin layer on the cavity surface. For a spherical ion, the cavity radius should be close to the distance of closest approach of solvent to the ion. However, when regarded as an adjustable parameter required to align theoretical and experimental solvation free energies, the required cavity radius is unexpectedly small and resides within the ion's excluded volume. This challenges the physical basis of Born's theory and highlights the need for a solvation model that produce "the right answer for right reason". Our lab's previous work shows that cavity model upon which Born theory is based fails to capture the essential features of aqueous ion solvation, thereby explaining the unphysical cavity radius values demanded by Born theory. We prove that the total bound charge surrounding an ion is equal to the bound charge of a dielectric continuum, but unlike continuum theory the true bound charge has a well-organized structure of strongly oscillating layers of counter- and co-charge, that is, layers of opposite and the same charge, respectively. Our lab developed a simple analytical model to capture the layering of bound charge and showed that the strong solvation response in an aqueous system is the result of charge layering near the solution, and not the accumulation of bound charge on the surface of a hypothetical cavity. Results show that two out of the four parameters in this model are expected to be solvent-specific and transferable between different solutes, while other two parameters should depend upon ion and solvent size. The polarizable continuum model (PCM), which is widely used in quantum mechanical packages to incorporate solvent effects uses a cavity that reflects the shape of the molecule to obtain solvation free energy using same assumptions as the Born model for a spherical ion. Moving beyond the spherical ion, we hope to develop simple analytical models based on molecular reality that can replace the continuum theory for the solvation response of polyatomic solutes. As a first exploratory step, we used classical molecular dynamics simulations to obtain a trajectory for a NaCl ion pair in SPC/E water. Comparing the bound charge layering obtained from this work with the results from spherical ion shows that the property that represent the parameters we claimed to be solvent specific is similar in both cases. This shows that only few free parameters will be required to develop a simple model for bound charge layering around the ion pair. After tackling the problem of ion pair, we will move onto more complex solutes like charged amino acids. Successful completion of this project will provide a framework to obtain accurate solvation response using a method which is faithful to the molecular level process behind aqueous solvation of an ion.

Keywords: Ion Solvation, Born Theory, Dielectric response, Electrostatics

In silico Investigation of the Conformational Changes of DNA Binding Proteins

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Abstract

DNA-binding proteins are essential for a range of cellular functions, including transcription, DNA repair, and replication, due to their ability to specifically interact with DNA. The mouse p202 protein, which plays a significant role in immune response and cellular regulation, binds to DNA and influences gene expression. Understanding the conformational changes that occur in such proteins upon DNA binding is crucial for explaining their functional mechanisms at a molecular level. This study investigates the structural and conformational changes in the p202 protein, with a particular focus on its interaction with a 12-mer dsDNA sequence to examine how it binds to the HIN domain of p202. To explore this interaction, in silico analysis was conducted using GROMACS (Groningen Machine for Chemical Simulations) molecular dynamics simulations over a 100 ns timeframe. The AMBERGS (Assisted Model Building with Energy Refinement with Generalized Solvent) force field was employed to model the interactions of DNA and protein molecules, with simulations conducted at 300 K and 1 bar. The study explored three configurations: DNA alone, DNA in complex with a DNA-binding protein, and the isolated protein model. Simulation data were analyzed using various computational techniques, including Root Mean Square Deviation (RMSD), Solvent Accessible Surface Area (SASA), Radius of Gyration (Rg), Root Mean Square Fluctuation (RMSF), and Radial Distribution Function (RDF). Stability was demonstrated by consistent values with minimal fluctuations in the RMSD and SASA profiles, stable Rg, minimal RMSF fluctuations, and unchanged RDF patterns throughout the simulations. These findings suggest that DNA binding does not substantially alter the structural integrity of the p202 protein, indicating a high degree of rigidity and stability in the protein's DNA-binding domain. The results indicate that the p202 DNA-binding protein does not undergo significant conformational changes upon DNA binding. This study provides novel insights into the molecular dynamics driving DNA-protein interactions. It also offers valuable information on the structural stability of DNA-binding proteins when complexed with DNA, with broader implications for the study of similar proteins in other organisms.

Keywords: DNA Binding Proteins, Molecular Dynamics, AMBERGS, GROMACS

A Synthesis and Characterization of Porous Graphene Oxides as an Adsorbent

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Abstract

Porous graphene materials, characterized by their exceptional specific surface area, have emerged as promising candidates for applications in energy storage, catalysis, and water purification. This has driven the need for the development of efficient and scalable synthesis methods for these materials. In this study, we investigate the thermal parameters critical for the consistent exfoliation and thermal reduction of graphene oxide (GO) films into porous reduced graphene oxide (rGO). Three distinct rGO variants (prGO-1, prGO-2, and prGO-3) were synthesized using varied thermal reduction strategies, specifically by altering the external heating rate applied to GO. The thermal reduction was carried out in a tube furnace at slow (<10°C min^{-1}) and fast (>10°C min^{-1}) heating rates, yielding prGO-1 and prGO-2, respectively. Additionally, a third reduction method utilized soldering iron tips preheated to ~350°C to produce prGO-3. The resulting prGO samples were thoroughly characterized by Fourier Transform-Infrared (FT-IR), Raman spectroscopy, X-ray Diffraction (XRD), and Scanning Electron Microscopy (SEM). SEM analysis revealed the presence of porous, disordered honeycomb-like structures in prGO-2 and prGO-3, while prGO-1 lacked such structures. The feasibility of these prGO samples for synthetic dye (methylene blue, MB) adsorption was also investigated. The results showed that prGO-1 had the highest dye adsorption capacity, while prGO-2 and prGO-3 exhibited significantly lower capacities despite their porous structures. This finding suggests that the presence of highly porous structures in prGO-2 and prGO-3 may hinder dye adsorption compared to the non-porous prGO-1.These results provide important insights into the synthesis of porous rGOs and their potential application as synthetic dye adsorbents.

Keywords: Graphene oxide, porous reduced graphene oxide, thermal reduction, adsorbent

04

Faculty Of Marine Engineering And Maritime Sciences

Decarbonizing international shipping

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Abstract

This study assesses hydrogen, ammonia, methanol, and waste-derived biofuels as alternative fuels for the shipping sector, focusing on their potential to meet the industry's 100% greenhouse gas (GHG) emission reduction target. Utilizing life cycle assessment, the study evaluates the full environmental impact of each fuel, from resource extraction to end use. Primary data through interviews and secondary data from environmental studies, reports, and ship logs were collected. Key findings show that green hydrogen, bio-methanol, and biodiesel derived from waste have the highest decarbonization potential, reducing emissions by 74–81%, 85–94%, and 87%, respectively, compared to traditional heavy fuel oil. However, these fuels are currently produced on a scale insufficient to meet industry demand, and vessel adoption of these alternatives remains limited. The study reveals that life cycle sensitivities, especially related to GHG emissions, significantly impact outcomes, with notable challenges for ammonia due to nitrous oxide emissions. This analysis underscores the importance of regulatory and technological advances to enhance production capacities and fuel supply chains. Moreover, integrating alternative fuels with complementary decarbonization strategies such as policy-driven incentives, slow steaming, and wind propulsion could expedite emissions reduction. Although promising, alternative fuels alone cannot meet the sector's 2050 emission goals, necessitating a combination of strategies. This study's insights provide a foundation for future research on sustainable fuel options for shipping.

Keywords: Shipping, Maritime, Alternative Fuels, Decarbonization, Life Cycle Assessment

Fuel consumption in maritime transport

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Abstract

Todays' world trade is primarily carried out by merchant ships which uses non-renewable fuels for their voyages. Burning fossil fuels has a prominently negative effect on the environment, thereby acts as a catalyst for global warming. This review critically evaluates the qualitative study conducted on estimating fuel consumption in maritime transport. It specifically aims to search the core cause of fuel consumption rate in order to reduce fuel consumption of ships to minimize emission of carbon dioxide and greenhouse gases. In this study alternative models were created employing the Response Surface Methodology of noon reports from a bulk carrier as data to determine the alteration of fuel consumption. The process involved three key steps which includes data separation, model fitting, and model evaluation. Through these statical models and graphs the study uncovers key findings, which includes some major internal and external factors affecting the fuel consumption. Strong analysis of collected data to plot graphs and charts, visual images clearly conveying the idea, considering specific types of fuel and considering ship's factors are this study's strengths, while some terms and technical phrases may be hard to understand by non-experts, data only concentrating cargo ships and bulk carriers but there are many types of ships thereby fuel consumption may vary accordingly, limiting only to noon reports are some drawbacks of this study. Overall, this review highlights the study's contribution on fuel consumption in maritime transport as it has become a vital research topic due to its potential to incite environmental issues, providing a valuable framework to be applied to other cases as long as there is accurate data. Nevertheless this study aims to help interested parties to find an effective fuel economy with the control and alteration of some factors.

Keywords: Fuel consumption, Models, Environmental and Economic threats, Noon report

Transforming the Shipping Industry with Autonomous Ships and Artificial Intelligence

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Abstract

The shipping industry is very important to global trade. This review critically examines the involvement of autonomous ships and artificial intelligence (AI), which aims to revolutionize the shipping industry. The study explores the significant challenges the industry faces, like labor shortages, security concerns and the need to reduce environmental impact. The researchers employed a multifaceted research approach, utilizing literature reviews, expert interviews and case studies. This combination of quantitative and qualitative methods provides a holistic view of the technological integration, benefits and challenges of autonomous ships and AI in the shipping industry. Through quantitative analysis, the study uncovers the key benefits of increased efficiency, improve safety to eliminate the risk of human error, reducing operational cost which leads to a sustainable cost saving and decreasing environmental impact by reducing fuel consumption in order to provide a detailed understanding of the developments, potential benefits, and challenges associated with the integration of these technologies. The research findings review significant advancements in automating ship technology and decision making algorithm which enable to operate with minimal human involvement. The study's strengths include its detailed examination of real-world case studies. Additionally, autonomous technology can lower operational costs by reducing the need for human labor, leading to long-term savings, as seen in the pilot projects conducted by *Kongsberg* with their fully autonomous ferry in Norway. Furthermore, these technologies can reduce fuel consumption, contributing to a lower carbon footprint, as demonstrated by the *Maersk's* efforts to integrate AI for more fuel-efficient route planning. its quantitative analysis of potential benefits and identifying of challenges while potential weaknesses include regulatory challenges, technological optimism, safety and sustainability and lack of depth on challenges such as maintenance and faulty detection system. Overall, this review contributes to the broader discourse on innovation for the automation of the shipping industry, providing a valuable foundation for future research on overcoming the barriers to the adoption of autonomous technology for a changing global economy.

Keywords: Artificial intelligence, Autonomous ships, Environmental impact

Impact of Oil Spills on the Marine Environment

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Abstract

In a world with increasing crude oil production the environmental implications of oil spills have become increasingly critical. These spills cause severe and long-term havoc on marine and coastal ecosystems. Some of the effects caused to marine organisms are habitat destruction, damage to marine life including reduced growth and respiratory disorders and damaging marine food chains. Reduced growth in plants, increasing toxicity are some ways marine flora is affected. Studies on various spills have shown that even a small spill can cause risks to the marine ecosystem therefore leaving marine species to either face long recovery times or permanent damages. This study examines the pathways through which human activities introduce oil pollution into oceans including land runoff, vessel accidents, and tanker discharges. A comprehensive review of the International Guidelines for preventing Oil spills and disaster response is undertaken assessing various oil spill response methods through ten evaluation criteria: cost, efficiency, time, wildlife impact, reliability, difficulty, oil recovery rate, weather conditions, effects on oil characteristics and need for further treatment. The primary objectives of oil spill response include preventing shoreline contamination, minimizing marine life impact, and accelerating oil degradation. Various remediation techniques physical, chemical, thermal, and biological are evaluated, including booms, skimmers, sorbents, dispersants, in-situ burning, and bioremediation. The analysis concludes that the most effective response strategy combines mechanical recovery methods with dispersants, supplemented by bioremediation, tailored to specific spill characteristics and environmental conditions. Oil spill accidents such as the Hebei spirit accident (South Korea, 2007) shows that better response strategies are required. Therefore, more experimentation should be done in order to find out a more effective and less harmful response strategy. Implementation of an integrated approach is vital for enhancing the resilience of marine ecosystems against oil spill disasters.

Key words: Oil spills, Marine ecosystem, Response

Classification of seafloor geology using multibeam SONAR data from the Scotian Shelf.

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Abstract

This review critically evaluates the qualitative study conducted on " Classification of seafloor geology using multibeam SONAR data from the Scotian Shelf " which aims to explore and classify geological features on the seafloor such as sediment ponds (seafloor depressions where particles settle and accumulate over time.), ridges, troughs etc. by using and comparing SONAR (Sound Navigation and Ranging) data attributes to idealized examples of known types of seafloors. Also, this study shows How this classification can be utilized to extract numerical geological information about underwater terrain features and their positioning. The researchers employed so many methodologies such as Multibeam SONAR data collections, Statistical classification, Data gridding, Hypothesis testing that means a statistical method used to determine if there is enough evidence in a sample of data to support or reject a proposed assumption about a population, Visualization and rose diagram (A circular chart used to display the frequency and direction of data) analysis, utilizing Simard EM 1000 SONAR(type of a SONAR) system, Bathymetric data, Simultaneous collection of backscatter and bathymetry, to gather rich insights from the inner part of the Scotian Shelf in Eastern Canada measures 21 Km in length and 3.6 Km in width. The information for this location was gathered using multibeam SONAR with complete 200% coverage and guaranteeing comprehensive mapping of the area. Through the statistical classification and paraboloid fitting (A mathematical technique used to approximate data points), this study uncovers key findings including seafloor classification effectiveness, insights in the structure of the seafloor and characterization of geological features. As the strengths of that study, we can see this study effectively combines data and enhancing the depth and accuracy of geological classifications. Also, they used innovative methodology that means they used a robust framework for identifying and analyzing complex seafloor structures is established through the application of statistical classification and paraboloid fitting. While weaknesses of the study include, the fact that the study is limited to a small region, lack of high-resolution seismic data and systematic variations in the data. Overall, this review highlights the study's contribution to Marine Geology and providing valuable research on Advanced seafloor classification, Comparison of seafloor and mapping techniques, Modeling the diffusion of sedimentation involves.

Keywords: Seafloor geology classification, Geological interpretation, Bathymetry, Backscatter

Climate warming, Marine Protected Areas, and the Ocean-Scale Integrity of Coral Reef Ecosystems

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Abstract

"Climate warming, marine protected areas and the ocean-scale integrity of coral reef ecosystems" by A.M.B Fernando – Using the largest dataset compiled so far, this global study investigates for the first time how climate change affects coral reefs and whether it is possible that MPAs become ecological refuges from climate change. The authors investigate this question in the Indian Ocean and experimentally study how a recent warming-induced coral bleaching event affected, at oceanic scale, coral and fish populations at 66 sites distributed over seven countries. Researchers measured the impact of a bleaching event, in which overheated seawater killed 48% of coral reefs at the central Indian Ocean. Using a technique called Bayesian meta-analysis (combining all information from multiple sources to make better decisions.), the scientists analysed differences in coral cover, reef structure and fish diversity between the mid-1990s and 2005 - data were collected before and after the bleaching. Overall, coral loss led to reduced complexity of reef structures with species that depended on corals most affected; this led to losses in fish diversity and local species extinction. The researchers found that while MPAs can contribute to higher fish biomass, they offer little protection from large-scale climate events. That means local measures, such as no-take zones, won't be enough to protect coral reefs from climate change impacts. Instead, conservation efforts should be directed at places that are intrinsically more climate change resistant. The study's main strength is that it had a large geographic coverage, looking at a number of different reef systems, and also used very detailed statistical methods to try to understand what was happening in the ecosystem. The biggest constraint is that we only sampled data at two time points, so we weren't able to capture how they might have kept changing going forward. The study brings into focus the need of merging the local conservation initiatives with other broader strategies for enhancing coral reef resilience to climate change.

Keywords: climate, coral, reef, fish, ocean

Coastal Pollution

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Abstract

This review critically evaluates qualitative research on coastal pollution and its implications for the marine industry, with a focus on investigating sources of pollution and their varied impacts on marine ecosystems, human health, and economic activities across different regions. Using a systematic literature review, the study analyzed data related to plastic debris, sewage, industrial effluents, oil spills, and non-point source pollution. Key findings indicate that human activities are significant contributors to marine pollution, with persistent threats posed by non-biodegradable pollutants. The review highlights the disastrous impacts of oil spills on marine life and habitats and explores the complex mechanisms of pollutant dispersion in coastal waters, noting that regional variations in pollution sources—such as industrial hotspots, urban runoff, and agricultural practices—result in differing environmental and health effects. These regional disparities underscore the need for tailored mitigation strategies to address localized pollution challenges effectively. Additionally, the long-term effects of pollutants and complexities in enforcement under international environmental law complicate mitigation efforts. This study's in-depth investigation into pollution sources from various origins and regions emphasizes the long-lasting ecological impacts on marine ecosystems and points to areas for future research. The framework provided here could inform the development of region-specific strategies and innovative technologies for pollution control in the marine industry.

Key words: oil spills, Environmental impact, pollution mitigation.

Marine Tourism Industry

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Abstract

The marine tourism industry has grown significantly in last 3 decades. This research is conducted on marine tourism industry, which aims to explore what is marine tourism, The history of maritime tourism, why maritime tourism will continue to grow and how it effects on countries like Malaysia, Indonesia, Thailand. Cruise tourism which began in 19th century generate billions of revenues in every year. The objective and scope of this research is analysing the trends and the diversities in maritime tourism. This may help to the economies of different countries. Marine tourism's continued growth is underpinned by rising tourism demand and technological improvements. However, its development raises concerns about environmental sustainability. Malaysia, with its rich coastal areas, has seen robust growth in maritime tourism infrastructure, especially in hotels development and water sports, Day trip tourism remains a major untapped revenue source, and special interest tourism, such as scuba diving, watching coral reefs, whale watching, yachting, and sport fishing, offers new opportunities to ensure sustainable growth, Malaysia and other region must adopt responsible tourism policies. This research is done by analysing many data, such as tourist arrival, economic data, travel books and data provided from globally. Also, this research will help countries to improve their services and facilities about tourism and gain more income. But in here there are no mention about cruise ships. Cruise ships also playing big role in marine tourism industry in countries like Malaysia and Thailand. And also, this paper emphasizes the importance of adopting sustainable development practices and policies.

Keywords: Tourism, Malaysia, Cruise.

The Five-Year Recruitment of Marine Life After the 1971 San Francisco Oil Spill

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Abstract

The 1971 San Francisco oil spill caused significant ecological damage to the local marine environment, drastically affecting biodiversity and the health of marine species. This study investigates the recruitment and recovery patterns of marine life over a five-year period following the spill, aiming to understand the resilience of various species and the long-term environmental effects. Marine populations were observed across 37 randomly selected transects, each typically 10 meters long, with some established prior to the oil spill for comparison. This approach helped assess whether the oil spill had a significant impact on marine life recovery in different areas over time. Key findings include cyclical variation in barnacle densities, population recovery at Sausalito, and evidence that non-pollution factors such as fluctuations in water temperature and food availability contributed to declines in some species. For example, crab populations fluctuated due to environmental factors unrelated to the spill, which complicated the assessment of recovery. One strength of this study is its comprehensive long-term monitoring, which provides valuable insight into the recovery trajectory of various species. However, a limitation is the variability of external environmental factors, including water quality and ongoing pollution, which may have influenced recovery rates beyond the immediate effects of the oil spill. Overall, the study suggests that while some marine species demonstrated resilience and partial recovery within five years, others were slow to recover or failed to do so entirely, indicating lasting ecological impacts. This review highlights the study's contribution to marine ecology and provides a valuable framework for future research on the long-term effects of oil spills**.**

Keywords: Oil Spill, Sen Francisco, Marine Environment

Ecological Impacts of Marine Renewable Energy Installations on Hydrodynamics and Benthic Ecosystems

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Abstract

This review critically evaluates the qualitative study conducted on marine renewable energy and the ecological implications of altering hydrodynamics, which aims to explore how marine renewable energy installations (MREIs) alter hydrodynamic conditions and the ecological impacts of these changes on benthic ecosystems and marine organisms. The researchers employed hydrodynamic modeling, field measurements, and ecological assessments, utilizing Acoustic Doppler Current Profilers (ADCPs) to gather rich insights from high-energy marine environments. Through hydrodynamic simulations and analysis of benthic responses, the study uncovers key findings, including that MREIs can significantly modify local hydrodynamic conditions, leading to changes in sediment transport and potentially altering species distributions. Some organisms like sea anemones, sponges, sea stars, sea urchins may benefit from MREIs, as they provide artificial reef-like structures, while others may be negatively impacted due to changes in flow regimes. The study's strengths include a comprehensive approach that combines modeling with real-world data collection, allowing for a detailed assessment of ecological impacts. However, potential weaknesses such as the limited understanding of far-field effects and the complexity of natural hydrodynamic variability slightly affect the scope of its conclusions. The inability to predict long-term ecological responses due to insufficient baseline data and temperature change are some limitations to the study. Overall, this review highlights the study's contribution to the field of marine renewable energy, providing a valuable framework for future research on the interaction between MREIs and benthic ecosystems.

Keywords: Marine Renewable energy, Hydrodynamics, Benthic Ecosystems

Economic Assessment of Oceans for Sustainable Blue Economy

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Abstract

The research determines the vital role of oceans for sustainable economic development. This study explores the economic value of ocean resources and their role in a sustainable blue economy. Through qualitative research, it examines the multifaceted benefits of marine ecosystems. The findings emphasize the need for sustainable ocean management to balance economic growth with environmental preservation. Thereafter, thematic analysis was applied, describing how to examine data while determining primary themes and patterns. Conclusions: The findings of the study confirm how much value in economic terms is represented by marine resources: fisheries, aquaculture, tourism, and renewable energies. This report shows that sustainable solutions are at the heart of marine ecosystems for good health and an economically wealthier future. Because it's an information mine, it goes in-depth with a number of ocean-related industries and their respective contributions to the economy. This is indeed a pioneering study with respect to the valuation of ocean economic values. A number of limitations might arise: there might be several biases in data, and attaching dollar values to natural benefits provided by the ocean is cumbersome. Despite these, it forms a very good basis for our quest towards sustainable ocean management and helps us in fully realizing the true value of the ocean and how we can protect it for the future. Its conclusions provide an important indication of the economic value held by our oceans, but the paper was ultimately speculative because it drew only from this small expert sample. Finally, the small sample size and poor generalizability of this study suggest that future research should be conducted to actively seek out larger and more diversified out-scales for better clarity. Together, our work propels the notion of the sustainable blue economy and offers new lessons for policymakers and other stakeholders who want to guide economic growth in a way that protects marine ecosystems.

Keywords: Blue economy, Ocean sustainability, Economic valuation of oceans

Effect of Piracy in Maritime Sector

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Abstract

The article entitled "Effect of Piracy in the Maritime Sector" highlights the effects of piracy upon global maritime activities and their responses. It critically reviews how piracy has shaped maritime operations, particularly around the high-risk areas of Somalia and Southeast Asia. The present study will explain the financial, psychological, and operational consequences of piracy, along with preventive measures and actions taken by the IMO. The researche has gone through a comprehensive literature review, including reports from International Maritime Organizations and past studies. They also used content analysis to gather interview data, summarizing and categorizing key elements related to piracy's effects on the maritime industry. Some of the key findings are financial losses due to ransom payments, damage to vessels, and the kidnapping of crew members. The onset of piracy has also affected the psychological well- being of the seafarers. Piracy disrupted maritime operations, which resulted in delayed shipments and losses running into billions for shipping companies annually. This study showcases the effectiveness of precautionary measures in reducing piracy incidents. IMO and other maritime organisations have implemented anti-piracy laws and conventions, like the Safety of Life at Sea (SOLAS) and the International Ship and Port Facility Security (ISPS) Code which intends to prevent piracy through international cooperation. The social life of seafarers is impacted by reduced socialization opportunities therefore referring this study will show how to overcome these barriers. Data sources of this study are explorations on the various effects of piracy, its practical recommendations for improving maritime security, surveys or interviews with current maritime professionals. piracy threats have reduced to a minimum value due to the laws and conventions. so, this article give the frame work to research how to further increase seafarers mentality to face threats like piracy. In conclusion, this article provides valuable insights into the challenges posed by piracy in the maritime sector and offers practical solutions for reducing its impact.

Keywords: Piracy, Maritime Industry, Maritime Security, Piracy Prevention

Exploration And Promoting Marine Tourism in North Sumatra

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Abstract

The potential of marine tourism in North Sumatra, Indonesia, as well as its importance for the local economy and community, are examined in the essay "Exploration of Marine Tourism in North Sumatra: An Analysis of Promoting Tourism." The study aims to tackle the issues that the marine tourist industry in the area faces, such as inadequate human resources, inadequate infrastructure, and a dearth of coordinated marketing techniques. The study's goal is to pinpoint efficient marketing techniques to boost domestic tourism to North Sumatra, an underappreciated destination despite its natural beauty and maritime attractions. Focus groups (FGDs) with 25 travel agents in North Sumatra were used in this qualitative study. The agents were chosen from a pool of 86 agents who were registered with the Indonesian Tours and Travel Agencies Association (ASITA). Observations of promotional actions on social media were another aspect of data collecting. The FGDs sought to investigate the unique possibilities and difficulties associated with advancing maritime tourism. A SWOT analysis was carried out, with an emphasis on the following areas: opportunities (social media, communication), threats (limited infrastructure, diminishing tourist visits), weaknesses (poor facilities, lack of promotion), and strengths (natural resources, culture, food). The results of the study highlight the necessity of integrated marketing plans that make use of information and communication technology (ICT) to boost maritime tourism in North Sumatra. Important assets like the region's rich culture and scenic beauty need to be marketed more skilfully, while inadequacies in the infrastructure and uneven pricing need to be fixed. To overcome these obstacles, the research highlights how crucial cooperation is between the government, travel agencies, and other tourism stakeholders. Notwithstanding many drawbacks, including a limited sample size and a dependence on qualitative techniques, the study offers insightful information for enhancing North Sumatra's tourism industry. Its ideas, which have the potential to greatly increase local tourism and benefit the neighbourhood, emphasise the need for standardised pricing, more promotional efforts, and stronger government backing.

Keywords: marketing strategies, marine tourism, North Sumatra

Global Marine Biodiversity Trend

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Abstract

This review examines trends in global ocean biodiversity. Marine biodiversity is the diversity of organisms belonging to the marine system. Researchers the relationship between human activities and natural factors on marine ecosystem. The research investigates how activities such as overfishing, pollution, biological invasions, habitat destruction and climate changes contribute to the ongoing changes in marine biodiversity. Tourism and costal development also cause damage to biodiversity. Researcher have used methods such as Field surveys and sampling, environmental data analysis. Environmental modeling and predicative analysis. Data collected by engaging the public through citizen science programs. Observations from boaters, divers and costal residences. Thoughtful statics and thematic analysis of the study revealed key findings. Such as a marked decline is special population, significant habitat loss and the accelerating effects of global warming on marine ecosystems. It highlights regional variations with particularly server impacts on sensitive ecosystems. like coral reefs and polar water. As this review, placing anchors on coral reefs, dumping garbage in the sea, chemical sunscreens destroy coral reefs. Coral reefs support about 25% of all marine life, including thousands of species of fish, invertebrates and plants. They provide critical habitat for these organisms, contribute to marine biodiversity. And polar water despite extreme conditions, polar water is home to diverse ecosystem, including arctic plankton, fish, seals, whales, polar bears, penguins and krill in Antarctica. Organization like MPAs [Marine protected areas] established to protect marine biodiversity and ecosystem. The main focus of MPA's is to protect marine habitats and the variety of life that they support. Marine biodiversity provides most service we obtain from the sea, including food security, protecting against costal erosion, recycling of pollutions, climate regulation and Recreations. Transport of goods takes places through marine ecosystems. Thereby causing damage to the ecosystem recreation. Organization like MARPOL have been established to prevent such damages. The efforts such as the establish of MPA [marine protected areas] and sustainable fisheries management system has shown some success in preserving biodiversity. This review does a great job in ocean conservation.

Keywords: Ecosystem, Marine Endangers, Marine Organization, Ocean Benefit

The impact of climate change on marine biodiversity

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Abstract

This study explores how climate change is reshaping marine life, with a particular focus on how human activities are accelerating these impacts. The research aims to shed light on critical environmental shifts, such as rising ocean temperatures, higher sea levels, and ocean acidification, that are threatening marine ecosystems. Using a structured analytical framework, this review pulls together insights from a range of sources, including scientific reports and academic studies, with key references like FAO (2007), Costanza et al. (1997), and Orr et al. (2005). Our analysis shows how these changes disrupt food chains, harm sensitive species like corals and mollusks, and lead to the loss of habitats. Beyond environmental effects, we also examine the social and economic impacts, providing a picture that speaks to both global and local concerns. This review is valuable for its broad, evidence-based look at the threats facing marine biodiversity. While it doesn't introduce new data or detailed case studies, it synthesizes existing research in a way that underscores the urgency of these issues. Some references may be slightly outdated, and technical terms could be challenging for general readers. Even with these limitations, this work highlights the pressing need for stronger conservation actions to protect marine life from the growing pressures of climate change. By bringing together findings from various fields, this study serves as a springboard for future efforts aimed at safeguarding marine ecosystems for generations to come.

Keywords: marine biodiversity, climate change, ocean acidification.

Information needs to support environmental impact assessments of the effects of European marine offshore wind farms on birds

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Abstract

This research is based on "Information needs to support environmental impact assessments of the effects of European marine offshore wind farms on birds". The objective of this study is to develop a better evaluation of the impacts on bird populations and distribution caused by European marine offshore wind farms. This aims Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs) for offshore wind farms (OWFs), focusing on understanding species-specific avoidance behavior, habitat changes, and collision risks associated with OWFs. By addressing these aspects, the study intends to support the EIAs, and SEAs required for OWF developments in Europe. The sources of data for this study are Meteorological Radars, Species-Specific Radar Studies, Aerial Census Data and Boat-Based Surveys, the European Seabirds at Sea (ESAS) Database, Spatial Modeling Techniques, and Transect Sampling. The accuracy of this data has been certified. Wide areas are searched through these radars and sensors and inspected the distribution of birds and their migration routes before and after the implementation of OWFs. Differences in such deployments can be studied through accurate data collection from the above sources. Key points of that this study are extensive mapping of waterbird densities and migration routes, Use of large-scale radar and aerial surveys to assess bird behavior, Detailed modeling of bird avoidance behavior, habitat changes, and collision risks. Instead of only Europe, if data gathering could be spread widely to large oceans along with large-scale offshore wind farms globally, the efficiency of the research conclusion could be improvised. Proper assessments followed by proper actions could save millions of birds from massive disasters. With the use of this study, authorities would be able to take necessary actions to prevent such environmental hazards in the future. However, the need for a qualitative study about OWFs' impact on bird populations is crucial. This article is directed towards saving the environment from human activities and making our renewable energy sources efficient and environmentally friendly.

Key words: Offshore wind farms, Renewable energy, Migrant birds

Level of Electrification of Seas

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Abstract

Human activity on earth is expanding rapidly; energy is the utmost puzzle that should be solved by mankind within this century. The ocean can be called a vast renewable energy source because it absorbs much of the energy from the sun. Hence demand for energy can be addressed in an eco-friendly way by electrifying oceans, yet there aren't sufficient investments and projects implemented. The primary objective of the study is to identify offshore electrification configurations required for electrification of seas, which will facilitate entrepreneurs, investors, and policymakers in taking decisions. This article particularly discusses the concept of MUP, or multiuse platforms, which is a step toward utilizing ocean energy in an economically advantageous and sustainable manner. This research has employed various qualitative methods such as morphological analysis, cross-consistency analysis, central tendency analysis, and structural analysis after collecting the data by questionnaires and interviews using the snowball sampling method from relevant experts in the field. The research data, investigators, and methodological triangulation have been approached to increase the credibility and validity of the results. Six electrification configurations, namely, vessels charging at wind farms, charging at fish farms, thermally powered platforms, tidal plants, and offshore container terminals, have been identified as the case study of the research. Further 59 Key variables that will aid the realization of the above configurations have been identified and have estimated the time of realizations for each configuration. Though the plausibility of each configuration is not in the scope, understanding the accomplishment of each configuration is arguably necessary. The possibility of changing identified variables is expected within a complex and dynamic operating environment, which is another limitation of the study. Since the offshore activities are expected to intensify, diversify, and expand further offshore, I find this research article significant because it leverages a methodological approach rooted in strategic foresight as a design and decision support tool to improve the prospects of a successful sustainable blue economy.

Keywords: Electrification, Offshore charging, Multiuse platforms, Strategic variables

Development of Maritime Management with New Technology

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Abstract

The review evaluates the qualitative study conducted on Maritime Management and Maritime Economics, which aims to explore how the shipping industry has advanced due to the evolution of digital technology and what Strategies that can be adapted by Maritime Management to sustain in the evolving global economy. The main objective of this research is to analyze the economic drivers, policy developments and technological advancements that shape the maritime industry and to propose strategic recommendations. The paper explores how important the shipping industry is as one of the main contributors to the global economy which participates in almost every aspect of the value chain. The shipping sector has been extensively shaped by ever-changing technology and as such management has to be properly guided to address new issues that keep emerging. The document underscores the urgency of radical change in maritime management with the rapid improve of digital technology and the emergence of new issues such as smart distribution, energy management, and green pollution. The research takes into account the impact of the digital era on its opportunities and challenges for maritime management and economics incorporating other sectors. Sea trade is described as a complex system embodying several components such as people, law, engineering, economics, and logistics. There is a persistent and increasing sea trade due to the increasing GDP all over the world, this highlights the importance of shipping business, but it also has challenges like economic downturns and environmental issues. But it has failed to mention the role of women in maritime management, challenges faced by the maritime work force like mental health. Conclusion in sum, in order to stay competitive and viable, shipping industry should be more advance, technology and strategic management oriented. The growth of world trade and seabourne economy is responding and associated with technological changes and maritime companies to ensure the future with the use of future technologies.

Keywords: Maritime Management, Shipping Technology, Shipping Industry, Digital era.

Marine Pollution Owed to Oil Spill

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Abstract

A major aspect of marine pollution is carried out by Oil spills. It disrupts marine ecosystems, harms wildlife, and affects human health. This study is based on the harm caused by oil spills and methods of prevention. Oil spills have been causing severe damage to the marine ecosystem throughout the past decades in multiple cases. The objective of this study is to showcase the harm caused by oil spills in marine ecosystems and distribute proper knowledge and actions to be taken within society to prevent and handle such incidents. This intends to encourage Shipping companies, Governments and maritime organizations to take actions to reduce such incidents in the future and to handle such situations effectively. The main sources of this study are Arctic and marine oil spill program, American petroleum institute, The marine pollution control unit(mPCU) of the coastguard agency, S.C.Amico 2005 Experimental investigation of various vegetable fibers are sorbet materials for oil spills and many other source information. Mentioned sources and people used to obtain the data and information have extensive knowledge about it and have conducted investigations into it, so the data and information are accurate. The main findings of this study are how oil spills on ships affect the environment and how to minimize the damage to the environment if such an oil spill occurs and how such an event affects people living near the coast. This study has been used to carry out a limited number of incidents of oil spilled ships, so this has been limited to a certain extent. The lack of study on several oil spilled ships is a weakness. Therefore, expansion of study is recommended. This study encourages people to be thorough with proper knowledge in handling such situations and shipping companies to prioritize the prevention of such incidents. Apart from that improvements made on vessels are suggested to be made to reduce such incidents.

Keywords: Marine Pollution, Oil Spills, Marine ecosystems

Maritime Security in a Technological era: Addressing Challenges in Balancing Technology and Ethics

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Abstract

The article titled, "Maritime Security in a Technological Era: Addressing Challenges in Balancing Technology and Ethics," explores the upcoming technology and its use in maritime security and the ethical challenges posed by some of its advances such as artificial intelligence (AI), unmanned maritime vehicles and cyber technologies. This study highlights various modes of piracy and environmental and human security threats evolving to these technologies and other new technology-based crime while warning of the possible ethical issues that may occur concerning privacy and human rights of people. The methodology adopted in this research looks to undertake a systematic literature review- scholarly articles, policy documents and applicable case studies. With this approach, it shall be possible to examine in detail on the Australian maritime security sector so integrating theory and practice on maritime security. Research shows that new technology increases the productivity and safety of sea operations, but it also brings tricky ethical issues. The growing use of AI and self-driving systems raises worries about human control, responsibility of the system, and possible threats to privacy and eco-friendly practices. The article also points out the downside in global laws, like UNCLOS, which haven't yet dealt with new technological advancements in industry. The article deeply looks at how tech and ethics mix in sea security, giving useful ideas to policy makers and researchers. But the study's use of only second-hand information without real-world data makes it less practical. Also, while it explains the ethical worries well, the talk could use more solid ideas on how to lower risks. All in all, it gives a very good balanced view of the ethical questions arising from technological changes in maritime security. For that reason, the paper is useful in pointing out that what is needed is a good, sound governance framework and more international coordination to ensure developments in technology are in line with ethical considerations.

Keywords: Maritime Security, Ethical Challenges, Autonomous Vessels, Unmanned Maritime Systems, Piracy.

Ocean – A vast reserve of renewable energy

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Abstract

Electricity is an essential part of the modern society. It was discovered nearly 150 years ago, transforming the world's lifestyle. Since then, various methods have been used to generate electricity. Primarily relying on crude oil, coal, etc., harming the environment. There is a great search in need for other renewable energy sources. Renewable energy means that the source used to generate electricity is naturally replaced or replenished. Among the number of sectors harnessing this type of energy, this paper focuses on the marine sector. There is an immense amount of renewable energy that can be harnessed from the ocean. The paper covers some ways of generating electricity via the ocean, such as using ocean tides, ocean currents, ocean waves, ocean temperature gradient (OTEC), and ocean salinity gradients. The working principles, various economic and operational feasibility tests, requirements for the installation of each type of generation plant are given. Some of the key findings are that tides are predictable and therefore a very effective source, and the power output of ocean currents is very small yet a valuable source of energy. Each method has its benefits and challenges, mainly to coastal societies and to marine life. Explaining future potential energy plants such as (OTEC) and salinity gradient plants, which are still in the pilot stage is a big strength of this paper, while not mentioning wind farms is a weakness of the paper. The research excludes offshore wind farms to focus on ocean-specific energy sources, allowing deeper analysis of unique marine conditions. Including wind would broaden the scope and overlap with well-studied areas, as offshore wind lacks the same direct marine interactions. In conclusion, This paper is extensively made of existing data and previous research and it offers valuable insights into the potential of ocean-based energy sources for future research

Keywords: Renewable energy, Ocean tidal power, Ocean thermal energy conversion, Salinity gradient power.

GNOME model-based oil spill hazard trajectory map for the coastal regions of Colombo

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Abstract

Coastal economies suffer substantial adverse impacts from marine oil spills, particularly affecting vital sectors such as tourism and fisheries. The complex interactions of factors like winds, sea currents, natural dispersion, and shoreline interactions challenge the accurate prediction of spill trajectories. This study aims to develop a holistic decision support system to mitigate the adverse effects of oil spills by predicting their trajectories and identifying high-risk zones. As oil spills frequently occur along major global sea routes, Sri Lanka's shores, situated along pivotal maritime pathways, face considerable risk. This study integrates Monte Carlo simulations with the GNOME (General NOAA Operational Modeling Environment) model to simulate the trajectory of a potential oil spill from vessel leaks 14 kilometers off the Colombo shoreline (latitude 6.99706, longitude 79.73579Input parameters, including wind speed, direction, wave height, and air temperature, were obtained from Windfinder data (April 26–May 5, 2024) to model the spill's behavior over a 10-day forecast. The Monte Carlo simulation highlights the variability and sensitivity of spill trajectories to these parameters by altering one variable at a time, the simulation identified the most influential factors affecting spill movement. The geospatial risk map identified high-risk areas along Sri Lanka's west coast, particularly between Negombo and Dikkowita, while Mount Lavinia to Colombo posed minimal risk. These findings demonstrate the value of integrating statistical and physics-driven simulations into decision support systems, enhancing oil spill response strategies. The map provides actionable insights for targeted mitigation, efficient resource allocation, and informed policymaking to minimize environmental and economic impacts.

Keywords: Oil Spill Trajectory; GNOME Model; Coastal Risk Management; Oil Spill Response; Marine Pollution; Environmental Impact Assessment

Analysis of Evolving Technologies and Impact of Smart Shipping on the Future Workforce in the Maritime Industry

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Abstract

This research article evaluates the qualitative study on analysis of evolving technologies and impact of smart shipping on the future workforce in the maritime industry which aim to explore the impact of emerging technologies, such as AI and IoT, on the maritime industry and its workforce. It aims to understand how these improvements affect maritime professions, the changes in job roles and workforce conversion, and explaining the importance of addressing challenges and opportunities. Furthermore, Smart shipping case studies were studied to collect operational experiences on the IoT and AI integration in maritime operations utilizing the PRISMA framework to guide the review and analysing real-world applications by selecting specific case studies. Through focusing on major findings concerning changes in technologies, smart shipping in the maritime industry and deeper understanding of how maritime technologies are sharping future workforce needs. Key findings highlight the potential for job losses in seafaring roles due to autonomous technologies but emphasize the creation of new land-based jobs, particularly in ports, driven by digital transformation. The study also underscores the critical role of IoT, cybersecurity, and cloud computing in enhancing operational efficiency, safety, and decision-making while potential weaknesses such as rapid technology changes, changes in maritime workforce management and human factors slightly affect the scope of its conclusions. Overall, this review highlights the study's contribution on evolving technologies in maritime sector including blockchain, AI, IoT and autonomous vessels, providing a valuable framework for future research on impacts of evolving technologies on maritime operations and the role of smart shipping in workforce transformation.

Keywords: AI, Inter of Things (IoT), Maritime Autonomous Surface Ships (MASS)

Health details of workers in a ship building and repair industry

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Abstract

The modern shipbuilding industry, encompassing shipyards and marine equipment manufacturing, plays a vital role in global trade, defence, and maritime transportation. In addition to constructing vessels like oil tankers, cargo ships, and naval ships, the industry is responsible for maintaining and repairing these ships, which is crucial for keeping maritime operations running smoothly. However, shipbuilding work presents significant risks. Tasks are often performed at heights, leading to the risk of falls, and many jobs take place in confined spaces like tanks or engine rooms, where poor ventilation increases the danger of hazardous gas exposure. Workers are also frequently exposed to toxic chemicals from paints and solvents, and metal fumes from welding and grinding can lead to serious respiratory issues. Exposure to certain chemicals on the job or to harmful substances in the field can cause long-term disabilities as well as other illnesses later on. Chronic diseases caused by exposure to harmful substances in the shipbuilding and repair industry include respiratory illnesses, cancer, neurological disorders and skin diseases. To protect workers, the industry must prioritize safety by implementing better ventilation, providing personal protective equipment (PPE), and offering safety training, ensuring that health risks are minimized while maintaining productivity. Aims: The purpose of this study was to examine the health conditions of shipbuilding workers and evaluate the occupational health risks specific to the industry. Settings and Design: This was a cross-sectional study conducted on 100 randomly chosen workers at a shipyard in Mumbai, India, where their health profiles were analysed. Materials and Methods: The workers were questioned about their medical history, including co-morbidities, addictions, and use of personal protective equipment (PPE), along with any health-related concerns. They also underwent general physical examinations, bedside hearing tests, and further detailed assessments based on their medical history or existing conditions. Results: Key findings included a high prevalence of addictions (69%), irregular use of personal protective equipment (PPE) by 50% of paint workers, hypertension in 20% of the workers, overweight in 53%, osteoarthritis in 10%, hearing loss in 25%, and overall poor self-care practices. Conclusions: Workers need ongoing health education about occupational risks and lifestyle-related diseases, with greater emphasis on consistent PPE use and regular health check-ups.

Key words: Health education, occupational health hazards, personal protective equipment, shipbuilding workers.

Significant Hazards in Maritime industry

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Abstract

This study takes a closer look at the critical hazards facing the maritime industry today, examining the main sources of onboard risks and how we can prevent them to protect both passengers and crew. To do this, we reviewed a wide range of resources such as publications, websites, news articles, and documentaries and gathered insights from experienced professionals in the field. Our findings highlight key hazards, including equipment failures (like issues with cranes and winches), weather-related dangers, operational challenges, piracy and other security threats, as well as environmental and health risks. We organized these risks into clear categories, with recommended prevention strategies for each, providing a structured approach to managing these hazards. Input from over 50 industry experts and data from the International Maritime Organization (IMO) added depth to our analysis. While this review is comprehensive, it's important to note that we were limited by a lack of quantitative data, like accident rates and casualty statistics, which could impact how broadly the findings apply. Overall, the study shows that maritime hazards are constantly evolving and that staying prepared for new risks is essential. This work not only adds to the existing knowledge on maritime safety but also offers practical insights that can help shape future research and policy in the field. This research will be a huge next step for safety of maritime field

Keywords: hazards, maritime safety, equipment failure, security, risk management, preventive measures

The impact of automation on maritime workforce management

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Abstract

In this study, a systematic review and content analysis are conducted to understand how automation affects the maritime workforce planning process. It was designed to explore the impact of high-order automation, such as that accompanying increased levels of autonomy and artificial intelligence, on skills, Labor market forces, and operational modalities in the maritime sector. Key Training Areas for Upskilling: The analysis emphasizes specific areas within workforce management that require urgent action, particularly identifying key training areas essential for upskilling the workforce to match the demands of automation. Regional and Global Context: To provide comprehensive insights, the study also references regions and countries particularly impacted by these trends, where changes in workforce dynamics are most evident. The review highlights that automation is transforming the workforce by placing higher value on digital literacy and cognitive skills, while routine, lower-skilled jobs face a rapid decline. Although automation enhances productivity and safety, it brings socio-economic challenges, such as job displacement and the need for re-training. Workers, especially in regions heavily impacted by technological shifts, are adapting their skill sets to maintain relevance in the job market. The results underscore the importance of developing tailored training opportunities to navigate these transitions as automation advances. The dual role of automation is further discussed—while it drives productivity and operational excellence, it also raises concerns about job displacement and the socio-economic welfare of maritime workers. Emphasizing workforce re-training and upskilling becomes crucial as technical proficiency surpasses traditional Labor skills. Future research should focus on the implications of automation for job creation and loss, worker impact, and long-term growth in the maritime industry. Understanding these impacts is essential for business leaders to foster sustainable technology adoption and create strategies that mitigate negative consequences for workers. The study ultimately stresses the importance of collaboration among supply chain participants to ensure that technological progress leads to a balanced improvement in working conditions across the industry.

Keywords: Maritime Automation, Workforce Management, Upskilling, Regional Impact, Employment Trends, Technological Advancement

The Mental Health of Seafarers

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Abstract

This research has sought to provide comprehensive overview of both published and unpublished information concerning the mental health of seafarers, with the intention of researching the current status of seafarers' mental health, the prevalence of mental health issues, particularly depression and suicide, and to evaluate strategies for enhancing seafarers' mental health through industry-wide initiatives. The researchers have carried out an extensive literature review, taken advantage of both published and unpublished data from 1960 to 2009, as well as employed industrial statistics to gather information from a range of sources, including case studies, and researchers have gathered information from interviews and consultation with members of the Melbourne Port Welfare Association and others in the international shipping industry stakeholders. Through comparative analysis, the primary finding of this study is that "seafarers' mental health remains significantly poor, with a high prevalence of depression and suicide among seafarers." As the strength of this study, thorough examinations of the contributing factors to poor mental health among seafarers and the practical suggestions for industry-wide mental health improvement can be mentioned. While potential weaknesses such as the finding may not be fully representative of all seafarers, the article mainly uses secondary data from existing studies and reports slightly affect the scope of its conclusions. In future research, observation methods like interviews, surveys and questionnaires with seafarers in different countries can be utilized to gain a deeper understanding of mental health challenges and verify the accuracy of the secondary data. Overall, this review highlights the study's contribution to the field of marine mental health and well-being, offering a valuable foundation for future research on related areas such as mental health and occupational stress in the maritime sector and the impact of healthy habitats on the mental health of seafarers.

Keywords: Mental health, Suicide**,** Depression

Advancement of Tidal Energy in the Upcoming ERA

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Abstract

Tidal energy has the potential to play a valuable part in the future era. It is extremely reliable, environmentally healthy and cheap compared to other energy sources. Tidal energy is only depending on the gravitational pull of the moon, sun and centrifugal forces created by rotation of earth-moon system. A tidal barrage utilizes the kinetic energy of the tide and turns it to electricity. The objective of the study is to show case the opportunities for tidal energy in future era. Researchers have done a comprehensive literature review for tidal energy technologies. They have analysed various case studies including operational projects and those in development at that time (2009). The key findings of this article are mature tidal barrage technology and tidal current turbines. Tidal barrage systems such as the La Rance power plant are reliable and proven. Tidal energy is seen as an important solution to mitigate fossil fuel dependence, contributing to energy security and reducing CO_2 emissions. The study's strengths are having clear technological insights which make it is accessible to both technical and non-technical readers. Usage of case studies which are examining the real-world examples, which demonstrates practical applications and challenges of tidal energy projects. It gives a balanced perspective show casing both the advantages and disadvantages in fields of technology & economy. Limitations associated with tidal energy are high installation cost, lack of data, logistical and technical difficulties & not all coastal areas have required geography. Government policies associated are still evolving. It is still not clarified that tidal energy is useful or harmful to marine life because scenarios like underwater structures supply habitats to sea creatures while rotating blades injure them. With the current advancements of technologies (Tidal Stream Technology) United Kingdom has made significant strides where tidal energy could generate up to 11% of its electricity demand by 2050. This review highlights the contribution of tidal energy as a resolvement to future occurring energy crisis, providing valuable framework on researching how to harvest tidal energy using much smaller turbines.

Keywords: Tidal energy, Renewable energy, Turbines, Tidal barrage

Green shipping technologies

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Abstract

Shipping, which accounts for approximately 90% of the total trade by total mass in the early 21st century, is considered a necessary component of the contemporary economy. However, despite a number of technological improvements, the shipping business has largely failed to lessen its ecological footprint and emissions in particular. Wind powered vessels, at least back to the Viking boats, were economical without emissions over the globe but the mainstreaming of the space went off from this eco-friendly trend. A revival of interest in green propulsion systems such as wind, wave and solar power for waterborne vessels is now taking place. More recent technologies like Sky Sails and Eco Marine Power's Aquarius MRE provide assistance in wind and solar power for the purpose of decreasing fuel and emissions. Sky Sails assistance in the propulsion system involves fastening of kites while Aquarius MRE solar panels in combination with rigid sails collects renewable energy. Flettner rotors depicted on 'E-Ship1' make use of wind force for lift with resulting savings on fuel of up to 25%. This technological development gives a clear indication that the maritime transportation industry is rapidly evolving into a more sustainable sea transportation. Additional measures such as including sails with overactive control devices into a hybrid system on the retainer vessels, wind turbine propulsion, and accumulation of energy in batteries are being applied to the ships to avoid the use of fossil fuels like coal, gas and oil releases greenhouse gases (carbon dioxide (CO2) and nitrous oxide (N2O)) into the atmosphere, which contributes to global warming and climate change pollution & expenditure on fuel bringing up the shipping sector to reasonable impeccableness.

Keywords: Green Energy, Fuel, Environmental Protection

UNCLOS 1982: Comparative Analysis of Marine Pollution Prevention by Ships

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Abstract

The main objective of this article is to reduce pollution in the sea due to ship-generated garbage through the lens of the United Nations Convention on Law of Sea (UNCLOS) 1982. Ship waste is one of the main components threatening marine environments. Such an approach helps to better understand the problems and breakthroughs experienced by different countries when carrying out these rules. This study employs qualitative research methodologies including document analysis, such as published reports, academic works, and interviews to evaluate the effectiveness of UNCLOS 1982. The key findings are, ratification VS implementation, enforcement mechanism, and monitoring and reporting.To improve the efficiency of UNCLOS 1982 in the fight against marine pollution, the study suggests increasing stakeholder awareness as well as improving training and education aimed at increasing compliance, strengthening enforcement with more effective legal and penal regimes for non-compliance, and enforcing reporting and monitoring mechanisms that would track progress and ensure accountability. This study's strengths are deeply study UNCLOS 1982 and garbage pollution by ships and prevent garbage pollution by ships. As well as this study unable to covers about other marine pollutants and their affects to marine environment, Such as oil pollution, sewage pollution and air pollution. UNCLOS 1982 plays a vital role to prevent marine pollution from ship waste as well as from other pollutants. This study helps effectively to safeguard ocean health and ensure the sustainable us of marine resources. Protecting ocean health and sustainably using marine resources require enforcements at national levels, as well as global coordination of activities and a call for transparency. This study is of primary importance with regard to the difficulties and achievements worldwide caused by the application of UNCLOS 1982, as it points out further directions to consider for broadening the aspects of marine pollution and promoting the effective endorsement of international law provisions.

Keywords: Marine pollution, Garbage pollution, UNCLOS 1982,

05

Faculty Of Humanities Education

Mobile Learning: Trends and Effectiveness in Higher Education

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Abstract

Mobile Learning is a way of using education on the move that has been on the rise through high usage of phones and other mobile devices since it appears most promising in developing countries like Sri Lanka. This study investigates the existing trends, adoption and effectiveness of mobile learning within higher education institutions in Sri Lanka. The inquiry focuses on the mode of enrollment of mobile technologies into the education system, the barriers to such development and the prospects of increasing outreach, interaction and the quality of education offered. It looks at how mobile apps are utilized, levels of digital education of students and academic staff, and the effect of Mobile Learning on student achievement and satisfaction. The study also examines the economic and other factors facilitating or constraining mobile learning, the preparedness of the institutions of higher education for such technologies, and how rural education deficiencies can be plugged through Mobile Learning. The objective of this study is to help higher education stakeholders in Sri Lanka understand the role of Mobile Learning in enhancing higher education and suggest ways of using this technology towards improving academic performance.

Keywords: Mobile Learning, Higher Education, Sri Lanka, Adoption and Effectiveness, Barriers and Prospects

Quantum Computing in Data Protection

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Abstract

The emerging field of quantum computing is full of possibilities but at the same time, its rise poses unwanted risks especially in areas related to data protection and Encryption. Following the proclamation of quantum supremacy by Google, quantum algorithms have been demonstrated to be able to threaten certain encryption techniques including Public Key Infrastructure PKI (Brassard et al., 2011). This paper analyzes existing data encryption systems with specific emphasis on how quantum machines disturb the key exchange protocols, RSA and AES encryption techniques and applications and perform a detailed analysis of the methods. The research makes use of an extensive study of the traditional approaches to securing information, reviews the literature on the possibility of quantum attacks, and reviews quantum simulation carrying traditional encryption in order to show the potential threat of quantum computing towards such encryption. The research reviews these threats and proposes a means of advanced encryption through Quantum Key Distribution (QKD) as a remedy for the threats. A methodology that employs elements of quantum physics in attempting to measure the effectiveness of QKD in providing resilient or hardy encryption keys is adopted and investigations into post quantum cryptography PQC systems are reported. In order to ensure that critical infrastructures are kept safe in a world that has embraced quantum computing, several avenues for future research are also suggested. Although the infrastructure which enables quantum computation is still being developed, it is imperative that governments, industries and end users comprehend the risks that such abilities can pose to the security of data.

Keywords: Quantum Computing, Data Protection, Quantum encryption, Cryptography.

Progressively Opting Out of the G.C.E. Advanced Level Examination: Trends and Impact on Sri Lanka's Higher Education System.

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Abstract

In Sri Lanka, students are progressively opting out of the General Certificate of Education Advanced Level (GC A/L) examination and enrolling directly in degree programs. The purpose of this study is to investigate the factors that motivate students to pursue this alternative pathway, as well as the potential implications for the country's higher education system. The results will clarify the trend's wider effects on Sri Lanka's higher education system's structure and educational policies. This study looks into the roles that foreign credentials, private degree programs, and student perceptions of the GCE A/L exam play in the emergence of this new trend. It does this by using a survey-based technique that targets 250 students from diverse private universities. The results indicate that 70% of the surveyed students cited dissatisfaction with the GCE A/L exam structure as a primary reason for their choice, while 60% reported the allure of faster graduation through private programs. Additionally, socioeconomic factors and influence from foreign universities were significant contributors, with 45% of students mentioning these in factors. The research also evaluates how this change would affect Sri Lanka's educational system in the long run and whether it will worsen the gaps that already exist across various socioeconomic categories. The findings emphasize how important it is for decision-makers to reconsider the place of conventional exams in light of contemporary learning options. The study emphasizes how crucial it is to develop a more accommodating and inclusive framework for Sri Lankan citizens to access higher education.

Keywords: GCE A/L, higher education, Sri Lanka, overseas qualifications, private degree programs, Advanced Level

Prediction of Student Adaptability Level in e-Learning Using Machine and Deep Learning Techniques

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Abstract

In this fast-growing digital era, e-learning has changed the concept of education by providing more personalized and flexible learning. On top of all, integration of machine learning and deep learning methods now helps educators to estimate the level of adaptability a student can have and thus provide learning pathways based on individual needs. This paper looks into AI in education and focuses on how the incorporation of predictive analytics would greatly improve student engagement in higher education, alongside academic success. An AI model, by processing data about students' performance, makes predictions over learning outcomes and provides personalized recommendations, which allows making education more adaptive and effective. This also involves thorny questions regarding explain ability and transparency in AI decision-making, underlining the need for trust and equity to be part of the use of automated tools within educational settings. Combining technologies in which adaptiveness may take place, the study points out the potential of AI to really change learning into an individual experience, catered to different learning styles. These innovations have their bottom-line contributions to improving student performance while paving an inclusive and effective way for education in the digital era.

Keywords: E-Learning, Education, Deep Learning, Machine Learning, Adaptability Level

Exploring the Motivations and Factors Driving Sri Lankan Students to Pursue Higher Education Abroad: A Case Study

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Abstract

The increasing trend of Sri Lankan students seeking higher education opportunities in foreign countries necessitates gaining insights into their motivations and the factors affecting such decisions. This study investigates studying abroad as a mechanism for better occupational outcomes through accessing foreign education of a perceived high quality, niche programs, global orientation, opportunities, and improved career prospects. A survey administered among grade 12 and 13 students (50) in the Western Province of Sri Lanka found that 96% of students agreed that there are better chances for career development if they study overseas. The study also looks at issues facing Sri Lanka's education system such as limited subjects to study, outdated syllabi, overcrowded universities, and a mismatch of education with employment that leads students to think of alternative international options. Financial support emerged as a crucial factor, with 94% of students indicating that scholarships and the affordability of studying abroad compared to local private institutes strongly influenced their intentions. Further, the study explores socio-cultural factors including the attraction of different cultures, and cosmopolitan living which influenced 78% of students' intentions to study abroad. The results reveal the urgent need for reforms in Sri Lanka's higher education sector to retain talent and prevent student outflows. Based on the findings, recommendations are made for policymakers to fill voids in the local education sector and to enhance the retention of students in the country.

Keywords: Higher education abroad, motivations, Sri Lankan students, education system gaps, student retention.

Teacher Perception of Use of AI on Classroom in Sri Lankan Government Schools.

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Abstract

This research explores the perceptions of teachers in Sri Lankan government schools regarding the use of Artificial Intelligence (AI) technologies in the classroom. The study aims to achieve three key objectives: to identify and analyze the challenges and barriers teachers face when implementing AI in educational practices; to explore teachers' perceptions of AI integration, including their views on potential benefits and drawbacks as well as their readiness to adopt AI tools; and to examine how the teaching profession can adapt to the increasing integration of AI technologies while ensuring that educational quality is maintained or enhanced. A quantitative approach was employed, using a survey-based methodology for data collection. A structured questionnaire was administered to 100 experienced teachers from 10 schools in the Colombo Zone. Data collection utilized both primary and secondary sources, with secondary data obtained through prior research studies, organizational records, media, government publications, and online resources. The questionnaire covered variables identified through literature review and the researcher's own insights into AI in education. Data analysis involved statistical techniques to assess trends in teachers' responses and to quantify key factors affecting AI adoption in classrooms. Findings are anticipated to shed light on the obstacles teachers encounter in implementing AI and offer insights for developing strategies to address these barriers. Ultimately, this study aims to contribute to a deeper understanding of teachers' perceptions of AI's role in education, highlighting the potential for AI to enhance teaching practices and educational outcomes.

Keywords: Teacher Perception, Artificial intelligence, Sri Lankan government schools

Impact of Digital Transformation on Business Model Innovation and Sustainable Performance

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Abstract

Inspired by the continuous development of digital technologies like AI, automation, and data analytics, the trend in radical change in business models is evident. This paper discusses the enabling role of digital transformation in business model innovation and sustainable performance across different industries. In this regard, the digital solutions inculcated into an organization will enhance operational efficiency, enable effective decision-making, and provide adaptability within highly volatile markets. The research design is a mixed-methods approach, as a series of case studies are being undertaken with data analysis across cross-industry sectors: health, education, and finance. These were evaluated based on the effects that digital tools have on enterprise performance and competitive positioning. Indeed, from the results, organizations embracing digital technologies stand at a vantage position to ensure the efficiency of operations, data-informing of decision-making, and attainment of sustainable growth. Nonetheless, this transformation does call for sound digital leadership together with the strategic focus of digital initiatives toward the attainment of business goals. The leading learning arising from this study is that, within the digital economy, only those firms can sustain a competitive advantage if they can adapt effectively and innovatively using digital tools.

Keywords: digital technologies, sustainability, sustainable business performance, digital transformation, digital leadership

Cyberbullying among Secondary School Students in Bandarawela Zone

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Abstract

In the digital age, cyberbullying is a form of bullying that occurs through digital methods of communication such as emails, instant messaging, and social media has expanded. Despite its often-private personality, cyberbullying can have serious and devastating consequences. The research will focus on the relationship between these attitudes and traits of personality, this study aims to explore secondary school students' attitudes towards cyberbullying and cyber victimization in the Bandarawela zone. 21 of the 500 students from secondary schools in the sample that were surveyed said they were the victim of cyberbullying. To evaluate the participants, the study used an edited version of the questionnaire and a system of ratings for cyberbullying indices. The findings indicate an important connection between views on cyberbullying and characteristics such as extraversion and psychoticism. The study also shows that an important number of students particularly female students have experienced cyber victimization at least once in their life. The creation of fake identities or websites and anonymous phone calls are the most often reported kinds of cyberbullying. The research highlights the importance of increasing awareness of cyberbullying while implementing preventive measures, particularly among vulnerable student populations. The study adds to the increasing understanding of cyberbullying and its psychological effects, providing a basis for additional approaches in educational settings in the future.

Keywords: cyberbullying, cyber victimization, students

Effectiveness of Technology Integration in Second Language Learning of Grade 9 Students: A Case Study

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Abstract

Technology integration in education is often used to describe such alternatives where digital software, computer hardware, or other devices are added or replaced programmatically. This research discusses how the integration of technology affected the student learning process with a subject context of learning Tamil as a second language for Grade 9 students in a rural school located in Sri Lanka. This study used a mixed-method approach, relying on quantitative data from student questionnaires and assignment results as well as qualitative data from teacher interviews and classroom observations. The findings show that students who followed technology-integrated classes scored an average of 38.65 in language proficiency whereas those in conventional classrooms scored 23.9, highlighting remarkable advancement. Additionally, 97.5% of students were attracted to technology-integrated classroom setups and 92.5% responded to wanting more technology to be integrated into future classroom settings. Still, technical interferences, poor infrastructure, and inadequate or no opportunities for teacher training are some of the aspects that work as a restriction to tapping completely into the potential of technology. Suggestions by the study include enhanced internet infrastructure, teacher training for digital utensils and policy-based structured application of technology in the classroom. Also, a hybrid learning strategy that mixes traditional and technology-integrated learning to improve overall functionality. This is why the concepts aim to bridge the digital divide and provide high-quality language learning in rural locations.

Keywords: Digital divide, Rural education, Second language learning, Teacher training Technology integration

The Impact of Career Path Discrepancy on Trainee Teachers Mind Set and Learning

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Abstract

This study aims to understand the experiences of career changers who transitioned into teaching after completing their Advanced Level (A/L) examinations. We explore the psychological and cognitive shifts that occur during this career change, focusing on how these individuals reconcile their career decisions, adapt their mindsets, and navigate the learning experiences within teacher education programs. To achieve this, an online survey was conducted with a sample of 50 trainee teachers. The survey delved into participants' motivations, challenges, and experiences during their teacher training. By examining the unique challenges faced by career-changing teachers, this research aims to inform the development of targeted support strategies. Potential interventions include mentorship programs, peer support groups, career counseling, curriculum adjustments, mindfulness workshops, and workplace support initiatives. These strategies can foster a more supportive and comprehensive learning environment for career-changing teachers, enabling them to thrive in their new roles. This study contributes to the growing body of knowledge on career transitions and the complexities associated with entering a new profession.

Keywords: Career changer, Mindset, Adaptation

Human-Centered AI: Enhancing Collaboration, Transparency, and Ethical AI Systems

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Abstract

It is novel concepts — like pushing to design AI systems that complement human skills, are explainable and transparent by default, concrete in their ethical approach (from the onset) and democratically fair at all relevant levels of implementation; they fall under what has been framed as Human-centered-AI -HCAI. In this paper, we assess the manner in which IBM Research is deploying HCAI across sales commerce transactions or processes (at scale as applied to process outcomes and intellectual capital) throughout finance businesses planning out human resource organization. This paper reports on the case of IBM, a bureau with decades-long user experience (UX) expertise — from theory to practice as well as in academia and software development; its journey ensuring artificial intelligence that works collaboratively within human-computer interaction (HCI), data science and design. IBM focuses on human AI (HCAI) harmony by automating AI model development with Auto AI for faster productivity and fewer data scientist errors, so that consistent integration of diverse analytics solutions could be accomplished. Moreover, IBM's SCORE engine even leverages AI to automatically come up with the best business-matching opportunities in a sales environment while giving clients an easy-to-understand narrative about their choices-process transparency capturing consumer buy-in. IBM's research on conversational AI, which forms the foundation of this experiment, is designed to advance development in smart assistants and customer service bots. By employing linguistic analysis and examining user expectations, IBM then fine-tunes these systems to become more interactive. It also examines how AI systems might be designed as creative partners for expert use, enabling tools that would expedite the innovation process, simplify intricate work and bolster creativity. Given the conclusions of this study, it is important to develop AI based on fairness and aligned with human values as well as AI that can be trust. Our study conclusions reinforce the need for interdisciplinary efforts to improve HCAIs and build fair AI tools that are sympathetic with human end users and ethical responsibilities.

Keywords: Human-Centered AI (HCAI), Ethical AI, AI-Augmented Human Capabilities

Investigating the Impact of Formative Assessment upon Summative Assessment Performances of Students at ABC school: Teachers' Perspective

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Abstract

This study investigates the impact of formative assessment practices on students' summative assessment performance, focusing on teachers' perspectives at ABC School. Using a census sampling method, data were collected from all 30 secondary school teachers through a structured questionnaire that included both closed-ended and open-ended questions. Quantitative data were analyzed using descriptive statistics and cross-tabulation, while qualitative responses were systematically coded based on thematic analysis. These codes were then quantified by assigning numerical values to each theme, facilitating further statistical examination. Results indicate that 86.7% of teachers perceive formative assessments as beneficial for improving student learning outcomes and positively impacting summative assessment performance. A frequent use of formative assessments, such as quizzes, peer reviews, and self-assessments, was associated with higher student achievement in summative assessments. However, teachers identified challenges including time constraints, large class sizes, and inconsistent technology integration as barriers to effective formative assessment practices. The findings underscore the significance of structured, well-implemented formative assessments in fostering student success. Addressing these challenges can enhance formative assessment strategies and lead to improved educational outcomes. This study has implications for teacher training and educational policy, promoting a balanced assessment approach that supports both student learning and institutional accountability.

Keywords: Formative assessment, Learning outcomes, Summative assessment

Exploring the Perception of Teachers Towards the Personality Traits of O/L Students

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Abstract

This study explores teachers' perceptions of ordinary level (O/L) students' personality traits framed through the Myers-Briggs Type Indicator (MBTI) personality theory. Understanding these perceptions is critical because they can significantly influence teaching strategies and student performance. Qualitative research methodology was used for this study. Accordingly, data was collected through semi-structured interviews with six teachers teaching different subjects in ABC school. This finding reveals varying awareness and understanding of MBTI theory among teachers, highlighting differences in how they interpret and apply these personality traits in the classroom setting. Many teachers recognized the value of personality traits in shaping students' behavior and interest in learning. At the same time, the study identifies gaps in teachers' knowledge regarding the use of MBTI theory. Some teachers reported that they try to actively incorporate students' personality traits into their lesson planning and classroom management strategies, helping to create a more engaging and supportive learning environment. Conversely, other teachers expressed uncertainty about how to effectively integrate this understanding into their teaching practices. All the data thus obtained were analyzed through thematic analysis. Accordingly, the responses were divided into common themes and analyzed across those themes. As recommendations related to that analysis, the research emphasizes the importance of professional development in equipping teachers with the skills and knowledge to understand and apply personality theories in educational contexts. By fostering awareness of personality traits, educators can tailor their instructional approaches to meet the diverse needs of elementary students. This study underscores the potential benefits of integrating personality theory into educational practice, suggesting that a deeper understanding of students' personality traits can lead to improved learning outcomes and a more harmonious classroom environment. This study explores the importance of providing guidance for future research and training teachers to effectively use personality insights in their teaching.

Keywords: Myers-Briggs Type Indicator (MBTI), Personality theories, Personality traits

The Impact of Parental Involvement on Academic Achievement Of Grade 8 Students in ABC School

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Abstract

This research focuses on the examination of parental involvement on the academic performance of the grade 8 students at ABC School. This research aims to answer the research problem by examining various forms of parental involvement and impact of parental involvement on grade 8 students' academic achievements. Quantitative questionnaires were administered to 80 students (census sampling), while 10 parents were interviewed (purposive sampling). Descriptive statistical analysis and thematic analysis were used to analyze the data. The study identified three dimensions (behavioral, affective, and cognitive) of parental involvement, and they had a positive relationship with academic performance. The behavioral involvement practices have higher positive impact on academic performance. For examples, checking of homework daily and participation school events. Positive learning environment and achievement related affective involvement was positively related to student motivation and performance. And the significant relationship identified between academic performance and cognitive involvement through providing study materials and training critical thinking skills. The study established several particular practices of parental involvement that were significantly related to academic achievement. The qualitative part of the study showed that parents understand the significance of their participation to a greater extent on academic achievements of students. The research results indicate that parental involvement significantly contributes to students' academic achievement, emotional well-being, and cognitive growth. The findings of the study can be applied to improve the educational practices that relate to parental involvement especially for the Grade 8 learners of ABC School. Generalization of the study results is constrained because, the study' sample involved only one international school. Further studies should include samples with greater number of participants from different educational settings and use longitudinal research to establish the long-term impact of parental engagement.

Keywords - Parental Involvement, Academic Achievement, Grade 8 Student

A Study of Psychological, Cultural and Social Experience of Female Protagonists in Diasporic Literature Portrayed by Female Writers

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Abstract

This qualitative research explores the psychological, cultural, and social experiences of female protagonists in diasporic literature, as portrayed by female writers Jhumpa Lahiri and Chimamanda Ngozi Adichie. By conducting a descriptive analysis of selected short stories 'Interpreter of Maladies' and 'The Thing Around Your Neck', this paper examines how both authors portray the challenges encountered by women in the diasporic communities while incorporating the two theories of intersectionality and postcolonialism. This study aims to identify the dual layers of discrimination based on gender and diaporic status these protagonists endure. These female protagonists navigate not only the complexities of cultural dislocation but also the gender-based discrimination that place them at the lowest level of social hierarchy. Lahiri's story provides insight to the psychological isolation, emotional strain, and identity crisis experienced by Indian women as they attempt to balance the pressures of assimilation with their cultural heritage. This story depicts how female characters face internal conflicts and societal expectations, exhibiting their sense of alienation in foreign environments. Similarly, Adichie's 'The Thing around Your Neck' emphasizes how Nigerian women experience a double marginalization as both immigrants and females. In the short story "The Thing around Your Neck," the protagonist deals with cultural alienation, racial prejudice, and economic hardships, further compounded by the patriarchal structures they must navigate in both Nigerian and Western contexts.This paper discusses which psychological and social challenges are highlighted through the female protagonists and how do the female protagonists in the diasporic short stories bring forth the intersection of gender discrimination and cultural displacement. By analyzing their psychological, social, and cultural experiences, the research seeks to contribute to the understanding of how female writers portray the intersectionality of race, gender, and migration in diasporic literature.

Keywords: diasporic community, cultural and social experience, female protagonists, female authors, psychological

Effectiveness of Peer Correction on The Development of Be Verb

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Abstract

This study investigates the effectiveness of peer correction in enhancing the development of the "be" verb in English writing among ESL (English as a Second Language) learners of first year undergraduates. ESL learners often struggle with its correct usage and conjugation, leading to errors in written communication. The aim is to show that there is more improvement in the students who do peer correction based on “be” verb followed by error discussion in the class. Moreover, to investigate learners’ attitudes and perceptions towards peer correction. The research employs a mixed-methods approach. It is done by combining quantitative analysis of pre-test and post-test scores with qualitative data obtained through written reflections, questionnaires and interviews. A sample of 50 ESL learners is divided into experimental and control groups, with the experimental group receiving peer correction activities supplemented by common error discussion in the class, while the control group did not practice it. This test is conducted by giving 6 topics to write paragraphs in a period of 12 weeks during the semester. Results indicated positive student attitudes towards peer correction and pretest-post test scores demonstrated significant improvement in students be verb writing and scores. The written reflections of the students of experimental group showed a significant improvement in the posttest compared to pretest. The study suggests that peer correction can be implemented cautiously with careful monitoring and supervision.

Keywords: Peer correction, learner autonomy, ESL, writing, pedagogical strategy

Silencing the Marginalized: An Exploration of Oppression in Media Narratives Through the Sri Lankan Film the Newspaper (2020)

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Abstract

Media narratives function as a lens through which audiences understand the world. By framing information in specific ways, they not only reflect the dominant social norms but also influence their creation. As a result, media narratives may not fully capture the subservient: the diverse and varied realities of marginalised communities, focusing instead on catering to the routine public trust on standard way of life. Through an in-depth analysis of the Sri Lankan film "The Newspaper (2020)" by Sarath Kothalawala and Kumara Thirimadura, this qualitative study explores any discrepancies that may exist between the portrayed versus actual experiences of marginalised groups, focusing on the injustice and lack of responsibility in the media narrative. Extensive content analysis method will be used as the primary method of study, which would allow keener observations to emerge. The Agenda Setting theory and Anthony Giddens's Structuration theory forms the theoretical base in analysing media content. The aspects of societal needs based content, impact on subject, narrative style and discursive lens will be the specific areas of focus. Furthermore, how social movements, cultural shifts, and political propaganda complicate this relationship, as media adjust to the changing social reality are explored in detail, thereby delving into the potential consequences of this interaction. This includes an examination of the plot, style, presentation and subtext and the context of the film. The study will then foreground the lack of subservient representation as a possible window to further societal harm. Thereby the study establishes the complex and dynamic relations between media narratives and social realities, emphasising the need for a more conscious and ethics-driven approach in mass media representation.

Keywords: Media narratives, Storytelling, Structuration, Marginalization

The Influence of Task-Based Assessment on Undergraduate Oral Presentations: Perspectives from Student Narratives

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Abstract

Innovative teaching methods enhance students' enthusiasm for both learning and assessments. Task-based assessment, in particular, offers significant benefits by providing learners with opportunities to improve their language and oral presentation skills. However, existing research suggests a potential gap in understanding the impact of task-based assessment on undergraduates' oral presentations. Investigating this complex relationship is the objective of this study as it could be beneficial for both the language teachers and learners. This paper reports on a qualitative study examining the effect of task-based assessment on undergraduates' oral presentations. The sample consists of six third-year sports science students, selected based on their scores for a personal branding video. Data was collected through semi-structured interviews, each lasting approximately 30 minutes. The interviews were transcribed intelligent verbatim and analyzed using thematic narrative analysis. Participants often described previous speaking assessments as unengaging, ineffective, and overly focused on the final product. In contrast, they viewed task-based assessments as transformative, prompting them to rethink their language-learning approaches and adjust their strategies through autonomous learning. This shift led to critically reassessing the pedagogical limitations that had previously restricted their language exposure. Furthermore, participants wanted to join English-speaking communities within their field, driven by career aspirations that necessitate strong oral presentation skills. The study concludes that allowing students to exercise autonomy within a structured task-based assessment framework fosters a sense of investigative learning. This process begins with self-awareness and culminates in repositioning their educational approach. The findings suggest that current pedagogical practices should evolve to align course content with student needs, incorporating more speaking-related and exploratory tasks. These changes would better assess and develop students' oral presentation skills, ultimately preparing them for future career opportunities.

Keywords: Autonomous learning, Exploratory tasks, Language learning, Oral presentations, Task-based assessment

Identifying the Necessity of Speaking and Listening in the Maritime English Curriculum; A Needs Analysis of the Deck Rating Students

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Abstract

This study investigates the necessity of authentic spoken and listening components within the Support Level Maritime English program aligned with Deck Rating course at MSTI Maritime Academy in Dehiwala, Sri Lanka. The Deck Rating course is specifically designed for Sri Lankan men aged 18 to 25, who are aiming to start their vocational career in maritime industry. The Support Level Maritime English program aims to equip participants with the English language skills essential for entry level positions. With the recognition of English as a lingua franca the proficiency of English is a major requirement for all the seafarers. Hence, a comprehensive needs analysis employing present situation analysis, target situation analysis, and in-depth interviews with learners and instructors are executed. The needs analysis included both open and close ended questions while interviewing 5 students, and 2 instructors. The study delves into the specific requirements of learners in this course in analyzing the existing gap between present situation analysis and target situation analysis. The findings unequivocally highlight a significant disparity between the current curriculum's emphasis on scripted dialogues which are being taught via a textbook that offers a variety of exercises encompassing vocabulary building, grammar drills, and reading comprehension problems. Yet the disparity arises between the mastered content and the realistic demands of onboard communication. The scripted materials frequently feature Sri Lankan English or standard written English, which diverge considerably from the colloquial and idiomatic language used by international maritime community. Moreover, the study reveals that the limited exposure to authentic spoken English within the curriculum hinders students' ability to effectively communicate with international colleagues and understand complex maritime terminology. This deficiency can have far-reaching implications for their professional success and career advancement. To address these shortcomings, the study underscores the imperative of integrating authentic spoken and listening activities into the Support Level Maritime English program of the Deck Rating curriculum. By providing students with ample opportunities to engage in real world conversations and listen to authentic English speech, the program can equip them with the linguistic skills necessary to thrive in the dynamic and international maritime industry.

Keywords: English for Specific Purposes, Maritime English, Needs Analysis, Speaking and Listening Skills

Group Work to Motivate English as a Second Language Learners to Improve Speaking Skills

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Abstract

Speaking is a fundamental skill for the advancement of English language learners, yet it frequently receives insufficient emphasis within educational settings. Consequently, students often exhibit significant errors in verbal communication and speaking tasks. Moreover, vocabulary acquisition and the precise application of language mechanisms play a vital role in strengthening speaking abilities. However, many lecturers rely on outdated, predominantly teacher-centered methods to develop students' speaking skills within universities. A shift toward student-centered English teaching methodologies is increasingly essential in today's classrooms. This study aimed to evaluate the effectiveness of implementing group work as a motivational strategy to enhance speaking skills among English as second language learners. The research included 40 first-year undergraduates from the Faculty of Humanities and Social Sciences (FHSS) at the University of Sri Jayewardenepura. Initially, a pilot study was conducted to gather data on students' speaking backgrounds and their proficiency in vocabulary and grammar. The participants were divided into two groups: an experimental group and a control group. Both groups received instruction on four selected topics over a four-week intervention period, supplemented by an additional vocabulary list. After each lesson, students in the experimental group completed a speaking task, which was exclusively enhanced through group work as a motivational mechanism. This speaking process encompassed stages of initial drafting with the given vocabulary list, peer correction to formulate meaningful sentences and relevant content based on the topic, and final speech production before the class. Continuous feedback was provided throughout the cycle by both group members and the researcher. Conversely, the control group followed the same procedure without continuous feedback or group collaboration. Data analysis employed both qualitative and quantitative approaches. The findings revealed that the experimental group demonstrated a substantial improvement in their speaking skills compared to the control group. Ultimately, the study highlights the importance of shifting from teacher-centered to student-centered methodologies to better support language acquisition in educational settings.

Keywords: Speaking skills, Vocabulary, Motivational, Group work, Collaboration

The Psychological Analysis of The American Wife in Ernest Hemingway's Short Story "Cat in The Rain," Explored through Sigmund Freud's Psychoanalytic Theory

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Abstract

This study investigates the psychological distress of the American wife in Cat in the Rain, a story known for its minimalistic style, that subtly conveys her inner turmoil and emotional isolation. Applying Sigmund Freud's Psychoanalytic theory, particularly his structural model of personality, the research explores unconscious factors influencing her emotional psychology. The investigation reveals that her mental anguish stems from repressed desires and internal conflicts, shaped by the tension between suppressed emotions and external circumstances. Literary devices such as symbolism (the cat), repetition and imagery express the American wife's repressed desires and internal conflict. Using a qualitative methodology alongside Reader Response Theory, the research interprets how the wife's emotions and desires are shaped by readers' personal experiences while also analyzing Freud's theoretical concepts. The findings reveal that her desire for the cat reflects a yearning for affection, restrained within her marriage. Analyzing her coping mechanisms demonstrates how the interplay between the ID (Unconscious Desire), ego (Pre-conscious Rationality), and superego (Moral Constraints), creates emotional turmoil contributing to her emotional isolation and psychological transformation. The analysis indicates that defense mechanisms, such as denial and displacement exacerbate her emotional isolation and psychological distress. Freud's psychoanalytic framework unveils the American wife's internal struggles, emphasizing themes of marital disconnection, emotional subjugation and the search for identity. This study highlights how the interplay between the unconscious (ID), preconscious (ego), and superego adds a nuanced layer to Hemingway's portrayal of human longing and isolation. It concludes that Freud's lens, Hemingway's portrayal of the American wife's internal conflict offers deep insights into human emotional denial, identity struggles, and the complexities of human relationships especially within the confines of marital disconnection.

Keywords: Cat in the Rain, Psychological distress, Structural Model of Personality, Defense Mechanisms, Freud, Symbolism, Reader Response Theory

The Application of the Principles of Richards in Teaching Listening Skills: A Qualitative Study Based on the Perceptions of Intermediate-Level Adult Learners in an Online ESL Classroom

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Abstract

Listening skills are considered the core skills necessary to master English as a Second Language[1]. Teaching listening skills in the Sri Lankan ESL context takes a passive approach, as it is not a frequently tested skill in both primary and secondary levels of education, thereby causing a lack of proficiency amongst those who enter the tertiary sector. Thus revolving around the theoretical underpinnings as posited by Richards (2009), this study addresses the research gap which notes that there is a lack of studies that propose a theoretical framework to overcome the passive method of teaching listening skills to adult learners within the Sri Lankan ESL context. Therefore, the purpose of this study is to examine the perceptions that the intermediate-level adult learners hold on applying the principles of Richards (2009) in teaching listening skills within an online ESL classroom. Thus, taking a qualitative approach, a sample consisting of thirty-two intermediate-level adult learners of English between the ages of twenty-six and thirty was selected. Learner perceptions of the control and experimental groups were gathered through an open-ended questionnaire, while semi-structured interviews were conducted for the experimental group based on the two research questions of the study. The first research question focuses on the comparative analysis of perceptions which can be categorized into several themes. The themes include the perceptions of student engagement, motivation and interaction, comprehension and vocabulary retention, and the flexibility of the stages included in the listening lessons to accommodate learner needs. Further, the findings of the second research question highlight the pedagogical application of the principles of Richards (2009) in teaching listening skills to intermediate-level adult learners. Conversely, the passive engagement of the control group emphasizes the limitations of traditional methods of teaching listening skills.

Keywords: Principles of Richards, Teaching Listening, Qualitative, Perceptions, Adult Learners

Understanding Academic Literacy in English Medium Instruction Degree Programs in Sri Lanka

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Abstract

Sri Lanka has seen a considerable increase in English Medium Instruction (EMI) degree programs across various subjects. This moves from traditional languages to English as the medium of instruction aims to enhance global competitiveness and ensure graduates have the skills needed to flourish in an increasingly linked world. However, despite this transformation, academic literacy in EMI programs remains unexplored. In today's world, academic literacy, which is enhanced skills of student's reading and writing caliber in academic subjects, is more important, especially in EMI degree programs. This study seeks to explore and comprehend the complexities of academic literacy in Sri Lanka's EMI degree programs. In addition, Mahawattha and Rassool, (2021) 'A few academics explained that the existing "sub-cultural," political and social situation does not allow undergraduates to progress in English'. In addition, this could be a significant challenge for future EMI degrees and their impact on undergraduates. Further Sri Lankan secondary education has a huge impact on EMI degree programs due to the significance of L1. 'Most students enter university after completing their studies in one of the vernaculars – Sinhala (78.4%) or Tamil (19.4%) (Annual School Census of Sri Lanka, 2020, p. 11as cited in Mahawattha & Rassool, 2023). Both learners and educators were interviewed in a semi-structured manner to learn more about their academic literacy experiences, perspectives, and obstacles in EMI programs. Thematic analysis has been used to find common themes and patterns in the interview data. The 102 medical students participated in the initial data collection and then it filtered to six at the final stage of data collection. This research presented the results that students who are in EMI degree programs have faced the issues in initial stages of learning but Academic writing or EMI programs helped them to be confident in their subject. This study intended to add to the current body of information about academic literacy in EMI programs by presenting insights particular to the Sri Lankan setting. The study's findings can help guide curriculum creation, pedagogical practices, and legislative decisions intended to improve academic literacy education in EMI degree program.

Keywords: EMI, Pedagogy, Sri Lanka

Exploring the Role of Social Isolation and Media Representation in Shaping Perceptions of Jeffrey Dahmer in Dahmer – Monster: The Jeffrey Dahmer Story

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Abstract

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The Netflix series, "Dahmer - Monster: The Jeffrey Dahmer Story" has reignited public fascination with the notorious serial killer, Jeffrey Dahmer from Milwaukee, who was responsible for 17 homicides from his early 20s to late 30s. Across its 10 episodes, the series delves into Dahmer's life, highlighting social isolation as a potential factor in his crimes. This study delved deeper, analyzing how the series portrayed social isolation as a key factor driving Dahmer's crimes, using qualitative content analysis of the series' dialogues, character development, and visual cues, through primary analysis of the series and secondary sources, including research papers, interviews, and articles where this research explored how isolation is depicted as central to Dahmer's psychological profile and motivations. Thus, findings indicated that social isolation is portrayed as a contributing factor, potentially intensifying Dahmer's violent tendencies, while also raising ethical questions about media narratives in representing complex behaviors. Ultimately, by analyzing the series' depiction and comparing it with reliable sources, the research aimed to contribute to a more comprehensive understanding of the aforementioned factor that contributed to violent crime. Additionally, it emphasized the ethical considerations surrounding media portrayals of the complexities of human behavior embedded in a serial killer, and the risks of oversimplification for media producers. Nevertheless, there may be other factors that provoked Jeffrey Dahmer to commit these crimes collaboratively. Subsequently, these factors could be addressed through future research acknowledging his mental state and criminal behavior in similar contexts.

Keywords: Jeffrey Dahmer, Serial Killer, Netflix, Criminal Psychology

A Comparative Analysis of the Two Short Stories "The Defeated" by Nadine Gordimer and "Everyday Use" by Alice Walker in Relation to the Theme of Identity Crisis

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Abstract

This study examines the theme of identity crisis within a postcolonial context through a comparative analysis of “The Defeated” by Nadine Gordimer and “Everyday Use” by Alice Walker. Both stories depict characters struggling with cultural heritage, education, and societal expectations, leading to internal conflicts in their sense of identity. This research aims to investigate how these two short stories portray identity crises shaped by education and cultural displacement. It examines how characters' self-perception, cultural heritage, and societal expectations influence their sense of self. Utilizing both qualitative and quantitative research methods, the study collects subjective and statistical insights through an online questionnaire distributed to lecturers and literature undergraduates at CINEC. This approach employs a critical analysis of diverse perceptions regarding identity conflicts in postcolonial narratives, specifically focusing on “The Defeated” and “Everyday Use”. The findings reveal that characters like Dee and Miriam experience identity crises driven by conflicts between personal ambition and cultural loyalty. Dee, in “Everyday Use”, develops a conflicted sense of self by using her African heritage for social gain while neglecting its true significance, Whereas Miriam, in “The Defeated”, distances herself from her parents' traditional values, seeking societal success but losing her connection to her roots. Education emerges as both empowering and alienating, contributing to their cultural disconnection. Ethical considerations for this study include maintaining participant anonymity and confidentiality, ensuring voluntary participation with informed consent, and respecting diverse viewpoints. However, the study is limited by focusing on only two short stories and a sample size from CINEC, which may restrict the generalizability of the findings. Future research could include different postcolonial texts from various cultural backgrounds to offer a broader view of identity crises. The study concludes that “The Defeated” and “Everyday Use” highlight the lasting effects of colonialism on identity, focusing on how education and societal expectations challenge cultural loyalty and self-perception.

Keywords: Everyday Use, The Defeated, Cultural heritage, Education, Identity crisis, Postcolonial Literature

A Study of J.B Jackson's 'Sense of Place': The Artist's Sense of Belonging at the Creation of Art

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Abstract

The term 'space' defines one's surroundings. The term, 'place' defines the occasion that the individual tries to create contact with the available space. The objective of the present research study is to investigate the connection between the artist's 'Sense of Place' and their work of art while referring J.B Jackson's (1996) theory of 'Sense of Place'. The theory elucidates that since everyone convinces themselves of the need for a private life, they prefer to live in the non-urban context. Not only that even it can be a certain event or an occasion that the person tries to make sense out of that space, in order to make it into a place. The present research pursues the research questions as follows, how does the artist use own 'Sense of place' to create own work of art of art? William Wordsworth was a British poet. Once he wrote the poem, 'I Wandered Lonely as a Cloud' after witnessing a field of daffodils. On the other hand, Dhammika Bandara is one of the famous Sinhalese composers in Sri Lanka. At one time, he was teaching at the University of Colombo, and he was compelled to visit the University of Peradeniya due to some of the official work. At the University of Peradeniya, Dhammika Bandara happened to be amazed by the beauty of the university. Methodology of the present study used thematic analysis in order to analyze the poem, I Wandered Lonely as a Cloud by William Wordsworth and the song, Hanthanata Payana Sada by Dhammika Bandara while referring to the theory of J.B Jackson's 'Sense of Place.' The findings of present study reveal that the artist's creation of the art is solely a re-creation of the artist's belonging to a certain place which is further driven by the powerful imagination of the artist.

Keywords: Artist, Belongingness, Creation, Place, Space.

The Role of Silence and Voice as Two Sound Devices in Portraying Hope and Oppression in Emily Dickinson's "Hope is the Thing with Feathers" and Maya Angelou's "Caged Bird"

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Abstract

This study examines the role of silence and voice as sound devices in conveying hope and oppression in Emily Dickinson's "Hope is the Thing with Feathers" and Maya Angelou's "Caged Bird." Through a comparative analysis of rhyme scheme and free verse, this research provides insights into how these poets use sound to portray resistance and empowerment. The objectives are to analyze how each poet employs these devices to express hope and defiance against societal constraints. Dickinson's metaphorical silence reflects hope as a quiet, steady force that fosters internal strength. In contrast, Angelou's caged bird's song symbolizes vocal resistance, underscoring the importance of self-expression against oppression. This study explores specific sound techniques: Dickinson's regular ABAB ABAB ABBB rhyme scheme and rhythmic patterns suggest continuity and upliftment, symbolizing hope as a subtle, enduring presence. Conversely, Angelou's use of free verse and repetition reinforces vocal defiance, portraying hope through the caged bird's unrelenting song of freedom. The analysis illustrates how, despite differing cultural backgrounds, both poets present hope as an empowering response to oppression. Findings suggest that Dickinson, as a 19th-century poet, subtly opposed patriarchal norms through her work, advocating for future female empowerment, while Angelou, a 20th-century voice, more explicitly championed women's equality and resistance. This analysis enhances our understanding of how sound devices in poetry convey complex themes of resilience and liberation.

Keywords: Empowerment, Hope, Oppression, Silence, Voice

Critiquing the Impact of Cultural Fidelity and Narrative Integrity in Literary Translation: A Comparative Analysis of English Versions of García Márquez's One Hundred Years of Solitude, Shikibu's The Tale of Genji, and Saramago's Blindness

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Abstract

This study critically examines the challenges of cultural fidelity and narrative integrity in the English translations of three seminal works: Gabriel García Márquez's One Hundred Years of Solitude, Murasaki Shikibu's The Tale of Genji, and José Saramago's Blindness. Using a qualitative, comparative methodology, the research analyzes the translations in relation to the original texts, drawing on translation theories such as dynamic and formal equivalence (Nida) and Venuti's domestication and foreignization. The study identifies key translation challenges: for One Hundred Years of Solitude, the difficulty lies in rendering the blend of magical realism and Colombian cultural references, which are often simplified or omitted, altering the novel's thematic depth; in The Tale of Genji, the challenge is preserving the emotional and cultural weight of Heian-period court culture and poetic language, which tends to lose its nuance in modern adaptations; and for Blindness, the challenge is maintaining Saramago's distinctive narrative style, particularly his long, unpunctuated sentences, which are often modified in English translations, affecting both thematic coherence and stylistic integrity. The research highlights the tension between maintaining fidelity to the original text and ensuring accessibility for contemporary readers. It concludes by calling for further exploration of innovative translation strategies, including deeper collaboration with cultural experts and the development of case studies, to better preserve cultural nuance while enhancing the global accessibility of literary works.

Keywords: Cultural Disparity, English Translations, Comparative Analysis, Translation Challenges, Narrative Style

Comparative Analysis of Aristotelian Rhetoric: Ethos, Pathos, and Logos in Landmark Political Speeches from the Late 20th to Early 21st Century

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Abstract

This study addresses a critical gap in the literature by examining the application of Aristotle's rhetorical appeals—ethos, pathos, and logos—across five seminal political speeches: Martin Luther King Jr.'s I Have a Dream (1963), Winston Churchill's We Shall Fight on the Beaches (1940), John F. Kennedy's Inaugural Address (1961), Nelson Mandela's I Am Prepared to Die (1964), and Barack Obama's Yes We Can (2008). While each speech has been studied individually, comparative analyses of their rhetorical strategies are scarce. The study aims to: (1) analyze the rhetorical appeals in each speech, (2) evaluate their effectiveness in shaping public perception, and (3) identify patterns and discrepancies across different political contexts. Using a qualitative content analysis approach, the study will examine how ethos (credibility), pathos (emotional appeal), and logos (logical argument) are employed in each speech. The analysis will also incorporate secondary data, including audience reactions from historical records, media coverage, and public opinion surveys, to assess how these rhetorical strategies influenced public perception. Additionally, the study will review existing literature on political rhetoric to identify scholarly perspectives on the effectiveness of these rhetorical appeals. This methodology will allow for a comprehensive understanding of how classical rhetorical strategies function in diverse political contexts, providing a comparative perspective on their use across different eras and issues. The findings aim to contribute to both theoretical and practical understandings of rhetorical techniques, with implications for contemporary political communication strategies. By examining the impact of these rhetorical appeals on public discourse, this study will advance the field of political discourse analysis and offer insights into the dynamics of persuasion in political communication.

Keywords: Aristotelian Rhetoric, Qualitative Research, Comparative Analysis, Political Speeches

Exploring the Influence of Buddhism on Sri Lankan Folk Poetry: A Descriptive Study

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Abstract

This study seeks to explore the profound influence of Buddhism on Sri Lankan folk poetry, an often underexplored dimension of the nation's literary heritage. Folk poetry in Sri Lanka has historically functioned not only as a repository of cultural knowledge but also as a conduit for the transmission of Buddhist teachings. This research will investigate how Buddhist doctrines are intricately woven into the fabric of folk poetry, and how these poetic forms serve as instruments for the preservation and dissemination of Buddhist philosophy and cultural values across generations. The methodology will be multifaceted. First, a thorough review of existing scholarly literature on Sri Lankan folk literature will provide the necessary historical and theoretical context. Second, an analysis of 10-13 Sinhala folk poems, selected for their thematic relevance to Buddhist concepts such as Karma, Anicca (impermanence), and Nirvana, will form the core of the textual analysis. These poems will be chosen based on their regional diversity, historical significance, and representation of Buddhist ideologies. Third, in-depth interviews will be conducted with 5-7 poets, teachers, and Sinhala writers from diverse regions of Sri Lanka. These interviews, which will build on preliminary discussions with a select group of regional informants, aim to uncover regional variations and provide insight into the ways Buddhist themes are articulated in folk poetry. This research will be framed by an interdisciplinary theoretical approach, drawing from cultural studies, literary theory, and religious studies. By examining how Buddhist principles permeate folk poetry, this study will illuminate the role of folk poetry in reflecting communal spiritual values, preserving Buddhist teachings, and shaping societal norms. The findings will contribute to a deeper scholarly understanding of the intersection between Buddhism and Sri Lankan folk literature, revealing the central role of folk poetry in cultural and spiritual transmission.

Keywords: Sri Lankan Folk Poetry, Poetic Tradition, Buddhist Influence, Descriptive Analysis, Folk Literature

The Recurring Literary Motif of Limerence as a Hamartia: A Psycho-Literary Analysis of the Characters Roderigo, Jay Gatsby and Humbert in relevance to the Wakin-Vo Model of Limerence

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Abstract

Limerence can be deemed a complex psychological phenomenon that is characterized by an obsessive yearning for another, often manifesting through intrusive thoughts and fantasies. This involuntary state of fixated infatuation emerges as a powerful narrative force in literature, frequently acting as a tragic flaw for various characters. Thus, this study aims to analyze the recurring literary motif of Limerence as a calamitous Hamartia across diverse literary epochs through an interdisciplinary exploration of the concepts in psychology and literature. Through the adoption of a qualitative approach, the characters of Roderigo, Jay Gatsby, and Humbert Humbert and their temperaments were meticulously perused through a textual analysis of Shakespeare's *Othello*, Fitzgerald's *The Great Gatsby*, and Nabokov's *Lolita*. Moreover, a comprehensive documentation review was utilized, and the Wakin-Vo I.D.R. Model of Limerence (2008) was applied as a theoretical framework for the study. Accordingly, Roderigo's unrequited passion for Desdemona brings forth his demise. Jay Gatsby's idealization of Daisy culminates in his tragic end. Humbert Humbert's predatory obsession with Lolita leads to his moral and legal downfall. Hence, the detrimental conduct observed in the three characters comprises intrusive thinking, emotional dependence, idealization, and longing for reciprocation, which mirror the key elements of Limerence elucidated in Wakin-Vo's Model. In addition, though the characters stem from divergent literary periods, they all showcase the commonality of being subject to a lamentable end engendered by their limerent state, which acts as the Hamartia of their plight. In essence, this research postulates Limerence as a pivotal tragic flaw that transcends cultural and temporal boundaries in its recurrence as a potent thematic motif across manifold literary works and advocates for further research in this regard.

Keywords: Limerence, Hamartia, Wakin-Vo Model, Recurring Literary Motif

Post-traumatic stress disorder in Wilfred Owen's Dulce et Decorum Est and Rupert Brooke's The Soldier:

A Critical Analysis of Patriotism and Horrendousness of War.

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Abstract

Post-Traumatic Stress Disorder (PTSD) is an extensive and compound psychiatric condition materialize because of several traumatic events which directly influence the psychological state of a person. Wilfred Owen, who is a soldier fought in World War One and hospitalized due to PTSD, elaborates the excruciating circumstance of war through his poem, "Dulce et Decorum Est". Owen sophisticatedly illustrates patriotism, egotism, and horrendousness of war through the poem. The study emphasizes the psychological circumstance of the soldiers, brutality of war, vicious daily struggle of soldiers in a war environment, the trauma which war leaves among the soldiers' lives and the society, dehumanizing aspect, self-centered attribute of the authority, vulnerability, meaningless dependance, irony of the title, imagery and symbolism, the role of propaganda, and the historical context that are depicted through the agonizing death of a soldier who is considered as the speaker of the poem. Moreover, In Rupert Brooke's "The Soldier", the poem's idealized portrayal of death in war touches on themes that resonate with the psychological impact of conflict, including the emotional burdens soldiers carry—concepts later associated with post-traumatic stress disorder (PTSD). The poem is written during World War One and it expresses a soldier's profound sense of duty and honor, framing his potential death as a noble contribution to his country. However, beneath this veneer of idealism, there lies an underlying acknowledgement of the profound psychological impact of war. While the poem emphasizes patriotism and sacrifice, the poet's vision of eternal peace in a foreign land suggests an underlying tension between heroic ideals and the trauma of separation and loss. Though PTSD is not directly addressed, the poem's glorification of war implicitly highlights the emotional scars left by battle. By contrasting this idealization with the psychological aftermath of war, "The Soldier" reveals the complex, often overlooked costs of patriotism and sacrifice. Furthermore, the study presents the deep emotional scars left by war, hidden dimensions of trauma, psychological impact of battle, colonization, and the historical context. Thus, the study fundamentally elaborates a comparison between the two poems considering the historical background, the poets' lives, themes, writing style, titles, and techniques.

Keywords: Post-Traumatic Stress Disorder, Patriotism, Horrendousness of War, Wilfred Owen, Dulce et Decorum Est, Rupert Brooke, The Soldier, World War

Exploring the Impact of Personality Factors and Learner-Centered Pedagogical Practices in Acquiring Oral Proficiency: A Critical and Statistical Analysis of English as a Second Language Learners

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Abstract

Speaking is a vital language skill that needs to be practiced and enhanced for effective communication. Yet, the instruction and acquisition of speaking remain challenging for both English as a Second Language (ESL) teachers and learners in Sri Lanka. This persistent issue of low oral proficiency among learners is often exacerbated by psychological barriers encountered by learners and the inadequacy of practical pedagogical strategies. It incentivizes the need for executing a systematic framework in the teaching-learning process. Although few studies have focused on the Task-Based Learning (TBL) framework in developing second language (L2) speaking and the relationship between personality factors and learners' speech production separately, no research in the existing literature has addressed the interplay between these concepts in terms of both the teacher's and learner's roles. Therefore, this study aims to investigate the effectiveness of implementing TBL as a prominent learner-centered approach in enhancing speaking skills of secondary-level ESL learners in terms of their different personality factors and effective classroom management techniques used by teachers. The study incorporated a mixed-methods approach and the data were collected from twenty Grade-10 learners from a government school selected according to stratified random sampling technique. Five semi-structured interviews were conducted to identify the personality traits that influence learners' speech production. Responses collected from a Likert-scale questionnaire were analyzed using the SPSS statistical software, followed by a thematic analysis in assessing the efficacy of TBL in practising speaking towards a dynamic teacher-learner interaction. Consequently, the outcomes suggest the feasibility of TBL towards successful L2 speaking acquisition, specifying the importance of maintaining a moderate level of self-esteem, inhibition, and risk-taking. The implications also indicate that extroversion and introversion positively contribute to learners' oral proficiency through either 'interaction' or 'individual cognition' which will assist the educators to meet the learners' academic and professional needs.

Keywords: low oral proficiency, personality factors, effective classroom management techniques, Task-Based Learning (TBL) framework, successful L2 speaking acquisition

Assessing the Development of Modern Skills in Sri Lankan BA in English Programs

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Abstract

This study examines the perceptions of final-year BA in English students at selected state and non-state universities in Sri Lanka regarding the acquisition and development of 21st-century skills during their undergraduate programs. The study was conducted between July and August 2024 and included 60 students aged 18 to 30. The primary objective was to assess the performance of these academic programs in developing critical skills for the modern workforce. This includes critical thinking, communication, collaboration, information literacy, technology literacy, creativity, leadership, and practical skills. The data collection methods used for this inquiry were online interviews and surveys. The results reveal that 66.67% of students generally perceived significant improvements in their critical thinking and 86.67% in communication skills, indicating that these areas are well-addressed within the curriculum. However, students indicated a need for greater support in technology literacy (43.1%), leadership (34.5%), and practical skills (77.6%) to better equip them for post-graduation challenges. Additionally, while analyzing creative works is part of their studies, 65.5% felt their creativity and innovation skills were underdeveloped, as the curriculum prioritized analysis over original creation. These findings suggest that while BA in English programs in Sri Lanka are successful in enhancing certain 21st-century skills, there is a critical need for a reformation of the curriculum to elevate practical exposure, enhance technology integration, and foster leadership development. By addressing these gaps, higher education providers can equip students with a comprehensive skill set that aligns with the demands of the 21st-century workplace. This study contributes to discussions on higher education reform in Sri Lanka's humanities and education sectors, highlighting the need for curricula that balance analytical and practical skills to enhance graduates' readiness for both academic pursuits and the professional demands of the modern workforce.

Keywords: 21st-Century Skills, BA in English, State Universities, Non-state Universities, Curriculum Development

Challenges Encountered by Students who Study English Literature for G.C.E Advanced Level in the Western Province

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Abstract

This research is an analysis of the challenges fifty G.C.E Advanced Level English Literature students in the Western Province have encountered during their period of academic study. It is revealed that students face a number of problems such as the lack of appreciation of the students' subjective thoughts which leads to their ideas being dismissed without any explanation from the teacher. As literature is a subject which requires evidence from the literary text to prove a particular point, it is revealed that during the period of study students are not taught the required depth or the scope of the literary texts, resulting in lower examination scores leading to confusions and disillusionment of the subject among students. This study aimed to explicate the difficulties the students face and offer plausible solutions offered by the students themselves to rectify this. Data was collected through a questionnaire using both quantitative and qualitative approach. The findings revealed a majority of students find it challenging to connect evidences for their interpretations and substantially more. Thus, this research aimed to find practical suggestions for Advanced Level English Literature teachers towards implementing an effective learning process in obtaining a successful outcome.

Key Words: Challenges, Advanced Level Students, English Literature, Helpful Suggestions, Effective Learning Method

Investigating the Roots and Implications of First Language Inferiority Complex Among Sri Lankan Private University Students: Understanding the Shame Associated with L1 and the Impact on Language Use and Academic Identity

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Abstract

This study explores the roots and implications of the first language (L1) inferiority complex in Sri Lankan private university students, emphasizing the shame associated with Sinhala and its impact on academic identity and language use. A sample of 41 participants from different private universities, selected based on their linguistic backgrounds, shared their perspectives through a structured questionnaire. The mixed-method approach incorporated quantitative survey questions along with qualitative open-ended answers. Quantitative data analysis identified patterns in attitudes towards language use and identity, whereas qualitative feedback showcased individual experiences of stigma and feelings of inferiority linked to L1. Findings indicate that shame associated with L1 greatly influences language behavior, causing students to understate their language skills and suffer a decline in academic self-confidence. The research further emphasizes the importance of encouraging lecturers and inclusive teaching strategies in fostering a more inclusive academic setting. However, limitations include a relatively small sample size, which may restrict the generalizability of the findings. The self-reported aspect of the data can lead to possible bias, since participants might minimize or exaggerate experiences according to their own views. Moreover, the research encountered difficulties in acquiring a representative sample from various disciplines and areas, which may influence the variety of viewpoints included. These limitations indicate the necessity for additional studies involving a larger, more varied sample to confirm and broaden the findings.

Keywords: First language inferiority, Sinhala, Academic identity, Shame, Inclusive teaching strategies

A Critical Analysis of the Role of Children in Preserving Tradition and Embracing Change in Achebe's Things Fall Apart

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Abstract

This paper explores how Achebe, in Things Fall Apart, illustrates the struggle of children caught in the tension between preserving tradition and embracing change. The objective of this research, grounded in postcolonial theory, is to analyze the physical and psychological conflicts faced by child characters as they navigate the competing forces of their traditional upbringing and the new colonial influence. This research addresses a gap in existing literature, which has largely overlooked the experiences and roles of child characters while extensively focusing on adult protagonists. To achieve this objective, a qualitative approach was employed, utilizing an online questionnaire with open-ended questions distributed among 60 undergraduate students to gather detailed insights into the perceptions and interpretations of key characters, traditional and colonial influences and experiences of child characters. The findings demonstrate that children in Things Fall Apart are perceived as powerful symbols of the clash between tradition and change. Moreover, this paper uncovers how traditional upbringings can burden children with both internal and external struggles. Further, the study reveals how parental and adult expectations rooted in tradition and the children's exposure to new ideas are significant themes in the novel. This paper provides a deeper understanding of the children's struggles representing the larger societal questions about survival, adaptation, and the preservation of culture in a rapidly changing world.

Keywords: Tradition, Colonial influence, parental expectations, physical and psychological conflict

A Comparative Analysis of the Portrayal of Slaves in Uncle Tom's Cabin and Wide Sargasso Sea in the Light of Orientalism

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Abstract

This comparative analysis examines the portrayal of slaves in Harriet Beecher Stowe's Uncle Tom's Cabin (1852) and Jean Rhys' Wide Sargasso Sea (1966) through the lens of Edward Said's Orientalism. As defined by Said, orientalism, refers to the Western portrayal and conceptualization of Eastern societies as exotic, backward, irrational, and inferior. This concept extends to how Western literature depicts colonized people, often reinforcing stereotypes and justifying colonial dominance. Uncle Tom's Cabin set in the antebellum South, portrays Black slaves as passive stereotypes who are cultured and educated through Western grooming. Conversely, Wide Sargasso Sea set in the post-colonial Caribbean, offers a nuanced and critical portrayal of Black characters, emphasizing their agency and resistance against colonial oppression. The study explores the portrayal of slaves by analyzing the content of the two texts and the findings were correlated with aspects of Orientalism using criterion validity. It reveals how Orientalist tropes manifest differently in each narrative and contribute to broader discourses on race, colonialism, and cultural identity. The authors' socio-political and historical contexts have evidently shaped the portrayal of slaves in their respective texts. While both texts place slaves in an inferior power dynamic relative to White slave owners, characters such as Eliza in Uncle Tom's Cabin and Christophine in Wide Sargasso Sea exhibit strong agency in the face of discrimination. In contrast to the Orientalist view, Tom's character in Uncle Tom's Cabin is depicted as morally superior, yet uncivilized. Furthermore, in both texts, exoticizing the practices and belief systems of the slaves can be observed. In conclusion, this comparative analysis underscores the evolution of literary portrayals of slavery, offering insights into how literature perpetuates and challenges Orientalist ideologies. The study also deconstructs the Eurocentric, stereotypical images and analyses how these stereotypes were constructed and perpetuated. While contributing to an in-depth understanding of how literature reflects and shapes societal attitudes toward race and identity in colonial and post-colonial eras, it encourages contemporary readers to engage critically with historical narratives and their implications for today's societal dynamics.

Keywords: comparative analysis, orientalism, slavery, Uncle Tom's Cabin, Wide Sargasso Sea

Between Reality and Reflection: The Influence of Sylvia Plath's Mental State on Narrative Dynamics in The Bell Jar

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Abstract

Sylvia Plath's The Bell Jar stands as a seminal work in 20th-century literature, largely due to its intricate combination of the author's psychological turmoil with the novel's narrative structure, offering a profound exploration of mental illness. While much research has focused on the autobiographical elements and feminist themes, this study critically examines how Plath's mental state, as understood through Sigmund Freud's theory of psychoanalysis, shaped the narrative's form. Freud's concepts of the unconscious, repression, and the divided self-provide a framework for understanding the novel's fragmented structure and its oscillation between reality and distorted perceptions. The study adopts a qualitative approach, involving a close reading of The Bell Jar alongside material analysis of Plath's life and struggles with mental illness. Through the lens of Freudian psychoanalysis, the narrative is revealed to be permeated by Plath's unconscious mind, filled with repressed memories and unresolved conflicts. This is evident in the protagonist Esther Greenwood's psychological disintegration, where the novel's disjointed chronology and shifts in tone mirror the Freudian concept of the fractured self, struggling between conscious and unconscious states. The research finds that the novel's structural and thematic disjunctions—such as the blending of reality with hallucination and memory—reflect Freudian mechanisms like repression and the return of the repressed. These narrative dynamics not only depict Esther's psychological descent but also provide a window into Plath's inner world, where her writing becomes a means of confronting and processing her unconscious fears and desires. Furthermore, the study highlights how the novel's unresolved tensions and ambiguous ending underscore Plath's ongoing battle with her inner demons, suggesting that the novel serves as both a reflection and exploration of her psyche. This study concludes that The Bell Jar is a literary manifestation of Plath's psychoanalytic self-exploration, with its structure serving as a mirror to her fractured psyche.

Keywords: Sylvia Plath, The Bell Jar, Psychoanalysis, Sigmund Freud, Unconscious, Repression, Narrative Structure.

Identifying Challenges Faced by Tertiary Level Students Who Study Literature-in-English Modules: Research based on Students of a Nonstate Higher Educational Institution

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Abstract

Literature-in-English is a term used to describe any and all literary works written in the English language regardless of their origins. Prior research conducted in Middle Eastern and African countries reveal that students who study Literature-in-English face significant challenges. However, there is a lack of research in the Sri Lankan context in this area and it is more highlighted in tertiary level education of the country. This research focuses on identifying the challenges faced by a chosen community of tertiary level students who study Literature-in-English modules. A mixed method research methodology was utilized for this study; for the qualitative component, a Google Form questionnaire was circulated among BA in English undergraduates of a chosen non-state higher educational institution, and semi structured interviews were conducted with the lecturers who teach Literature-in-English modules. The data gathered through the questionnaire and the semi-structured interviews were then analyzed for the quantitative component. It was discovered, in both the questionnaire and the interviews, that most students have vocabulary issues when studying Literature-in-English at the tertiary level. However, opinions seem to vary with the rest of the issues concerned; while a majority of students claim that they do not have issues with prior knowledge of Literature-in-English, the opinions presented by the participants of the semi-structured interviews are contradictory. It is also the opinion of the interview participants that students do not adequately use the resources they have access to whereas the majority of students claim that they do not have adequate resources for Literature-in-English. Students also provided varying opinions regarding their personal challenges when studying Literature-in-English. Based on all the information gathered, in conclusion, this research has the potential to identify the nature of the challenges faced by tertiary level students of Sri Lanka learning Literature-in English and improve the teaching-learning process of such modules in universities.

Keywords: Literature-in-English, Tertiary level education, Challenges in learning, non-state higher educational institution

A Comparative Analysis of "Eve" by Alfreda de Silva and "Break, Break, Break" by Alfred Lord Tennyson through the Lens of Buddhist Philosophical Concepts of Karma and Impermanence

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Abstract

This study aims to conducts a comparative analysis of "Eve" by Alfreda de Silva and "Break, Break, Break" by Alfred Lord Tennyson, examining how "Karma" and "Anicca" (impermanence) are depicted in each poem and their interrelation between literature and Buddhist philosophy. Both poems explore themes of curiosity, suffering, desire, forbidden hunger and the impermanence nature of life. Utilizing qualitative methods including critical close reading, both texts focus on themes, imagery, symbolism, and linguistic and stylistic elements rooted in Buddhist perspectives. This analysis combines discourse analysis based on Fairclough's theory of Critical Discourse analysis (CDA) model, which provides as the theoretical framework, supporting a layered exploration of language, structure, socio cultural context within the poems. The analysis focuses on how de Silva's "Eve" reflects the implications of human desires and the resultant suffering, while Tennyson's poem contains personal grief and the certainty of loss. The findings reveal that "Eve" emphasizes Buddhist teachings on "Karma", illustrating how curiosity and forbidden desires lead to suffering and rebirth, symbolizing the loss of "Nirvana". In contrast, "Break, Break, Break" emotionally highlights the impermanence of life and the emotional pain of attachment, echoing with the Buddhist principle of "Anicca". This comparative analysis reinforces the interrelation of impermanence and "nirvana" in Buddhist philosophy. By understanding the temporary nature of existence, individuals can foster insight and compassion, ultimately attaining liberation from suffering. The comparison of these poems enriches the exploration of human experience and philosophical themes, illustrating how literature can illuminate the complexities of Buddhist teachings on suffering, attachment, and the path to enlightenment.

Keywords: Buddhist philosophy, Karma, Impermanence, Alfred Load Tennyson, Alfreda de Silva

Reflection of the crumbling aristocracy; a comparative analysis on "Pride and Prejudice" by Jane Austen and "Uprooted" (Gamperaliya) by Martin Wickramasinghe in Marxist Approach

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Abstract

This study explores the reflection of the crumbling aristocracy through a comparative analysis of Jane Austen's "Pride and Prejudice" and Martin Wickramasinghe's "Uprooted "in Marxist Approach. Subsequently, the research problem focuses on how both novels depict the decline of the aristocratic class and its impact on societal dynamics under the same Marxist Approach. The research objectives are to identify, compare and contrast the portrayal of aristocratic decay in each novel using the theory of Marxism by analyzing the class struggle, shifting power structures and socio-economic transformations reflect through the characters, plot, and literary techniques. Ultimately, the aim is to understand how the aristocratic deterioration is presented in Marxist framework with parallel themes in each novel to craft the overall messages. In this qualitative literary analysis, the methodology is mainly based on theory of Marxism, close contextual analysis and historical data. The research reveals that the aristocrats' immense grapple to preserve their fading social dignity, even at its breaking point, serves as a catalyst for the rise of the lower classes to emerge in a more progressive form. In Pride and Prejudice, the decline of the aristocracy is marked by a shift in values, where emotional bonds and mutual respect at the institution of marriage are prioritized over materialism. In contrast, Uprooted reflects the decline with rise of the lower classes through education and personal development amidst social change. In conclusion, this comparative analysis suggests that, despite differences in time frames, geographical contexts, both novels provide insights under the same approach of Marxism on the decline of the aristocracy, highlighting universal themes of social transformation.

Keywords: Pride and Prejudice, Gamperaliya, Crumbling aristocracy, Marxism

The Selection of English Literature as a subject for General Certificate of Education (G.C.E) Ordinary Level Students in Grade 10 in the Matara District of Sri Lanka: Investigating the Impact of Language Proficiency and Interest

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Abstract

After Sri Lanka's independence, local languages were established as the medium of education and administration, relegating English to the role of a "link" language. In the government school system, English is introduced as a subject beginning in grade 3, while English Literature is incorporated into the curriculum from grade 10. This study seeks to explore the influence of language proficiency and student interest on the selection of English Literature as a subject for the Ordinary Level (O/L) examination among grade 10 students in two schools within the Akuressa Education Zone of the Matara District. Employing a mixed-methods approach, the research combined both quantitative and qualitative data collection techniques, with the sample comprising 150 grade 10 students selected through convenience sampling. Data were primarily gathered via a questionnaire and structured interviews. The quantitative analysis revealed that fewer than 20 students in each school opted to study English Literature at the O/L level, while the majority refrained due to their inadequate language proficiency, which in turn diminished their interest in the subject. Furthermore, 10-15 students expressed a lack of foundational knowledge in English Literature and literary techniques. The qualitative interviews provided deeper insights, with several students acknowledging the value of English Literature for both academic success and personal development. However, many expressed anxiety over potentially failing the subject, citing insufficient language skills. Additionally, they criticized the monotonous nature of their learning experience, which was heavily exam oriented. The study concludes that students' low inclination to select English Literature is predominantly driven by their limited language competence, which negatively affects their interest in the subject. Consequently, this research underscores the necessity of adopting innovative teaching strategies to bolster language proficiency from an early stage and integrating literary texts into regular English textbooks to familiarize students with literature from a young age.

Keywords: English Literature, G.C.E. Ordinary Level, Language proficiency, Multi-Research Method

Navigating Diversity and Inclusion in Contemporary African Literature: A Comparative Analysis of Americanah, Half of a Yellow Sun, and Purple Hibiscus

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Abstract

This comparative study examines the portrayal of diversity and inclusion in three contemporary African novels: Americanah, Half of a Yellow Sun, and Purple Hibiscus. Despite their distinct settings and historical contexts, these works share common themes of identity, colonialism, and social injustice. However, they also diverge in their emphasis on specific marginalized groups and the complexities of their experiences. The research addresses a gap in the existing scholarship by focusing on the intersectionality of race, gender, class, and sexuality in these novels. By analyzing the characters, plot, and themes, the study aims to understand how these works contribute to ongoing discussions about diversity and inclusion in African literature. The research questions are as follows: How do the novels represent the complexities of identity formation in a globalized world? What are the enduring legacies of colonialism on the characters and societies portrayed? How do the novels address issues of social injustice, including gender inequality, class disparities, and racial discrimination? What are the similarities and differences in the portrayal of marginalized groups across the three novels? The study employs a comparative analysis methodology, examining the texts through the lens of postcolonial theory, feminist literary criticism, and intersectionality. By identifying common themes and exploring their variations, the research provides a nuanced understanding of the ways in which these novels contribute to the broader discourse on diversity and inclusion. The findings reveal that all three novels grapple with the challenges of identity formation in a postcolonial context. They explore the complexities of belonging, alienation, and the negotiation of multiple cultural identities. Additionally, the novels offer critical perspectives on the enduring legacies of colonialism, including economic exploitation, political marginalization, and cultural erasure. In conclusion, this study demonstrates that Americanah, Half of a Yellow Sun, and Purple Hibiscus offer valuable insights into the experiences of marginalized groups in contemporary Africa. By addressing issues of diversity and inclusion, these novels challenge dominant narratives and contribute to a more inclusive understanding of African literature.

Keywords: African Literature, Comparative Analysis, Diversity, Feminist Literary Theory, Inclusion, Intersectionality, Postcolonial Theory

06

Faculty Of Health Sciences

Evaluation of Antimicrobial and Phytochemical Properties of *Syzygium caryophyllatum* through a Comparative Study of Bark, Leaf, and Synergistic Aqueous Extracts Against Pathogenic Bacteria

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Abstract

Syzygium caryophyllatum, belonging to the Myrtaceae family, is widely recognised for its potent antimicrobial activity and its longstanding use in traditional medicine, particularly in the treatment of wounds. Current study investigates the antimicrobial efficacy and phytochemical properties of *S. caryophyllatum* extracts derived from synergism of bark and leaves, utilizing a reflux method in an aqueous medium against six clinically isolated pathogenic bacteria, *Klebsiella spp*., *Escherichia coli*, *Serratia* spp., *Pseudomonas* multidrug-resistant, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*. The efficacy of antibacterial activity was determined via the well diffusion technique following CLSI guideline and Vancomycin and Ciprofloxacin used as positive controls and DMSO used as the negative control. Diameters (mm) of inhibition zones were measured after a 24-hour incubation. The phytochemical screening method was performed to detect the presence of alkaloids, flavonoids etc. The data was analyzed via SPSS 23.0V and revealed significant differences in the mean inhibition zone diameters between the control group and the bark, leaf, and synergistic extracts ($p<0.001$) for all tested bacteria. One-way ANOVA indicated a significant difference in antibacterial activity among the extracts against six bacterial strains ($p = 0.001$). Two-way ANOVA highlighted significant main effects of extract type ($F(2, 36) = 20.809$; $p = 0.001$) and microbial species ($F(5, 36) = 164.59$; $p = 0.001$), with a notable interaction effect between extract type and microbial species ($F(10, 36) = 12.878$; $p = 0.001$). Pearson correlation analysis showed extremely strong positive relationships between the inhibition zone diameters of the synergistic extract and both individual bark ($r = 0.968$, $p < 0.001$) and leaf extracts ($r = 0.981$, $p < 0.001$), and strong correlation between bark and leaf extracts ($r = 0.931$, $p < 0.001$). Phytochemical analysis identified flavonoids, phenols, tannins, and glycosides in the bark extracts, while alkaloids, saponins, phenols, and tannins were found in the leaf and synergistic extracts. The findings underscore the potential of *S. caryophyllatum* leaf and bark as a promising source of antimicrobial agents and recommend its application in microbial control.

Keywords: Antimicrobial, Phytochemical, Well diffusion, Wound, Synergistic

Antimicrobial and Phytochemical Analysis of *Adenanthera pavonina* Leaf and Bark Extracts Against Clinically Relevant Microbes

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Abstract

The rise in drug-resistant pathogens highlights an urgent need for alternative antimicrobial agents derived from medicinal plants. This study evaluates the antibacterial efficacy and synergistic effects of aqueous bark and leaf extracts of *Adenanthera pavonina*, commonly used in Sri Lankan traditional medicine, against clinically significant microbes, including *Klebsiella spp.*, multidrug-resistant *Escherichia coli*, *Serratia spp.*, multidrug-resistant *Pseudomonas spp.*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*. Extracts were prepared via decoction, with concentrations of 10 mg/mL for the bark, leaf, and a 1:1 synergistic extract. The antibacterial activity was assessed using the agar well diffusion method, following CLSI guidelines, with ciprofloxacin as a positive control and sterile water as a negative control. The inhibition zone diameters were measured (in mm) and converted to percentage inhibition for each micro-organism. Results showed mean inhibition zones for the bark extract ranging from 12-22 mm, leaf extract from 12-17 mm, and the synergistic extract from 15-22 mm, with the highest activity against multidrug-resistant *Pseudomonas spp.* (22 mm, 73%) in the synergistic test. Phytochemical screening was conducted using standard qualitative methods, identifying alkaloids, saponins, steroids, flavonoids, phenols, tannins, and glycosides in both extracts. One-Way ANOVA revealed significant differences in inhibition zones among the six microbes ($p < 0.001$). Pearson correlation analysis indicated strong positive correlations between the synergistic extract and individual extracts (bark: $r = 0.968$; leaf: $r = 0.981$), underscoring potential synergism. The antibacterial efficacy of *Adenanthera pavonina* appears linked to its rich phytochemical profile, particularly phenols and flavonoids, suggesting a promising role in managing resistant bacterial infections. Further studies are warranted to elucidate the mechanisms of action and practical applications of these findings in antimicrobial therapy.

Keywords: *Adenanthera pavonina*, Antibacterial efficacy, Phytochemical profile, Drug-resistant pathogens, Natural extracts

Evaluation of Anti-Bacterial Properties of *Cymbopogon Citratus, Psidium Guajava* & *Senna Alata* Used to Treat Skin Diseases In Sri Lanka

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Abstract

Skin diseases are common globally and In Sri Lanka, skin exposure to environmental factors increases its susceptibility to bacterial infections. Our objective is to assess the antibacterial efficacy of three plants used to treat skin diseases. This study examined the antibacterial properties of three medicinal plants Guava (*Psidium guajava*), lemongrass (*Cymbopogon citratus*), candle bush (*Senna alata*) as tested plants and Iluk (*Imperata cylindrica*) as a control plant to provide a reference point. The crude ethanolic extracts were prepared using the Soxhlet apparatus at 78℃ in 250 ml ethanol for 3.5 hours. The well diffusion method was utilized to test and Mueller Hinton agar medium was used to culture all selected six microorganisms which are two Gram-positive bacteria, *Staphylococcus aureus* and *Enterococcus*, and four Gram-negative bacteria, *Escherichia coli*, and *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Pseudomonas aeruginosa* are highly used for the anti-bacterial investigations and used a 0.5McFarland to standardize the bacterial inoculum. Agar plates were prepared in triplicate by creating four wells of 8 mm in diameter, two wells for 100µl of plant extracts as sample individually another two wells for antibiotic discs (Augmentin, Vancomycin, Ciprofloxacin) and Deionized water as positive and negative control respectively. The zones of inhibition for each extract and the synergistic combination (Common guava, Senna alata, Lemon grass) were observed after 24 at 37°C. According to the T-test compared to the Iluk plant extract, guava ($p = 0.002$), candle bush ($p < 0.001$), and lemongrass ($p < 0.001$) had shown the presence of significant antibacterial effect. Further, Post hoc analysis had revealed significant differences in susceptibility among bacteria, *Escherichia coli* and *Klebsiella* showing varying sensitivity to the plant extracts ($p = 0.000$). In conclusion, this study showed the presence of potential antibacterial of guava, candle bush, and lemongrass against various bacteria, suggesting their use as alternative antimicrobials.

Keywords: Antibacterial properties, *Cymbopogon citratus, Psidium guajava, Senna alata*

Characterization of bacterial contamination present in the herbal dietary supplements and herbal therapeutic oral preparation products marketed in the Western province, Sri Lanka, Cross-sectional study

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Abstract

Edible herbal products could originate from plant extracts and are highly used as dietary supplements and for therapeutic preparations. Due to the high level of human intervention during their production process, these products are more prone to get contaminated by microbes. The current study had evaluated the pathogenic microorganism contamination in commercially available edible herbal products marketed in the Western Province of Sri Lanka which are Suranvidura guli , Dathri, Rasnada, Kanchanara, Kaishora, Gokshuradhi, Chandra Prabha Wati as solid samples Kushmanda Rasayanaya ,Chandra Kalka as Semisolid samples and Cough syrup, Panchabala amurtha panaya , Pavatta thal sookiri syrup as Liquid products. A quantitative cross-sectional study was carried out using total of 36 samples, which were collected from pharmacies located on the Colombo, Gampaha, and Kalutara districts. All the herbal products (1 ml of volume from all Liquid samples and also 0.1 g of from each solid and semi- solid samples) were centrifuged with sterile distilled water under aseptic conditions. The supernatants were cultured using spread plate method on nutrient agar. Isolated colonies after overnight incubation had re-cultured to obtain pure colonies and biochemical identification of the colonies were performed. All the herbal produces were Out of 12 herbal products, 50% of the products were contaminated with pathogenic microorganisms: *Escherichia coli* 41.67%, *Bacillus subtilis* 8.33%, *Enterobacter aerogenes* 8.33%, *Pseudomonas aeruginosa* 8.33%, *Candida albicans* 16.66%, *Bacillus cereus* 8.33%, and *Staphylococcus aureus* 8.33%. ABST results had shown that a significant proportion of isolated microorganisms displayed resistance to the commonly used antibiotics, including Vancomycin, Gentamycin, and Ciprofloxacin. A proportion of 72.72% of the tested samples were resistant to Vancomycin and Gentamycin. District of Colombo represented comparatively low rates of microbial contamination (14.84%), and District of Gampaha had indicated the higher prevalence (38.2%) and hence probably due to insufficient hygiene practice and quality control. The district of Kalutara did not deviate significantly relating to the contamination rates from the other districts (P=0.08) as per the Chi-Square test that was performed using SPSS 25.0. These findings from the present study further emphasize the importance of strict quality control measures during the product manufacturing processes and periodic monitoring of herbal products to ensure consumer safety.

Keywords: Herbal product, Microbial contamination, Biochemical tests, ABST

HIV/AIDS-related Knowledge, Attitudes, and Practices among undergraduate university students in the Western province of Sri Lanka

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Abstract

HIV remains a significant global public health concern, with significant effects on populations in Sri Lanka. University students, due to their potential engagement in high-risk behaviors and their role in shaping public health outcomes, are a crucial group for HIV prevention efforts. Gaining insight into their awareness, attitudes, and practices regarding HIV is vital for crafting effective educational and prevention programs in Sri Lankan setting. This study aimed to assess the level of awareness, attitudes towards HIV and its related risks, and preventive practices among university students in the Western Province of Sri Lanka. A questionnaire-based cross-sectional survey was conducted from November 2022 to August 2024 and the research involved 137 undergraduates aged between 18 to 60 years in Western province, Sri Lanka, with ethical approval granted by the CINEC Campus Ethics Review Committee. The structured questionnaire explored various dimensions of HIV knowledge, including transmission, safe sexual practices, attitudes towards multiple sexual partners, HIV testing history, and awareness and use of PrEP pills. According to the results, 91.24% (125/137) of the participants are not aware that HIV could be cured. Regarding the attitude towards the HIV disease, 62.77% (86/137) had a positive impression of collaboratively working with HIV-positive individuals which could be considered as positive social behavior from the youth population in the study area. The majority from the study were aware of the HIV testing, although 98.54% (135/137) had not undergone proper HIV testing at any circumstances. There is no significant difference (P=0.451) between the knowledge attributes on the transmission of HIV among the three districts, while there is a significant difference (P=0.01) between the attitude factor that HIV would lead to death once it has been infected. The current study has emphasized that the knowledge factors regarding the treatments and testing for HIV among the youth population is still lacking. Hence, there is an increasing requirement to deliver proper knowledge on disease conditions, and it should be implemented through awareness programs on a mass scale in the study area.

Keywords: HIV, PrEP, Safe sex practices, transmission

Comparison of antioxidant potential of boiled and non-boiled aqueous extracts of selected vegetables of *Brassica oleracea* L. species in Sri Lankan market

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Abstract

The antioxidant potential of vegetables is widely acknowledged for protecting our bodies from the detrimental effects of oxidative stress. Hence, this study aimed to evaluate the antioxidant potential of boiled and non-boiled aqueous extracts (BAE and NBAE respectively) of selected vegetables of the *Brassica oleracea L* species, i.e. *Brassica oleracea* L. var. *italica* (Broccoli; BOI), *Brassica oleracea* L. var. *capitate* (White Cabbage; BOC), *Brassica oleracea* L. var. *gongylodes* (Kohlrabi; BOG), *Brassica oleracea* L. var. *botrytis* (Cauliflower; BOB). Market samples of selected vegetables were randomly collected from different market places in Colombo, Western Province, Sri Lanka. *In-vitro* antioxidant activity was evaluated by using a 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay. Ascorbic acid (6.25 µg/mL- 50 µg/mL) was used as a positive control. The radical scavenging activity of test samples was expressed as an EC_{50}, which was determined by using the graph plotted with the mean concentration of each test sample vs. the percentage radical scavenging activity. The BAE of BOI, BOC, BOG and BOB showed antioxidant activity with an EC_{50} value of 20.12 mg/mL, 67.90 mg/mL, 97.53 mg/mL and 21.67 mg/mL respectively. On the other hand, NBAE of BOI, BOC, BOG and BOB showed 21.62 mg/mL, 140.62 mg/mL, 177.40 mg/mL and 106.66 mg/mL respectively as their EC_{50} values. The ascorbic acid showed an EC_{50} value of 21.48 µg/mL. According to the results, BAE of white cabbage, kohlrabi and cauliflower showed significant ($p<0.05$) enhancement in antioxidant activity compared to their NBAE. There is the absence of a significant difference between NBAE and BAE extract of *Brassica oleracea* L. var. *italica* (Broccoli). However, broccoli showed the highest antioxidant potential compared to other tested Brassica vegetables. The higher antioxidant activity in boiled samples may be due to the increased release of active compounds, which did not undergo thermal degradation and since the vegetable is fully consumed, these compounds can be absorbed. These findings could provide valuable insights for nutritionists and consumers in selecting the best Brassica family vegetable and the food preparation method for optimizing the antioxidant intake.

Keywords: Antioxidant, DPPH, Brassica vegetables

Mixed Method Approach to Dysmenorrhea: WaLIDD Score and Correlation with Body Weight in Female Undergraduates in Sri Lanka – Epidemiological and Pain Analysis

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Abstract

Dysmenorrhea is a common gynecological condition affecting women's quality of life and daily functioning. Despite its prevalence, the relationship between body weight and dysmenorrhea remains underexplored. This study aimed to analyze the prevalence and severity of primary dysmenorrhea using the WaLIDD score and examine its correlation with body weight among female undergraduates in Sri Lanka. A mixed-method approach was employed in a quantitative cross-sectional study involving 389 female undergraduates aged 19-27 years in Sri Lanka. Data were collected through a structured questionnaire using the WaLIDD score to assess dysmenorrhea in terms of anatomical pain, intensity, duration, frequency, and impact on daily activities. The sampling was carried out across multiple universities through a google form, and ethical approval was obtained from the Ethical Review Committee of CINEC Campus, Sri Lanka, with ERC number ERC/CINEC/2023/005. The study's objective was to assess the impact of body weight on dysmenorrhea among female undergraduates in Sri Lanka. Pearson correlation coefficients were calculated using SPSS version 27 to analyze the association between body weight, dysmenorrhea severity, and pain intensity. Results indicated that the mean body weight of the participants was 53.82 ± 10.13 kg and the mean height was 157.80 ± 10.00 cm. The prevalence of dysmenorrhea was high, with 98.2% experienced dysmenorrhea, and 26% reporting mild, 52.4% moderate, 19.8% severe dysmenorrhea. Lower abdominal pain was the predominant pain site, affecting 82.5% of the participants. The average age of menarche was 13 years for 45% of the cohort. The Pearson correlation coefficient between dysmenorrhea type and impact on working ability was 0.692, indicating a strong positive correlation. However, the correlation between body weight and pain location (0.035), pain intensity (-0.071), and dysmenorrhea severity (0.006) was negligible, suggesting that body weight does not significantly affect dysmenorrhea intensity. A similarly weak correlation was found between BMI and dysmenorrhea severity (-0.009). In conclusion, the study found that while primary dysmenorrhea is prevalent and impacts work performance, body weight and BMI have minimal influence on dysmenorrhea severity and pain intensity among female undergraduates in Sri Lanka.

Keywords: Dysmenorrhea, Body Weight, Female Undergraduates, WaLIDD Score, Pain Analysis, Sri Lanka, Epidemiology

The Impact of Maternal BMI during Pregnancy on Placental Dimensions and Neonatal Outcomes: A Preliminary Study

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Abstract

Maternal weight and body mass index (BMI) are critical determinants of pregnancy outcomes, influencing both maternal and fetal health. Variations in maternal BMI can impact placental development, which is crucial for nutrient and oxygen exchange between the mother and fetus. We aimed to investigate the impact of maternal weight on placental dimensions and birth outcomes in pregnant women. Ethical clearance was obtained from the Ethical Review Committee of CINEC Campus, Sri Lanka, and the Institutional Ethical Review Committee of the Colombo South Teaching Hospital Kalubowila (IERC, CSTH). Written informed consent was obtained from all participants before sample collection. A total of 30 clinically healthy pregnant women, aged 20-40 years with singleton pregnancies, were recruited during delivery at Colombo South Teaching Hospital. Exclusion criteria included pre-existing medical conditions (e.g., diabetes mellitus, autoimmune diseases, and hypertension), multiple gestations, substance use, or pregnancy complications. Maternal weight during first trimester and before delivery, maternal height, placental weight, and neonatal weight were recorded. Placental weight was measured using an electronic scale, and a standard measuring tape was used to measure placental thickness, as well as the longest and shortest diameters. Pearson correlation analysis revealed a significant positive correlation between first trimester BMI and placental weight ($r = 0.505$, $p = 0.004$), long diameter ($r = 0.431$, $p = 0.018$), short diameter ($r = 0.572$, $p < 0.001$), and BMI at delivery with placental weight ($r = 0.472$, $p = 0.008$), long diameter ($r = 0.474$, $p = 0.008$), and short diameter ($r = 0.578$, $p < 0.001$). Additionally, placental weight positively correlated with birth weight ($r = 0.558$, $p = 0.001$). In conclusion, maternal weight significantly impacts placental dimensions and birth weight, emphasizing the need for monitoring maternal BMI during pregnancy. Understanding these relationships can help healthcare providers better optimize pregnancy outcomes.

Keywords: Pregnancy, BMI, Placental dimensions, Neonatal outcomes

Assessment of Antibacterial, Antibiofilm Efficacy and Phytochemical Profiling of Aqueous Maceration Extract from The Leaves of Endemic and Indigenous Sri Lankan Medicinal Plant *Osbeckia octandra* (Heen Bovitiya)

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Abstract

The rising threat of antibiotic-resistant bacteria necessitates the exploration of novel antimicrobial agents, particularly from natural sources. *Osbeckia octandra* is an endemic indigenous plant in Sri Lanka traditionally used in herbal medicine for various ailments such as jaundice, skin disorders, and reduce inflammation. This study focuses on the antibacterial and antibiofilm efficacy of its aqueous maceration extract, alongside a comprehensive phytochemical analysis. The active phytochemicals were extracted from the leaves by maceration method in hot aqueous medium. The antibacterial efficacy of the leaf extract was assessed against four pathogenic bacteria, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Klebsiella spp.*, using the agar well diffusion method. Negative control groups underwent treatment with 10% DMSO. All the procedures were strictly adhered to aseptic protocols. Antibiofilm activity was assessed using a crystal violet assay and OD values were measured at 590nm to calculate biofilm formation inhibition. The diameters of the inhibition zones and crystal violet stained biomass were measured, following a 24-hours incubation period. Phytochemical screening was conducted to identify key bioactive compounds present in the extract. The statistical analysis was conducted using SPSS software package. The independent t-test unveiled a significant difference in mean values between the negative control group and leaf extraction concerning *Staphylococcus aureus* 18.00 ± 1.19 (P=<0.001), *Pseudomonas aeruginosa* 19.67 ± 0.58 (P=<0.001), *E. coli* 15.44 ± 1.71 (P=<0.001), and *Klebsiella spp.* 18.33 ± 1.45(p=<0.001). Furthermore, there was a significant difference between the leaf extract against four organisms (One Way ANOVA; p=0.024). The extract also exhibits substantial antibiofilm activity against all four tested bacterial strains, with a mean value of 44.94%. Phytochemical analysis, revealed the presence of Phenol, Tannin, Flavonoids, Saponin, Phytosterol, and Coumarins. The current findings revealed the potential of the *Osbeckia octandra* plant as a valuable reservoir of antimicrobial and antibiofilm agents and potential applications within the field of microbial control is recommended.

Keywords: Antimicrobial, Antibiofilm, Osbeckia, Phytochemical, Maceration

Assessment of Awareness and Knowledge of Scabies Among People in the Kaduwela MOH Area, Colombo District, Sri Lanka: A Cross-Sectional Study

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Abstract

Scabies is a common and highly pruritic condition caused by the parasite *Sarcoptes scabiei*. The disease is often unrecognized and underdiagnosed, leading to improper treatment, especially in disadvantaged tropical and subtropical communities. The current study evaluated the awareness and knowledge of scabies through a cross-sectional study from November 2022 to July 2024. Sample of 384 residents aged between 18 to 65 years in the Kaduwela MOH area, Colombo, Sri Lanka, were interviewed using a semi-structured, interviewer-administered questionnaire addressing demographics, awareness and knowledge regarding scabies. Data was analyzed using SPSS version 27. Ethical clearance was obtained from the Ethics Review Committee at CINEC Campus. The study results revealed a significant knowledge gap regarding scabies with the majority of participants (n=255) unaware of the disease, particularly in urban areas (n=182) compared to rural areas (n=73). Among those who were aware (n =129), the primary sources of information included the internet (n=36), parents (n=25), and newspapers (n=20). Familiarity varied by age and gender, being highest among females aged 18-30 years (n=41) and males aged 18-30 years (n=17). As per the awareness, the main symptoms were scratching (n=100) and rashes on skin (n=79), pus containing vesicles (n=54), nocturnal itching (n=33), fever and chills (n=23) and thick crust formation (n=18). Additionally, only 45 participants were aware that scabies is caused by a parasite. Spearman's correlation analysis revealed no significant relationship between scabies familiarity and age ($r = -0.055$, $p = 0.278$) or living area ($r = 0.041$, $p = 0.424$). However, significant negative correlations were found between living area and knowledge of scabies etiology ($r=-0.204$, $p=0.021$) and diagnosis ($r=-0.215$, $p=0.015$). A positive correlation was observed between education level and knowledge of scabies transmission ($r=0.174$, $p=0.049$). The results revealed a significant gap in scabies awareness and knowledge in the study area. Targeted public health campaigns can enhance understanding, correct misconceptions, and improve prevention, leading to better disease management and reduced prevalence of scabies in Sri Lanka.

Keywords: contagious, neglected tropical disease, parasite, *Sarcoptes*, skin-related

Knowledge, Attitudes on Breast Cancer and Practices on Self-Examination Among Undergraduate Female Students in Six Selected Non-State Universities in the District of Colombo, Sri Lanka

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Abstract

Breast cancer remains a significant global health concern, particularly in developing countries where awareness and early detection practices are often limited. The current study assesses knowledge, attitudes, and practices regarding breast cancer and self-examination among female undergraduates (n=174) aged 20-30 at non-state universities in Colombo, Sri Lanka. Using descriptive cross-sectional design and convenient sampling, the data was analyzed with SPSS 27.0 to evaluate awareness and practices in this demographic. Out of the 174 participants, 73.6% have awareness of breast cancer, while 9.25% lack awareness. Individuals (141) between ages 20-25 have abstained from breast care awareness programs compared to the 23 who have. 52.9% of respondents are aware of the Breast Self-Examination (BSE) process, 25.3% are unaware, and 21.8% feel their awareness is inadequate. The data reveals that 79.9% of respondents believe BSE is a utility for screening of breast cancer, while 5.7% disagree, and 14.4% are unsure. Out of 174 only 154 view breast cancer as a serious condition, while only 10 believe it is not serious, and another 10 are uncertain. Spearman's correlation between age and knowledge of the BSE shows a weak concordant of 0.071($P > 0.05$). Spearman's rho correlation between the faculty the participant is studying in and their awareness of breast cancer shows a weak concordant of 0.106 ($P > 0.05$). The Spearman's rho correlation between age and the belief that only females are affected by breast cancer" is 0.158 ($p=0.037$), indicating a statistically significant but weak concordant at the 0.05 level. Further, the correlation between awareness of breast cancer and knowing diet can influence breast cancer is 0.191 ($p=0.012$) indicating a statistically significant concordant at the 0.05 level. These findings highlight the need for comprehensive breast cancer education and awareness programs targeting young females in Sri Lanka to improve knowledge, promote predetection practices, and reduce breast cancer fatality.

Keywords: Breast Cancer, Knowledge and Attitudes, Practices and BSE, Undergraduate Females, Sri Lanka.

Utility of urine culture testing in the assessment of maternal health in a hospital setting in Western province

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Abstract

Pregnancy induces profound physiological changes that may predispose women to urinary tract infections (UTIs) and other complications, affecting maternal health outcomes. Despite maternal mortality rates, urine testing's role in maternal health remains underexplored. This ongoing study aims to identify mothers at risk of pregnancy complications through urine culture testing, with the objective of correlating these findings with both maternal and neonatal outcomes as data collection progresses. A cross-sectional study at Colombo South Teaching Hospital involved 107 second and third-trimester women, assessing maternal risk through clinical questionnaires and urine cultures to identify at-risk pregnancies. The analysis of urine cultures among 107 subjects indicated that 43 (40.18%) cultures grew with a single organism, out of which *Escherichia coli* was the most dominant, occurring in 22 cases (51.16%). Seven samples recorded mixed growths from 16 organisms, accounting for 6.54%. Fifty-seven of the samples, about 53.27%, showed nil growth. The positive urine culture results found to strongly correlate with some clinical indicators. Investigation clearly revealed that the presence of *Escherichia coli* was strongly associated with increased leukocyte, with r=0.852 and P=0.042, suggesting a strong inflammatory response. Moreover, inadequate hydration was moderately linked to urinary discomfort, with r=0.58 and P=0.046, and to subsequent positive urine cultures, with r=0.44 and P=0.043. Preliminary findings underline the central role played by *Escherichia coli* in pregnancy-related urinary tract infection, signaling targeted interventions on ensuring proper hydration and monitoring leukocyte levels to minimize possible complications. Prevalence of significant growths in urine cultures underscores UTIs' clinical relevance during pregnancy, necessitating tailored interventions. Integrating routine urine analysis into prenatal care can monitor maternal well-being, enhancing pregnancy outcomes. Proactive screening and targeted interventions are crucial for maternal health during pregnancy, however ongoing follow-up on neonatal outcomes is needed to fully understand the long-term impact of maternal UTIs. Future investigations will further clarify urine testing's value as a reliable tool for maternal health assessment.

Keywords: Culture, Dipstick, Pregnancy, Urine testing, Utility

Development of a Natural, Sustainable and Economically Viable Cell Stain from *Sweitenia macrophylla* King Bark

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Abstract

Cell staining is a crucial technique in biomedical science, enable visualization and analysis of cellular structures. The present study aimed to explore the potential of *Swietenia macrophylla* King (mahogany) bark as a natural, sustainable, and economically viable source of cell stain. The bark was air-dried at room-temperature, 25^0C and the periderm was scraped for extraction using solvents (ethanol, methanol, acetone, hexane) and water decoction. The resulting liquid-extract was undergone modifications including open-air oxidation along with seven days aging, pH adjustments into 12 pH, and metal-salts ($Al_2(SO4)_3$ and $FeSO_4$) addition to enhance its staining properties. The staining efficacy was evaluated on human buccal cell smears, plant cell smears, and *Bacillus* and *E. coli* smears. Comparative analysis was conducted against Gram-stain and methylene blue. Observations under the microscope demonstrated that *Swietenia macrophylla* King extract obtained through decoction method yield the most positive results; also it was discovered that the pH 12 solution was particularly effective. It effectively stained the cytoplasm and nucleus in human buccal cells, the cell wall and guard cells in plant tissues, and both *Bacillus* and *E. coli* smears. However, although the bacterial morphology could be identified, prolonged staining led to the disruption of bacterial chains. Further, the color intensity was measured using ImageJ software; mean values represent the color intensity, with higher values indicating stronger staining. Statistical analysis, including a T-test, showed a significant difference ($p<0.05$) in color intensity between methanol and decoction extractions; decoction method resulted in higher intensity. Phytochemical analysis revealed the bark extract is containing steroids, alkaloids, phenolic compounds, tannins, saponins, and glycosides. Study concludes that *Swietenia macrophylla* King bark extract shows significant potential as a natural staining agent with a competitive staining compared to traditional synthetic stains. Further research is recommended to optimize the staining process and assess the long-term biocompatibility and safety for widespread use.

Keywords: cell staining, phytochemical analysis, *Swietenia macrophylla* King, natural stain

Ecological Analysis of Pathogenic Bacterial Diversity in Leaves *Camellia Sinensis* and Associated Soil in Rathnapura and Awissawella Areas of Sri Lanka

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Abstract

Camellia sinensis (tea) is an important agricultural product in Sri Lanka, significantly contributing to the national economy. However, the labor-intensive nature of tea cultivation requires close monitoring of workers' wellbeing and safety to maintain productivity. This study investigates the microbial ecology of pathogenic bacteria associated with tea leaves and their rhizosphere in the Rathnapura and Awissawella areas of Sri Lanka, due to their significant workforce employed in tea plantation**s**. Random samples of tea leaves and rhizosphere soil were collected from four estates located in Mudunkotuwa-Rathnapura, Godigamuwa-Rathnapura, and Puwakpitiya-Awissawella, with areas affected with flooding excluded from the analysis. Each estate was divided into 3 equal parts and 1 sample of few tea leaves and 1 soil sample were collected from each section. Bacteria were isolated from tea leaves by briefly contacting both sides of each leaf with nutrient agar. The streak plate method was performed, followed by incubation at 37°C for 24 hours. Isolated bacterial colonies were subjected to Gram staining, biochemical assays, and antibiotic susceptibility testing (ABST) with eight antibiotics. Soil samples were inoculated onto nutrient agar, and the above processing was done on the colonies. A total of 50 bacterial isolates were obtained from tea leaves and 23 from soil samples, identifying 16 species at the genus level. The predominant bacteria found included *Moraxella spp.* (28%), *Bacillus spp.* (14%), and *Acinetobacter spp*. (12%) on tea leaves, and *Bacillus spp.* (47.83%) followed by *Enterococcus spp*. (13.04%) in soil. The bacteria were categorized into pathogenic (43.75%), opportunistic pathogens (37.5%), rarely pathogenic (12.5%), and non-pathogenic (6.25%) groups. Six antibiotics showed susceptibility in most bacteria (31.25%), 12% was resistant to all eight antibiotics tested. This study emphasis the importance of conducting follow-up studies to ensure that workers are safe and that agricultural practices are sustainable.

Keywords: *Camellia sinensis,* tea estate, tea leaves, soil, pathogenic bacteria, ABST

Knowledge, Attitudes and Practices Regarding Sleep Deprivation and its Causes and Consequences Among Undergraduate Students in Non-State Universities in Colombo District, Sri Lanka

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Abstract

Adequate sleep is a basic human requirement for healthy wellbeing. However, undergraduate students are vulnerable to the negative effects of sleep deprivation. Therefore, this study investigated the knowledge, attitudes, and practices regarding sleep deprivation and its causes and consequences among non-state undergraduates. A social, descriptive cross-sectional study was conducted with 399 undergraduates aged 18-29 from pre-selected eight non-state universities in Colombo District. An online Google Form with a structured, self-administered questionnaire in English, Sinhala, and Tamil was used for the data collection and analyzed via SPSS 27.0. Ethical clearance was taken for the proposal and the questionnaire by the Ethical Review Committee of CINEC Campus Malabe, Sri Lanka. The sample showed a relatively balanced gender distribution, with 53% females. The 22-25 age group (67%) was dominant, while the 18-21 group was 26% (n=399). Though there's a significant association between the degree and the knowledge ($p<0.001$), 64.9% (n=399) have obtained higher scores on knowledge. Among the respondents, attitudes towards sleep patterns were mixed and showed a disruption of sleeping patterns during stressful times, *viz* exams, while 33.3% (n=399) were neither satisfied nor dissatisfied with their sleep quality. Moreover, 92% of the population are sleep deprived during the exam period, while 47.5% (n=399) during the vacation evidence that academic schedules influence the sleeping practices of the population. The Pearson correlation analysis between the academic year and satisfaction with their sleeping patterns showed a moderate negative correlation ($p<0.001$). According to the analysis during academic years, respondents' satisfaction with sleep patterns and overall health due to sleep tends to decline. Further, the study identified that good knowledge does not lead to good practices; therefore, the study revolved around a demand for suitable programs to generate a better understanding of the effects of lifestyle choices on sleep quality, especially during high-stress periods such as exams.

Keywords: Sleep deprivation, Sleep patterns, Academic performance

Mixed-Methods Analysis of Menstrual Cycle Patterns Among Female Undergraduates in Sri Lanka

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Abstract

The menstrual cycle is one of the key hormonal processes a woman's body undergoes each month to prepare for a potential pregnancy. The present study aimed to examine variations in the menstrual cycle pattern among Sri Lankan female undergraduates. Ethical approval was obtained from the Ethical Review Committee of CINEC Campus, Sri Lanka, with ERC number ERC/CINEC/2023/005. This study analyzed menstrual cycle patterns among female undergraduates in Sri Lanka using a simple random sampling method over a five-month period, covering universities across the island. It presents a comprehensive qualitative and quantitative analysis of menstrual cycles, focusing on key aspects such as the onset of menstrual pain, blood color, peak blood flow timing, period duration, and the occurrence of menstrual cramps. The present study, conducted as a quantitative cross-sectional study, surveyed 389 female university students aged 19-27 to explore these menstrual characteristics. The results indicate that 45.5% of participants experienced their first menstrual pain at menarche, with varying onset times for the remaining participants: 24.2% at one year later, 10% two years later, and 20.3% more than two years later. Dark red blood was the most commonly observed color (54.8%), followed by bright red (42.4%), brown/black (2.1%), and pink (0.8%). Peak blood flow typically occurred on the second day (60.2%), with some reports of peak flow on the first and third days (19.5%, 5.4%, respectively). Period durations predominantly ranged from 4 to 5 days, with 38.8% experiencing 5-day periods, 37.8% with 4-day periods, 14.4% with 3-day periods, and 7% with 7-day periods. Cramps were most commonly reported during menstruation (28.8%), with 17.5% experiencing them before menstruation, and 0.8% after menstruation. The findings highlight the variability in menstrual experiences among Sri Lankan female undergraduates, with common issues such as menstrual pain at menarche, peak blood flow on the second day, and cramps during menstruation. This study offers valuable insights into menstrual health, emphasizing the need for targeted educational interventions to address diverse menstrual health management experiences

Keywords: Menstrual Cycle, Menarche, Blood Color, Peak Blood Flow, Menstrual Period Duration, Menstrual Cramps, Female Undergraduates, Sri Lanka

Navigating Dysmenorrhea: An Insight into Pain Management Practices Among Female Undergraduates in Sri Lanka

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Abstract

Dysmenorrhea significantly impacts the daily lives and academic performance of female undergraduates in Sri Lanka, prompting the use of various medical and self-care strategies for pain management. Ethical approval was obtained from the Ethical Review Committee of CINEC Campus, Sri Lanka, with ERC number ERC/CINEC/2023/005. This quantitative cross-sectional study surveyed 389 female university students of aged 19-27 years to investigate menstrual pain management practices. The study analyzed the different management strategies of menstrual pain either by medical management or self-medication, and a combination of both. Among the respondents, of 389 in our cohort, (370) 95.11% of employed at least one type of pain management and rest of (19) 4.89% had not used any treatment for menstrual pain. (214) 57.8% favoring a combination of medical treatment and self-medication, making it the most popular approach. (39) 10.5% of respondents had preferred mainly medical management and (117) 31.6% of respondents rely solely on self-medication. The data reveals a strong inclination towards combining medical management with self-medication, suggesting that many individuals find a mixed approach of taking prescribed medications along with personal remedies to be the most effective way to alleviate menstrual pain. Paracetamol emerged as the predominant medication, used by (205) 71.9% of participants, while mefenamic acid follows with (66) 23.2% of respondents, (13) 4.6% of respondents had gone with ibuprofen. Voltaren has been taken by only 1 respondent. About self-medication, (184) 38.4% had consumed coffee and (163) 34.0% had used hot water bags, (67) 14.0% had used Siddhalepa, (46) 9.6% for coriander water, and (3) 0.6% of them had mentioned about cummin drink. (247) 66.8% had used medication during menstruation, prophylaxis practice was noted by (26) 7% and (14)3.8% had used drugs both before and during menstruation. Post-menstrual drug usage was indicated with (0.8%) 3 participants. These findings underscore the widespread reliance on both modern and traditional remedies, with a mixed approach to pain management being the most prevalent. The study suggests a need for targeted educational interventions to optimize menstrual health and pain management strategies among this population.

Keywords: Dysmenorrhea, Self-Management, Medical Management, Menstrual Pain, Female Undergraduates, Sri Lanka, Pain Relief Methods

Evaluation of antimicrobial activity and phytochemical composition of plant leaf extract of *Mikania cordata* by mercentration method in hot aqueous medium.

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Abstract

Mikania Cordata which is known as "Wathu Palu" in Sinhala is a common plant species that belongs to Asteraceae family and extensively used for wound injuries. This study was performed to investigate the antimicrobial property of the *Mikania cordata* mature healthy plant leaves. After confirmation of the voucher specimen, aerial parts were plucked, dried and compounds were extracted by mercentration method in hot aqueous medium. The concentration of solution was made as 2 x10^5 ppm. Well diffusion agar assay for antimicrobial property was conducted for multi-drug resistant patient samples of *Psudomomas aeruginosa, Klebsiella pnumoniae, Escherichia coli, Serratia spp. and Staphylococcus aureus* using double distilled water as the negative controls and Ciprofloxacin (Gram negative) Gentamicin (Gram positive) as positive controls. These organisms were confirmed by biochemical analysis and 100 uL of inoculum suspension of 10^5 CFU/mL was used, each well contains 100 uL of plant extraction. The statistical analysis was conducted using SPSS 23.0 software package. Diameter of inhibition zones was measured after 24 hours incubation. Our results found out that bacterial inhibition was significant for *Klebsiella pnumoniae* 11.00 ± 0.19 mm (p= 0.016) and *Escherichia coli* 10.44 ± 0.19 mm (p=0.016). There was no significant antibacterial effects for *Psudomonas aeruginosa*, *Staphylococcus aureus* and *Serratia spp*. The MIC (Minimum Inhibitory Concentration) of the extract was evaluated by qualitative assay with two fold dilution of plant extract. Bacteriostatic effects was observed at *Klebsiella pnumoniae* 1.25x10^5 ppm and *E. coli* 1.25x10^5 ppm concentration. Phytochemical analysis of the plant leaves extract revealed the presence of Alkaloids, Tannins, Glycoside, Flavonoids and Steroids. Current findings revealed the potential of *Mikania cordata* plants leaves as a supplementary treatment for hospital-acquired pneumonia from *Klebsiella pneumoniae*, and further research is suggested to explore their effects on *E. coli* in urinary tract infect.

Keywords: Antimicrobial, Mercentration, *Mikania Cordata*, Phytochemical.

Investigating the presence of pathogenic microorganisms and their antibiotic susceptibility patterns in Colombo and Kandy districts in Sri Lanka

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Abstract

Soil is one of the most important aspects in agriculture. Due to excessive usage of organic and inorganic fertilizers and chemicals, it was found that antibiotic resistance can be build up on microorganisms present in agricultural soil. The study was conducted to assess the presence of pathogenic microorganisms and their antibiotic susceptibility patterns in Colombo and Kandy districts in Sri Lanka. The samples from each location (n = 36) were cultured in Nutrient and Potato dextrose agar and the isolated colonies were identified via conventional standard biochemical keys. Antibiotic susceptibility was assessed via antimicrobial susceptibility testing (AST) using Kirby-Bauer disk diffusion method and the diameter of the inhibition zone (mm) was measured following CLSI guideline. Analysis was obtained via SPSS V25 (95%, P = 0.05). Fourteen pathogenic bacterial species namely; *Chromobacterium spp., Escherichia coli, Acinetobacter spp., Clostridium spp., Bacillus spp., Salmonella spp., Listeria spp., Enterobacter spp. and Enterococcus spp. Streptococcus spp., Pseudomonas spp., Citrobacter spp., Staphylococcus spp.* and *Proteus spp.* were identified in both Colombo and Kandy districts. Significant diversity of bacterial population observed due to the difference in soil type and nutrients as Colombo has Red Yellow Podzolic soil while Kandy consists of Redish Brown Lateritic soil. Antibiotic susceptibility testing (AST) patterns indicated significant antibiotic resistance in isolated microorganisms from both districts ($p < 0.05$) to 10 µg/ml Gentamycin (46.6%), 30 µg/ml Vancomycin (92.3%), and the broad-spectrum antibiotic 30 µg/ml Augmentin (69.2%) Ciprofloxacin (5µg/ml) indicated sensitivity (100%) to the isolations and observed a significant difference between locations (p=0.003). Antibiotic resistance is found to be a global problem and the present study addresses the prevalence and the antibiotic resistance of pathogenic bacteria in Sri Lankan agricultural soil. The study completes the current research gap by highlighting the risks to public health, environment and furthermore improves the agricultural productivity.

Keywords: Agricultural Soil, Antibiotic Resistance, Antibiotic Susceptibility testing, Pathogenic bacteria, Red Yellow Podzolic soil, Redish Brown Lateritic soil.

Antibacterial Activity of Marine Brown Algae *Dictyota ciliolata* Against Multi Drug Resistant Bacteria

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Abstract

The rise of multi-drug-resistant (MDR) bacteria poses a significant public health risk, highlighting the critical need for innovative antimicrobial agents. Marine macroalgae, containing diverse bioactive compounds, offer a promising source for new antibacterial agent. The present study aimed to determine the antimicrobial activity of different extracts of brown algae *Dictyota ciliolata* against (n=7) clinical isolates, multi drug resistant (MDR) bacteria *Pseudomonas aeruginosa, Staphylococcus aureus, Klebsiella pneumonia, Escherichia coli, Serratia, Enterobacter spp., and Proteus spp.* Seven different crude seaweed extracts were obtained (Chloroform, Methanol, Ethanol, Acetone, Diethyl Ether, Dichloromethane and Hexane) via maceration technique which were air-dried and grounded into a powder. Crude extracts diluted with DMSO from each organic solvent were tested for antimicrobial susceptibility (ABST) on Muller-Hinton and Nutrient agar using the well diffusion method, with inhibition zone diameters measured according to CLSI guidelines. Vancomycin and Cipro floxacillin utilized as positive control and DMSO utilized as negative control. The statistical analysis was obtained via SPSS V23.0.(95%, $P<0.05$). Chloroform demonstrated the largest inhibition zone of 15.67mm against *Staphylococcus aureus* on nutrient agar. Methanol yielded the most substantial zones of 16.67mm against *Pseudomonas aeruginosa* and 12.33mm against *Proteus spp.* on Mueller-Hinton agar. Acetone exhibited the highest inhibition zones of 18.33mm against *Serratia spp.*, 15.67mm against *Pseudomonas aeruginosa*, and 16.67mm against both *Pseudomonas aeruginosa* and *Staphylococcus aureus* on nutrient agar. Methanol, Ethanol, Acetone and Dichloromethane solvents extractions were indicated significant sensitivity to the MDR ($p=0.001$) compared to the other solvents. Further *Pseudomonas aeruginosa, Serratia spp.,* and *Proteus spp.* revolved the highest significant sensitivity ($p=0.02$) to the *Dictyota ciliolate* all seven types of crude extracts compared to the other MDR. The findings suggest that *Dictyota ciliolata* holds potential as a source of effective antimicrobial agents against multi-drug-resistant bacteria. Chloroform, methanol, and acetone extracts exhibited the highest antibacterial activity, particularly against *Pseudomonas aeruginosa, Serratia spp.,* and *Proteus spp*., underscoring the algae's promise in developing new antibacterial treatments.

Keywords: Brown algae, Secondary metabolites, Antibacterial activity

Formulation and development of neck firming and hypopigmentation cream using *Withania somnifera* and *Psidium guajava*

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Abstract

Skin aging is an unavoidable complex biological process therefore people seek solutions to reduce aging symptoms from cosmetics. Antioxidants can reduce the effect of aging. *Psidium guajava* ("Pera" in Sinhala) leaves and *Withania somnifera* ("Amukkara" in Sinhala) roots have been used as herbs in folk medicine. *Psidium guajava* and *W. Somnifera* have researched their individual antioxidant capacity, but the combination of plant extracts has not yet been evaluated. The primary objective of this research is to formulate a neck-firming and hypopigmentation cream using the most effective antioxidant combination ratio. Initially the plant samples were collected and authenticated from relevant government authorities. Then both plant samples were refluxed with 95% ethanol. The yield percentage of *P. guajava* and *W. somnifera* was 3.44 ± 0.32% w/w and 1.83 ± 0.17 % w/w respectively. The crude extractions and the combinations of plant samples were subject to an *in-vitro* antioxidant assay using 1,1-diphenyl-2-picrylhydrazyl (DPPH). Ascorbic acid (6.25 µg/mL – 25 µg/mL) was used as a positive control. Five different cream bases were formulated, and their characterization and physical stability were evaluated at 4°C, 25°C and 40°C temperatures with and without centrifugation. As all the bases were physically stable, the most suitable and complied cream base was selected by considering the pH changes and textural differences within the evaluated period. The selected base sample was incorporated with the active plant extracts identified using antioxidant assays. The product formulations were also subjected to stability evaluation, characterization, and toxicity evaluation. The results showed that the crude extracts of *W. somnifera* and *P. guajava* had EC_{50} values of 377.58 µg mL^{-1} and 146.45 µg mL^{-1}, respectively. The EC_{50} values for three ratios of 1:1, 2:1, and 1:2 of *P. guajava* and *W. somnifera* were 24.27 µg/mL, 38.87 µg/mL, and 10.14 µg/mL, respectively. The formulated neck firming cream was white with a pleasant odour, smooth texture and pH of 4.8. The spreadability was 24.88 gcm^{-1} and no phase separation was seen at 3000 rpm for 30 mins. The formulated cream was nontoxic to the brine shrimp. In conclusion a stable cream formulation for neck firming was developed and further characterization to commercialization will be recommended.

Keywords: Antioxidant, Cream, Formulation, *Psidium guajava, Withania somnifera*

Formulation and development of herbal sunscreen gel from *Leucas zeylanica* and *Tagetes erecta*

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Abstract

The sunscreen gels are a protective topical product that effectively shields the skin from harmful UV radiation while ensuring optimal skin compatibility and user comfort. Developing a new herbal sunscreen gel is crucial for providing a natural, skin-friendly alternative to synthetic sunscreens, harnessing the protective benefits of plant-based ingredients while minimizing potential side effects and environmental impact. Hence, this study aimed to formulate and develop a sunscreen using aerial parts of *Leucas zeylanica* ("Ceylon slitwort" in English and "Geta thumba" in Sinhala) and flowers of *Tagetes erecta* ("African marigold" in English and "Dhaspethiya" in Sinhala) and evaluate their characteristics and toxicity of the formulation. Although both plants were evaluated for their properties separately there was no information revealed about their synergistic activity and there is no any cosmetic formulation made out of this combination of plants for sun protection. Our previous studies have shown that 2:1 ratio combination of 95% ethanol extract of aerial parts of *L. zeylanica* and flowers of *T. erecta* has the highest antioxidant activity (EC_{50}= 55.26µg/mL) in 1,1 – diphenyl -2- picrylhydrazyl (DPPH) assay and sun protection factor (SPF= 19.03) compare to the individual crude extracts and different other ratios (1:1 and 1:2). Hence, 2:1 *L. zeylanica* : *T. erecta* ratio was used as to formulate sunscreen gel. The ratios were compared for statistically significant differences by one-way analysis of variance (ANOVA) using Prism 4.03 (Graphic Pad Software, Inc, USA). Data were considered significantly different at $p < 0.05$. When developing a sunscreen gel, the base was formulated using gel phase and oil in water emulsion. The most potent plant extract was added to the water phase of the emulsion. All the stability tastings i.e short-term; long-term; and accelerated, were carried out for emulgel bases and the final emulgel was formulated using the most potent plant extract. Further, toxicity was evaluated by brine shrimp assay. The final stable formula of sunscreen gel was white in colour and the pH was 5.6. Further, it shows 33.55 $gcms^{-1}$ of spredability and 1400 cp in viscosity. Visual changes were absent over time and no phase separation in the cycling test. Further, lethality percentages do not exceed 50% in the tested concentration series (5000 mg/mL- 100 mg/mL). Hence, there was no toxicity detected in the developed sunscreen gel formula. In conclusion, the present findings provide evidence for the formulation and development of a new sunscreen gel containing *L. zeylanica* and *T. erecta* plant extracts in their synergistic ratio for antioxidant activity and sun protection.

Keywords: Antioxidant, Gel, *Leucas zeylanica*, SPF*, Tagetes erecta*

Formulation and development of sulfate-free anti-fungal shampoo containing *Elaeocarpus serratus* leaf aqueous extract

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Abstract

Developing a new herbal antifungal shampoo is important for offering a natural, gentle solution to dandruff that harnesses the therapeutic properties of plant-based ingredients while reducing reliance on synthetic chemicals. Hence, this study aimed to formulate and develop a sulphate-free antidandruff shampoo incorporating aqueous leaf extract of *Elaeocarpus serratus* ("Ceylon olive" in English and "Vearalu" in Sinhala). Fresh leaves of *E. serratus* were collected and authenticated. Aqueous extract of fresh leaves of *E. serratus* (AELE) was prepared by reflux method. The antifungal effect of AELE was evaluated by agar well diffusion method against *Candida albicans*. The zone of inhibition (ZOI) for 100 mg/mL of AELE was 1.97 ± 0.15 cm. The shampoo base was developed utilizing distilled water, fragrance, ethylene glycol mono-stearate, cocamidopropyl betain, glycerine, NaCl, sodium benzoate, Polysorbate 80, ehylenediamine tetraacetic acid, liquid germal plus and stearic acid in acceptable quantities and AELE was incorporated into it. The long-term, short-term and accelerated stability was done for the developed formulae. Further, a toxicity test was done by brine shrimp assay for different concentrations (5000 µg/ mL- 50 µg/ mL). Physicochemical parameters along with the stability studies were done for the final formulation was light green in colour, had a glossy texture, and smelled strongly of mint. The pH of the final shampoo was 6.2. There was no phase separation after centrifuge for three minutes at 2400 rpm. The solid content percentage of the completed shampoo was 25.87% and the detergency percentage was 23.47%. The formulated shampoo was nontoxic to the brine shrimp. Due to free from sulphate-containing surfactants formulated shampoo is sulphate-free. In conclusion, a stable anti-fungal shampoo formulation was developed and further study will be recommended to screen the anti-dandruff activity of the developed shampoo formula against *Malassezia* sp.

Keywords: Antidandruff, Antifungal, *Elaeocarpus serratus*, Shampoo, Sulfate-free

Formulation and development of an anti-ageing body lotion containing aqueous extracts of *Camellia sinensis* leaves and *Glycyrrhiza glabra* roots

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Abstract

Anti-ageing cosmetic products are in high demand due to the growing desire among individuals to maintain a youthful appearance and delay visible signs of ageing. *Camellia sinensis* (tea) and *Glycyrrhiza glabra* (licorice) are recognized for their anti-ageing properties, supported by scientific and traditional evidence. This study aimed to formulate, develop, and evaluate the anti-ageing body lotion incorporating aqueous extracts of *C. sinensis* leaves (AECL) and *G. glabra* roots (AEGR), obtained by refluxing with water at 45 °C for 30 minutes. As antioxidant activity is one of the anti-ageing mechanisms, the antioxidant potential of mixtures of 1:1, 1:2, and 2:1 AECL and AEGR was evaluated by using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay to identify the optimum combination for anti-ageing lotion. Concurrently, a body lotion base was formulated consisting of water, almond oil, shea butter, glycerin, emulsifying wax, stearic acid, sodium benzoate, liquid germall plus, and fragrance. All the stability tests, i.e., short-term, long-term, and accelerated, were carried out for the developed formula. *In-vitro,* lethal toxicity assay for the final formulation was evaluated using brine shrimp assay. The results indicated that EC_{50} values for 1:1, 1:2 and 2:1 of AECL and AEGR were 260.512 µg/mL, 303.935 µg/mL, and 210.887 µg/mL respectively, with the 2:1 ratio showing the highest antioxidant activity. The final stable formula of anti-ageing lotion was yellowish-white in colour, and the pH was 5.92. Further, it showed 7.66 $gcms^{-1}$ of spreadability. Visual changes were absent over time and no phase separation in the centrifugation test (3000 rpm). The brine shrimp assay yielded an LC_{50} value of 2186.06 µg/mL, and this indicates that the formulation has less toxicity. In conclusion, the developed anti-ageing body lotion containing *C. sinensis* and *G. glabra* plant extracts demonstrated strong antioxidant activity and low toxicity, supporting its potential as an effective anti-ageing cosmetic product.

Keywords: Anti-ageing, Antioxidant, *Camellia sinensis,* DPPH, *Glycyrrhiza glabra*

Development and Formulation of anti-acne cream incorporating *Coriandrum sativum*

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Abstract

Anti-acne products are formulated to manage acne, which affects a large population. The use of anti-acne products can prevent future breakouts. Most synthetic products have adverse effects, particularly for those with sensitive skin, recently research has focused on finding new anti-acne formulas with natural ingredients. Hence, this study aimed to formulate and develop an anti-acne cream incorporating *Coriandrum sativum* ("Koththamalli"). The aqueous and ethanol extracts of authenticated *C. sativum* leaves (AECL and EECL respectively) were prepared by maceration. The antimicrobial activities of AECL and EECL were examined by well diffusion method against *Staphylococcus aureus* and *Klebsiella pneumonia* with positive controls gentamycin and ciprofloxacin and negative control saline water. Different formulas were developed using jojoba, rosehip, mineral oils and *C. sativum* extracts. The preparations were placed in the oven (40 °C), refrigerator (4 °C) and room temperature. They were observed for changes in stability, pH, spreadability and physical factors. Toxicity was evaluated by brine shrimp assay. The results showed that AECL had no antimicrobial activity on both test organisms. However, EECL extracts showed that it has a significant antimicrobial effect against *Staphylococcus aureus*. 1000 mg/dL indicated a zone of inhibition of 17.67±0.577 mm, 500 mg/dL indicated a zone of inhibition of 16 mm, and 250 mg/ dL indicated a zone of inhibition of 13.33±0.577 mm. Hence, EECL was incorporated into the cream formulae. The stable formulae were yellowish brown colour with smooth consistency (spreadability was determined in the range of 7.7 to 8.3). The pH was in the range of 5.3- 5.4. There was the absence of phase separation in all storing conditions. No toxicity was detected in the brine shrimp assay, as at a concentration of 1000 µg/mL more than 50% of brine shrimp were alive. In conclusion, this study develops a new formulation for an anti-acne cream containing ethanol extract of *C. sativum* leaves.

Key words; Acne, Antimicrobial, *Coriandrum sativum*, *Staphylococcus aureus*

Evaluation of antioxidant activity of silver nanoparticles synthesized from *Clitorea ternatea* and formulation of an anti-aging agent

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Abstract

Clitoria ternatea is a herbal medicinal plant and its flowers are known to have antioxidant property. Plant-derived antioxidants and silver nanoparticles work synergistically for effective anti-aging agents in cosmetic and pharmaceutical industries. Thus, the present study was designed to evaluate the antioxidant activity of silver nanoparticles of the *Clitoria ternatea* flowers and incorporated into a cream formulation as an anti-agent. Silver nanoparticles were synthesized using the aqueous extract of *Clitoria ternatea* as the reducing agent by using silver nitrate. The light brown colour indicated the formation of silver nanoparticles and was further proven by the surface plasma peak at 430 nm in UV-Vis spectroscopy. The FTIR analysis indicated that the peak at 3288 cm^{-1} is due to the presence of anthocyanin and it might be responsible for the reduction of Ag^{+} to silver nanoparticles (AgNPs). The results showed the average size of the synthesized NPs are 125.3 nm. The XRD revealed the well-dispersed cubic crystalline structure of NPs with a 10-30 nm diameter. The free radical scavenging (RSA) activity was determined by using an in-vitro 2,2-di(4-tert-octylphenyl)-1-picrylhydrazyl (DPPH) assay and a release study was carried out by using an egg membrane followed by the measurement of absorbance at 430 nm at specific time interval indicated that the absorbance of AgNPs increased over time. The RSA activity of green synthesized silver nanoparticles and aqueous extract of *Clitoria ternatea* flowers is 77.8 % and 53.4% respectively. One way ANOVA and post hoc tests were conducted and $P < 0.05$ indicated the significant different. The results revealed that the green synthesized silver nanoparticles exhibited significant antioxidant activity in the cream formulation and show a strong potential as an anti -aging cream.

Keywords- *Clitoria ternatea*, DPPH assay, Silver nanoparticles, Cream formulation

Determination of Lead (Pb) content in selected lipsticks in Sri Lanka

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Abstract

Lead (Pb) is a heavy metal that can cause severe health issues, particularly in children and pregnant women. Lipsticks, which are widely used cosmetic products, have been found to contain Pb, and studies have shown that this can lead to exposure through oral ingestion or absorption through the skin. In Sri Lanka, there is currently limited information on the levels of Pb in lipsticks. Therefore, the aim of this pilot study was to investigate the Pb content of a selection of lipsticks available in Sri Lanka. In this study, 13 lipstick samples from various brands were obtained randomly from a cosmetic store. Each sample was digested with concentrated nitric acid and heated on a hot plate until it was dried. Hydrogen peroxide was added dropwise to oxidize the organic matter of residues, and the resulting solution was filtered through a Whatman filter (Merck, 0.45 μm). The concentration of metal ions in the filtered solution was determined using atomic absorption Spectrophotometric (AAS) method with a detection limit of Graphite Furnace Atomic Absorption Spectrometry (GFAAS) specified for lead. The results showed that 10 out of the 13 samples had no detectable levels of Pb, while 4 samples had levels ranging from 0.06 to 0.28 ppm. However, the detected lead content in all sample tested was found to be below the allowable limit by the USA food and drug administration (FDA) for lead in color additives approved for use in cosmetics (20 µg/g). The findings of this study suggest that the use of cosmetics, particularly lipsticks, may expose consumers to low levels of lead. Therefore, manufacturers should ensure that their products are safe for use and adhere to the regulatory limits for heavy metal content. Further research is needed to assess the health risks associated with exposure to lead (Pb) in lipstick products.

Keywords: Lipstick, Lead, AAS

Formulation and Development of Novel Herbal Anti- Acne Face Gel Incorporating Aqueous extract of *Psidium guajava L*. Leaves

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Abstract

Acne is a common skin condition that occurs when hair follicles become clogged with oil, dead skin cells, and bacteria, leading to the formation of pimples, blackheads, whiteheads, and sometimes more severe lesions like cysts or nodules. There are synthetic and herbal anti-acne products are available in the current cosmetic market. However, herbal products align with the increasing demand for sustainable and environmentally friendly skincare solutions nowadays. Hence, currently cosmetic industry is trying to find more and more anti-acne herbal products to provide consumers with effective, safe, and natural options that promote healthier skin and overall well-being. *Psidium guajava* ("Pera" in Sinhala and "Guava" in English) leaves are natural products with numerous pharmacological effects. Hence, this study focused on formulating and developing an anti-acne gel. The aqueous and ethanol extracts of authenticated *P. guajava* leaves (AEPL and EEPL respectively) were prepared by reflux process in 1: 4 sample to solvent ratio. The antimicrobial activities of AEPL and EEPL were examined by well diffusion method against *Staphylococcus aureus* and *Candida albicans.* For *S. aureus*, Gentamycin was used as a positive control. Negative control sterilized saline was used to extract ethanol. Distilled water was used to extract the water extract. For *C. albicans*, fluconazole was used as a positive control. Negative control was the same as S. aureus for both extracts. The results showed that zones of inhibition (ZOI) for *S. aureus* for AEPL and EEPL were 1.8 ± 0.25 cm and 2 ± 0.10 cm respectively. It was 3.2 ± 0.25 cm for Gentamycin. Further, ZOI against *C. albicans* were 1.6 ± 0.36 cm and 1.8 ± 0.17 cm for AEPL and EEPL respectively whereas it was 2 ± 0.0 cm for fluconazole. As there were no significant differences ($p>0.5$) between AEPL and EEPL against two tested organisms, by considering commercial benefits aqueous extract was selected for developing an anti-acne face gel formula. The product formulations were subjected to stability evaluation i.e. short-term, long term and accelerated stability. Further toxicity was evaluated for AEPL, gel base and the stable final product by using Brine shrimp assay. Among the developed formulas, the stable formula for all three conditions was orange in colour with a smooth texture. It had a lavender odour which did not change with time. A spreadability of 13.61 ± 1.7 g cm^{-2} indicates easy application, and the formulation's pH of 5.5 is optimal for skin compatibility. All of these findings point to a product that is both convenient to use and well-balanced. There was no toxicity for AEPL, gel base and stable face gel formula. In conclusion, the novel anti-acne herbal gel formulation including aqueous extract of *P. guajava* leaves has been established, offering a potential natural remedy for acne management.

Keywords: Anti-acne, gel, *Psidium guajava, Staphylococcus aureus*

Impact of Anxiety, Stress, and Depression on Academic Performance of College Students in Sri Lanka

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Abstract

Student well-being is crucial for academic success, yet the impact of psychological factors like depression, anxiety, and stress on academic performance in Sri Lankan universities remains underexplored. This study aims to address this gap by examining how these psychological factors influence academic performance and how these effects vary by gender and academic year. A cross-sectional survey was administered to 138 university students in Sri Lanka using Qualtrics. Psychological factors were measured using the Depression, Anxiety, and Stress Scales (DASS-21), and academic performance was assessed with the Academic Performance Scale (APS). Spearman's rank correlation analysis was employed to explore the relationships between psychological factors and academic performance. Gender and academic year differences were analyzed using independent t-tests and ANOVA. Statistical analyses were performed using SPSS software. The sample consisted of 30.4% male and 69.6% female students, with a mean age of 24.1 years (SD ± 1.6). Most participants reported mild to extremely severe symptoms: depression (51.1%), anxiety (59.8%), and stress (82.6%). Negative correlations were found between academic performance and psychological factors: depression ($\rho = -0.143$, $p = 0.094$), anxiety ($\rho = -0.129$, $p = 0.130$), and stress ($\rho = -0.138$, $p = 0.107$), suggesting that higher levels of these factors are associated with lower academic performance, though these relationships were not statistically significant. Significant positive correlations were observed among psychological factors: depression and anxiety ($\rho = 0.547$, $p < 0.001$), depression and stress ($\rho = 0.508$, $p < 0.001$), and anxiety and stress ($\rho = 0.758$, $p < 0.001$). Female students experienced significantly higher levels of stress ($M = 14.40$, $SD = 5.16$) compared to males ($M = 12.35$, $SD = 5.52$), $t(136) = 2.94$, $p = 0.004$, and performed better academically ($M = 10.12$, $SD = 6.54$) compared to males ($M = 8.31$, $SD = 4.86$), $t(136) = 2.35$, $p = 0.021$. First-year students reported the highest stress levels ($M = 15.25$, $SD = 5.68$) and the lowest academic performance ($M = 8.75$, $SD = 5.93$). The results suggest that while there is a trend indicating the negative impact of psychological factors on academic performance, the evidence is not strong enough to be deemed statistically significant. Gender differences in stress levels highlight the need for targeted interventions. The study underscores the importance of considering the academic year in developing support strategies for students, emphasizing the need for tailored approaches to address psychological challenges throughout their academic journey.

Keywords: Depression, Anxiety, Stress, Academic Performances, Sri Lankan Students

Medicinal plants used for the management of dysmenorrhea: An overview

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Abstract

Dysmenorrhea, a common condition among women of reproductive age, is characterized by cramping pain in the lower abdomen before or during menstruation. Although it is a common condition, dysmenorrhea is often inadequately addressed considering as a normal part of the menstruation. Conventional medications such as Paracetamol, Ibuprofen, and Mefenamic acid are commonly used for the pain management, but they can lead to adverse effects, including gastrointestinal and renal issues. Therefore, most of the women tend to use herbal remedies for the pain management although many of these lack scientific validation of their mechanisms. This review was aimed to explore the scientifically proven mechanisms behind these medicinal plants. A comprehensive literature survey was conducted to identify the medicinal plants used for managing dysmenorrhea by collecting the data from Ayurvedic practitioners. Based on the information provided by the local Ayurvedic practitioners, 29 herbal plants were selected for the review. Initial review was conducted at the Ayurvedic library of the Faculty of Indigenous Medicine, University of Colombo, using sources such as the Ayurveda Pharmacopoeia and Compendium of Medicinal Plants. To explore the mechanisms of action of selected medicinal plants, scientific databases including PubMed, Google Scholar and Web of Science were utilized, along with 76 journal articles. Among 29 medicinal plants, 19 medicinal plants were identified with the capability of pain relieving action. *Coffea arabica*, *Rosa damascena*, *Glycerrhiza glabra*, *Allium sativum*, *Tamarindus indica*, *Cinnamomum verum, Terminalia chebula, Coriandrum sativum, Coscinium fenestratum, Carica papaya, Macuna pruria, Seasamum indicum, Cyperus rotundus, Phyllanthus emblica, Cuminum cyminum, Trachyspermum involucratum, Piper nigrum, Terminalia bellirica,* and *Zingiber officinale* were identified as the medicinal plants for the management of dysmenorrhea. The phytochemicals in these plants exhibit analgesic, anti-inflammatory, and antinociceptive properties, acting through mechanisms such as inhibition of central pain receptors, pro-inflammatory mediators, nitric oxide production, and cyclooxygenase-2 expression. Therefore, this study provides rich sources of data for utilizing medicinal plants in herbal remedies as an alternative method for conventional medications and further research on these herbs would be recommended to prove their effectiveness.

Keywords: Dysmenorrhea, Menstruation, Pain management

Formulation, stability evaluation and toxicity assessment of effervescent granules incorporating aqueous extracts of *Aloe barbadensis* Miller leaves and *Punica granatum* peels.

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Abstract

Aloe barbadensis Miller and *Punica granatum* are known for their therapeutic properties, particularly in treating ulcerative gastritis. Therefore, this study was focused on preparation of effervescent granules incorporating aqueous extracts of *Aloe barbadensis* Miller leaves and *Punica granatum* peels and to evaluate the pre-compression parameters, stability and lethality with the aim of developing as an antacid dosage form. Initially, eight different effervescent formulations were prepared by varying the ratios of acid-base compositions (citric/tartaric: sodium bicarbonate/sodium carbonate). Among them, F1 (citric acid : sodium bicarbonate, 1:3)and F8 (Citric acid : tartaric acid: sodium bicarbonate 1:0.2:2) were identified as the best formulations based on their effervescence time, pH and solubility and pre-compression parameters such as bulk density, tapped density, Carr's index, and angle of repose. The selected plant extracts were then incorporated into the optimum granule formulation and the same properties were re-evaluated. Brine shrimp lethality assay was conducted for two selected doses (1g of *Aloe barbadensis* Miller and 2g of *Punica granatum* peels) of plant extracts. Physical stability was evaluated at room temperature (28 ± 5^0C) and high temperature (45^0C) for the period of 3 months for prepared granules including plant extracts. The effervescence time of all eight formulations was within the acceptable range, and the pH of the effervescent solution within pH 5.4 to 5.7. Among these, F1 and F8 were freely soluble while others were partially soluble. The compressibility index of F1 and F8 were 17.76% and 20.4% respectively where F1 was passable while F8 was fair to passable. Angle of repose of F1 and F8 was obtained as 36.30 and 35.0 respectively, where both formulations were passable. Therefore, F1 exhibited better flow properties than F8. Re-prepared granules of F1 including plant extracts demonstrated good compressibility index (15.689%) and angle of repose (34.90) which was passable. The pH was 7.2 and solution was freely soluble within the required effervescence time. The selected plant extract doses were non-lethal to brine shrimps. The F1 was stable at room temperature while at high temperature the granules did not maintain the stability. Therefore, F1 stands out as the best candidate for further developing the effervescent granules to treat ulcerative gastritis.

Keywords: *Aloe barbadensis* Miller, *Punica granatum,* effervescent granules, pre-compression parameters

Evaluation of *In vitro* Anti-inflammatory Activity of *Pyrrosia heterophylla* Extracts Using Human Red Blood Cells Membrane Stabilization Method

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Abstract

Inflammation is a complex biological response that acts as a protective mechanism against various stimuli but can lead to chronic conditions when dysregulated. The quest for effective anti-inflammatory agents from natural sources has gained considerable attention due to their potential therapeutic benefits and fewer side effects compared to synthetic drugs. *Pyrrosia heterophylla*, a fern species in the family *Polypodiaceae*, is used in traditional medicine for the treatment of asthma, swellings and pain among other conditions. Therefore, present study was conducted to evaluate the anti-inflammatory activity of *P. heterophylla*. Fresh leaves of *P. heterophylla* were dried and extracted with a 70% ethanol solution using reflux extraction. The anti-inflammatory activity of the extract was assessed by determining the percentage hemolysis using by using the heat induced Human Red Blood Cells (HRBC) membrane stabilization assay and triplicates were conducted for each test sample. Ethical clearance for this study was obtained from the CINEC ethics review committee. A concentration series of 5 mg/mL, 2.5 mg/mL, and 1.25 mg/mL was prepared from the plant extract and the positive control (Aspirin) respectively. Notably, the maximum percentage inhibition of *P. heterophylla* was recorded at 61.38 ± 2.00% at a concentration of 5 mg/mL. In contrast, aspirin demonstrated a percentage inhibition of haemolysis of 76.95 ± 2.00% at the same concentration. Further, the IC_{50} value of *P. heterophylla* was determined as 2.5 mg/mL. The findings of this study underscore the potential of *P. heterophylla* extracts as promising anti-inflammatory agents. Further studies are recommended to evaluate the mechanism and the chemical composition of the plant responsible for its anti-inflammatory activity.

Keywords: Anti-inflammatory, Aspirin, Human Red Blood Cell, Membrane stabilization. *Pyrrosia heterophylla*.

In silico investigation of inhibition of NF-κB signaling pathways on liver fibrosis by C-glycosidic ellagitannins, a bioactive molecule from plant *Osbeckia octandra*

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Abstract

Liver fibrosis represents a major challenge in the management of chronic liver diseases, with limited therapeutic options currently available. Extensive research has been dedicated to unfolding new drug candidates for the treatment of this disease. Liver fibrosis is often mediated through the activation of the NF-κB pathway in liver cells. Herbal medicines have gained popularity in various countries as an alternative treatment for this condition. In Sri Lanka, the endemic herbal plant *Osbeckia octandra*, traditionally known as "Heen Bovitiya," has been used since ancient times for the prevention and treatment of liver disorders, including liver fibrosis. *O. octandra* is reported to contain bioactive C-glycosidic ellagitannin compounds, including epi-punicacortein A, casuarinin, casuariin, castalagin and vescalagin. Therefore, the aim of the present study was to analyze the potential activity of five different types of C-glycosidic ellagitannins towards the inhibition of the NF-κB pathway associated with liver fibrosis using an *in silico* approach. The structures of some of the NF-κB pathway proteins were obtained from the Protein Data Bank (PDB IDs: 1TNF, 1EXT, 1F2H, 5XME, 3GUT), while others were modeled using homology modeling through SWISS-MODEL software. Binding site analysis for the NF-κB pathway proteins was conducted based on literature targeting competitive inhibition. The C-glycosidic ellagitannins were geometry optimized using Gaussian software. Molecular docking studies of the C-glycosidic ellagitannins and NF-κB pathway proteins were conducted using the PyRx 0.8 virtual screening tool. The five C-glycosidic ellagitannins showed promising affinity towards the protein targets in contrast to the current drugs used to treat liver fibrosis. The docking results indicate that the inhibition of NF-κB pathway proteins in hepatic fibrosis by C-glycosidic ellagitannins could be a captivating candidate for treating liver fibrosis.

Keywords: *Osbeckia octandra,* C-glycosidic ellagitannins, *in-silico,* NF-κB pathway

Fractional analysis of *in vitro* hypoglycemic activity of methanolic extract of *Mangifera zeylanica* leaves

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Abstract

The genus *Mangifera* has gained significant attention in pharmacological research, particularly *Mangifera indica*, which is widely studied for its diverse therapeutic properties. However, *Mangifera zeylanica*, an endemic species to Sri Lanka known as "Etamba" in Sinhala, has received comparatively less focus despite its potential medicinal benefits. Studies have revealed that stem barks of *M. zeylanica* possess antioxidant, anti-inflammatory, and anticancer effects, while leaves are being used in herbal medicine for the treatment of diabetes. Further, the studies have shown the methanolic extracts of *M. zeylanica* leaves possess *in vitro* hypoglycemic activity. Therefore, the present study was conducted to evaluate the *in vitro* hypoglycemic activity of purified fractions of the methanolic extracts of *M. zeylanica* leaves. Fresh leaves were collected from the Gampaha area and authenticated from National Herbarium, Royal Botanic Gardens, Peradeniya, Sri Lanka. The methanolic extracts were prepared using powdered samples of leaves by Soxhlet extraction and the filtrate was rotary evaporated to obtain the solid crude extract. It was subjected to TLC analysis to identify a suitable mobile phase for column chromatography. Extract was fractionated by sequential elution with eluents, chloroform, toluene, methanol and acetic acid in the ratio of 4:5:0.5:0.5, respectively. Separated fractions were evaluated for *in vitro* hypoglycemic properties in triplicates and compared the activity with the positive control, acarbose. Three fractions were separated from crude extract using column chromatography with R_f values of 0.7 - 0.9, 0.2 - 0.7 and 0.1 - 0.2 for fractions 01, 02 and 03, respectively. Among these fractions, fraction 02 exhibited higher hypoglycemic activity, with an IC_{50} value of 1575±1.32 µg/mL, while fraction 01 and 03 exhibited IC_{50} values of 1675±0.93 µg/mL and 2129±1.12 µg/mL, respectively and acarbose exhibited an IC_{50} value of 121.6±3.30 µg/mL. According to the present study, fraction 02 exhibited a higher *in vitro* hypoglycemic compared with the other two fractions. Future research is recommended to characterize the chemical compounds in the highest activefractions and to evaluate the mechanism of action responsible for its hypoglycemic activity.

Keywords: *Mangifera zeylanica*, Etamba, Hypoglycemic, TLC, Column chromatography

Formulation and stability evaluation of herbal shampoo containing *Cyanthillium cinereum* leaves extract

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Abstract

Dandruff is a fungal infection characterized by itching and scaling of the scalp and is identified as a major problem in cosmetics. Since many herbal plants have been identified with remarkable antifungal activity, plant extracts containing fungistatic agents hold potential for incorporation into scalp cosmetic formulations. Therefore, the plant *Cyanthillium cinereum*, which has been scientifically proven for its antifungal effect, was considered in this study to formulate a shampoo with the aim of developing a stable antidandruff formulation. Initially, five different bases were prepared using ethylenediaminetetraacetic acid, sodium chloride, lavender oil, glycerin, sodium benzoate, sodium lauryl sulfate, distilled water, and citric acid or sodium hydroxide as excipients. A simple mixing method was employed to prepare the formulations by varying the amounts of added excipients, and they were subjected to short-term stability evaluation for 14 days. After 14 days, the most stable base was selected and reformulated into three additional base formulations, differing only in the percentage of added sodium chloride. After 60 days, the most stable base was identified and incorporated with an ethyl acetate leaves extract of the selected plant, prepared using maceration. The selected dose of the plant extract (0.125 mg/mL), which was incorporated into the shampoo, was subjected to a brine shrimp lethality assay. The shampoo was further assessed for its stability at room temperature ($28^0C \pm 2^0C$) by observing changes in pH, texture, color, and odor. The shampoo maintained a smooth texture with a pleasant odor without any color change throughout the stability evaluation period. The pH value of the shampoo was 5.98, which was close to the non-scalp-irritant pH of 5.5. Furthermore, the selected dose of the plant extract did not show any cytotoxicity to brine shrimps. In conclusion, the developed shampoo, which was stable and complied with all tested physicochemical properties, will be considered for further development as an antidandruff formulation.

Keywords: Anti-dandruff, *Cyanthillium cinereum*, ethyl acetate leaves extract, shampoo

Evaluation of *in-vitro* anti-inflammatory activity of *Thespesia populnea* barkextract

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Abstract

Thespesia populniea commonly known as "Gansooriya" in Sinhala, is a medicinal plant belongs to the family Malvaceae. This plant is valued for its therapeutic properties, addressing a range of conditions including skin disorders, digestive diseases, and inflammatory conditions like arthritis. Despite its widespread use, there is a limited amount of published scientific research available on inflammatory activity of *T. populnea*. Therefore, this study was conducted to evaluate the anti-inflammatory activity of *T. populnea* ethanolic bark extract. Ethanolic bark extract was Soxhlet extracted and rotary evaporated to obtain the crude extract. A double dilution series of 5 mg/mL, 2.5 mg/mL, 1.25 mg/mL, and 0.625 mg/mL was prepared from the crude extract. The anti-inflammatory activity of each concentration was determined by using the heat induced Human Red Blood Cells (HRBC) membrane stabilization assay and triplicates were conducted for each test sample. Diclofenac sodium was used as the positive control while normal saline was used as the negative control. The IC_{50} value was determined by calculating the percentage of inhibition of heat induced HRBC hemolysis. Statistical analysis was performed by one-way ANOVA. The highest percentage of inhibition of 78.76 ± 0.21% was obtainedfor the 5 mg/mL concentration, while 91.25% was obtained for the 5 mg/ml concentration of positive control. The plant extracts demonstrated an IC_{50} value of 2.4 mg/mL. The results showed that ethanolic bark extractof *T. populnea* has significant ($p<0.05$) anti-inflammatory activity compared to the positive control. Therefore, the results of the present study demonstrated that ethanolic bark extract of *T. populnea* possess *in vitro* anti-inflammatory activity. Further studies are necessary to determine the mechanisms responsible for the anti-inflammatory activity of *T. populnea*.

Keywords: *Thespesia populnea*, Anti- inflammatory, HRBC membrane stabilization assay

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Faculty Of Management And Social Sciences

The Determinants of the Satisfaction of Tourists in Developing an Integrated Inbound Platform in Sri Lanka

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Abstract

The study was conducted to find out the determinants of the satisfaction of tourists in developing an integrated inbound tourist platform (IITP) in Sri Lanka. Along with the main objective “to identify and analyze the factors that influence tourist satisfaction with the features and functionalities of a proposed IITP in Sri Lanka," there were two more secondary objectives: “to examine how demographic factors shape tourist expectations and desired functionalities within an IITP for Sri Lanka; to provide recommendations for the design and implementation of the IITP based on the identified determinants of tourist satisfaction.." The features and functionalities that could impact the satisfaction of tourists in the development of IITP were identified through the literature, and based on that, a quantitative research study was conducted referring to the developed conceptual framework. The questionnaire was a research tool that gathered primary data. Correlation analysis and regression analysis were conducted and revealed the correlation of the identified variables. The integrated inbound platform was taken as the major independent variable, consisting of seven sub variables. Tourist satisfaction was the dependent variable. All the considered variables showed a significant strong relationship with the dependent variable, and the regression equation showed its strength of impact on the dependent variable. Demographic characteristics had not impacted the selection of IIPS or satisfaction. The study concluded with important implications for policymakers and authorities, highlighting the possible positive impact of the elevation of the tourism industry in Sri Lanka.

Keywords: Tourist Satisfaction, Integrated Inbound Platform, Digital Transformation

The Role of Tour Guide on Inbound Tourist's Re-Visit Intention; With Special Reference to the UK Source Market

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Abstract

Tour Guides are the face of a destination. They could make or break the experience of a particular tourist, which means they play a significant role in ensuring a particular Tourist's satisfaction. This study seeks the relationship between the role of a tour guide and the inbound tourist's re-visitation intention. The role of the tour guide was segregated down to four aspects after a thorough literature review as; Leadership, Knowledge, Flexibility, and Organizing of the Tour for the ease of reference. The research study is built around the experiences gathered by tourists from the United Kingdom. Data was collected as of the convenient sampling method, from 188 inbound tourists via a self-administered questionnaire. A quantitative methodology was implemented to test the hypotheses of the study. Statistical information was processed with SPSS software and were analyzed using Descriptive analysis, Pearson's correlation Test, and Multiple Regression Test. Results have indicated positive and direct relationships between the role of a tour guide and the re-visit intention of the inbound tourist. According to the regression analysis it was proven that "Knowledge" factor of a Tour Guide is the most impactful to the re-visitation intention of the tourist. Recommendations for further training and further research areas are also discussed. The study concluded by highlighting the significance of the role of a tour guide in encouraging re-visitation.

Keywords: Role of the Tour Guide, Tourist Satisfaction, Re-visit Intention

Factors Influencing Customers' Intention to Purchase Online Event Tickets in Sri Lanka with Special Reference to Colombo District

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Abstract

Factor influencing customers to purchase online event tickets in Sri Lanka with special reference to the Colombo district. This industry plays a major role in the tourism industry. Therefore, most people have come into this industry. Currently, most event planners are doing any type of event and as a result entrepreneurs are introduced to the ticketing platform. Therefore, most people are purchasing event tickets from that site. The goal of this study is to identify the factors that influence customers to purchase online event tickets in Sri Lanka. To identify the relationships between the demographic factors and preferences of customers to purchase online event tickets in Sri Lanka. This study aimed at increasing event industry efficiency and effectiveness to boost overall organization performance. The main challenge is population can't count online purchasers in the Colombo district. for this study used the convenience sample method. Furthermore, more researchers conducted quantitative data collection with Likert scale questionnaires for data collection. Statistical information was processed with SPSS software and data collected from 135 respondents were analyzed using descriptive analysis, KMO, and Bartletts Test and Kruskal Wallis test. This test revealed commonalities table and total ticket purchaser explained, scree plot, and component matrix were generated and rotated component matrix and interpreted. After the get component matrix, could be identified four factors and factor analysis. In the end of the, get to the hypothesis testing using Kruskall Wallis test and by that found which demographic factors are significant and which demographic factor are not significant. The final result, two demographic factors are significance (age, occupation) & other demographic factors are not significant.

Keywords: Events, Online Platform, Online Ticket, Online Ticket Purchasing

A study on how the recent skilled labor migration in hospitality sector in Sri Lanka has affected to the service quality of hotel industry: with Particular Reference to the Top Ten Hotels in Colombo

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Abstract

Wonderful natural tourism resources and a true culinary culture have elevated Sri Lanka to the top of the list of popular holiday destinations. Although tourists like traveling in Sri Lanka, the hotel industry has experienced problems with a lack of human resources (HR) and unmotivated employees. A significant issue with hotel industry service quality was brought about by the movement of skilled laborers in the hospitality sector. Therefore, it is mandatory to analyze whether there is a problem created as of the skilled labor shortage since the rate of migration and has it impacted on the service quality in the hospitality sector. In order the research problem the researcher is aimed to fulfill the objectives of mainly analyzing how the service quality of hotel industry in Sri Lanka has impacted by the migration of the labors in hospitality sector. The study is done in quantitative method and the questionnaire has been designed to collect the data through the hotel manages. Therefore, according to the responds of the managers the analysis was done through SPSS analytical tool to get the results and the conclusion of the study. Nevertheless, ultimately it has proved that there is a possible impact on the service quality of the hospitality sector as of the skilled labor migration in Sri Lanka.

Keywords: Rate Of Migration, Skilled Labors, Hospitality Sector, Service Quality

A Study on Attracting Foreign Visitors Using Social Media Marketing in Wildlife Parks: with Special References to Southern Region

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Abstract

This study investigates the efficacy of social media marketing in attracting foreign visitors to wildlife parks in the Southern Region, based on data collected from 260 international participants. It explores key factors influencing visitor decisions, including information quality, perceived risk, usefulness, ease of use, and electronic word of mouth (eWOM). The findings highlight positive perceptions among respondents towards wildlife park experiences and available resources. Electronic word of mouth emerged as a significant predictor of travel decisions, emphasizing the influential role of online recommendations. Convenience sampling was chosen for its practicality and efficiency in accessing participants who were readily available and easily accessible within the study area. This approach allowed for the collection of data from 260 foreign visitors, providing valuable insights into their perceptions and decision-making processes. The data collection method employed in this study is quantitative, focusing on gathering numerical data through structured surveys administered to foreign visitors at wildlife parks in the Southern Region. The survey instruments were designed to capture information related to visitor perceptions, attitudes, and behaviors regarding wildlife park experiences and social media influences. The study used regression analysis and correlation analysis to identify key factors influencing travel decisions and to evaluate the effect of social media marketing strategies on visitor behavior. It also contributes to understanding effective marketing strategies for wildlife tourism, highlighting the critical role of social media engagement in attracting and engaging foreign visitors. The recommendations derived from this research have practical implications for wildlife park management and tourism promotion in the Southern Region, with implications for sustainable tourism development and conservation efforts.

Keywords: Sri Lanka Tourism, Wildlife Parks, Foreign Visitors, Social Media Marketing

Study on Tourist Travel Motivation of Wellness Tourism in Sri Lanka Special Reference to Southern Province in Sri Lanka

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Abstract

The genuine Ayurvedic experiences provided in specialized resorts and wellness centers, where knowledgeable practitioners customize treatments to meet specific needs, draw tourists. A major factor in the appeal of wellness tourism is the tranquil beaches that adorn Sri Lanka's coastline. This study aims to evaluate the relationship between travel motivations and wellness tourism in Sri Lanka. Further this examines the impact on wellness tourism from travel motivations in Sri Lanka. for stakeholders in Sri Lanka's tourism industry to effectively market their offerings and give visitors meaningful experiences, they must have a thorough awareness of the numerous elements impacting tourist travel motivation in wellness tourism such as relaxation and escape, Self-Development, Novelty, Attraction and Activities, Safety and Security. This study considers every visitor who came to Sri Lanka in the previous three months. By considering the sample, the researcher hopes to choose a sample using the non- probability sampling approach; the sample size will be determined using the Morgan Table and the convenience method. 373 number of samples will be considered out of 9,816 total number of tourists visited for wellness tourism in Sri Lanka in 2023. The process of gathering and evaluating numerical data is referred to as the quantitative approach and physical questionnaires will be used to get primary data and utilize by 5-point Likert Scale. In this research will use SPSS software to calculate Pearson Correlation Analysis and Multiple Linear Regression. These findings will important implications for destination marketers, policymakers and entrepreneurs in Sri Lanka and other healthcare settings, and provide guidelines for the development of targeted strategies and supply chains to attract and manage welfare travelers effectively.

Keywords: Wellness Tourism, Travel Motivation, Ayurveda, Holistic Well – being, Yoga, Meditation, Government Intention

Determinants of Passenger Perception Towards Self-Service Check in as a Technological Improvement for Air Travelling

(Special Reference to Bandaranaike International Airport)

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Abstract

In today's world, technological improvements play a key role, leading to the adoption of "self-service check-in" in many airports to streamline passenger processing operations, and as a result, most of the countries consider "self-service check-in" as a viable passenger check-in method where there is an immense benefit for the passengers. The present study investigates determinants of passenger perception towards self-service check in as a technological improvement for air travelling, the study involves a survey that is conducted among passengers comprised of 334 respondents and was undertaken using convenient random sampling technique, the statistical data was processed with SPSS software and the data were analyzed using reliability analysis, descriptive analysis, correlation and regression analysis and thus, from the survey the researcher identified factors such as perceived ease of use, perceived usefulness and behavioral intentions are the factors that has a strong relationship towards the dependent variable passenger perception. The research findings reveal that perceived usefulness has the strongest correlation within the study. Moreover, the researcher identified that passenger perception towards "self-service check-in" has a moderate perception towards this passenger check-in method, and the research findings conclude that "self-service check-in" helps to reduce time and streamlines passenger processing experience within the airport, while within the study the researcher has also identified the main reasons why passengers do not use "self-service check-in," and the main reasons for this technology remain a less embraced concept among the passengers.

Keywords: Passenger Perception, Self-Service Check In, Technological improvement

Service Personalization Strategies on Enhancing Business Traveler Satisfaction: An Exploratory Study in Colombo City Hotels

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Abstract

In a context of engaging in competition with one another to offer a five-star level service, hospitality establishments have encountered a novel trend known as 'service personalization'. The key purpose of this concept is to tailor the services offered to guests by matching with their characteristics, expectations, and preferences. Encountering such services would result in guest satisfaction and leading to business excellence. The aim of this study is to explore to what extent, service personalization strategies could enhance thesatisfaction of business travelers who lodge in city hotels situated in the commercial capitalof Sri Lanka, Colombo. The study is expected to reveal answers on the current state of adopting service personalization in Colombo city hotels, perceptions of business travelers, potential service personalization strategies to introduce, and practical challenges that may arise during strategy implementation. The study has adopted a quantitative approach and data collection was conducted in the form of questionnaires, targeting business travelers andhoteliers associated with Colombo city hotels. Thorough data analysis and usage of relevanttheories assisted in uncovering the following key study findings. The importance of technology-based personalization, further development of Hardware, Humanware, and Software amenities of a city hotel is essential for the satisfaction of business travelers. These findings will certainly contribute to the development of both academic and industrial knowledge in the areas of hospitality service delivery and quality standards, understandingand attracting the business traveler consumer market segment, and overcoming potential challenges that may occur while executing service personalization on hospitality service.

Keywords: Service Personalization Strategies, Business Travelers, Customer Satisfaction, Colombo City Hotels, Hardware, Humanware, Software

Critical Analysis of Factors that affect Departure Passenger's Overall Satisfaction at Bandaranaike International Airport (BIA)

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Abstract

This study focusses on the impact of overall service quality of BIA that are offered by airport on factors towards airport passenger satisfaction in Bandaranaike International Airport. The crucial variables as the satisfaction factors include service quality, healthcare & special needs, safety & security and basic facilities. Passenger satisfaction is adding value to the airline's solid reputation. This research study involved a likelihood/probability sampling method (simple random) in gathering data from online questionnaires and data collection from google forms using quantitative research methodology with correlation analysis, simple and multiple linear regressions and descriptive data analysis to deliver an inclusive thoughtful of passenger overall satisfaction depending on airport services. The results show that the awful services that are offered by the airport give the strongest influence on passenger dissatisfaction. The objective of this study aims to identify the factors affecting departure passengers' overall satisfaction at BIA and identify individual relation between each and existing factor. As the continuous growth of aviation industry, we can get an idea about the influence of passenger loyalty has become critical part for the airports. By recognizing the factors affecting passenger satisfaction through quality airport services, this study examines what are the areas should be grown to increase passenger satisfaction at the BIA. This study engages quantitative research methodology to broadly examine the impact of factors to passengers' overall satisfaction. This survey includes four independent variables through a total of 35 sub variables to gather data. This study shows that the departure passengers are dissatisfied with the services that are provided by BIA. Departure passenger satisfaction, which is the utmost significantly impact, BIA solid reputation. This research study underwrites the increasing figure of knowledge in the field of aviation and passenger overall satisfaction, mostly in the unique framework of BIA.

Keywords: Bandaranaike International Airport, Departure Passenger Satisfaction, Airport Solid Reputation, Passenger Loyalty, Service Quality

The Impact of the Factors Affecting to the Unemployment Among Math Graduates

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Abstract

One major socioeconomic concern in Sri Lanka is the unemployment rate among math graduates. Even though analytical abilities are highly valued in today's global job market, many Sri Lankan math graduates find it difficult to find suitable jobs. This study investigates the variables affecting unemployment among Sri Lankan math graduates living in the Colombo District. The main goal is to identify the important factors that contribute to unemployment and create a predictive model for evaluating the risk of unemployment for these young, educated people. A 5- point Likert scale structured questionnaire is used in this study and is given to a sample of jobless math graduates in the Colombo district. The questionnaire explores a few topics, such as demographics, educational history, acquired skills, and information technology (IT) knowledge. The independent factors in this study include gender, race, religion, married status, education level, English literacy, residential sector, and IT knowledge. The dependent variable in this study is unemployment among math graduates. The data will be analyzed using multiple regression analysis to determine the important factors affecting math graduates' employability. According to preliminary results, the residence sector, level of schooling, and English literacy may all be significant factors in influencing an individual's employment prospects. The purpose of this study is to provide some insight into the problem of unemployment that math graduates in Colombo experience. The study aims to provide guidance for policy proposals that improve graduates' employability in the area by identifying critical elements. This study adds to our understanding of graduate unemployment in a particular geographic setting. The results provide a framework for further research and actions targeted at resolving related issues and enhancing graduates' career prospects.

Keywords: Unemployment, Employment, Discrimination

Supplier Selection Model using Analytic Hierarchy Process (AHP) For Packaging Categories for Large-scale Apparel Companies in Sri Lanka

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Abstract

Supplier selection in a volatile environment is a multi-criteria decision-making problem incorporating qualitative and quantitative aspects. In Sri Lanka, many organizations lack a systematic approach to evaluating and selecting the best suppliers from a diverse pool, underscoring the need for a structured framework. This study aims to address this gap by determining critical supplier selection criteria and developing a multi-criteria decision support model for packaging categories in large-scale apparel companies in Sri Lanka. The primary research objective is to identify prominent supplier evaluation criteria to select the best supplier for packaging categories from a supplier pool in large-scale apparel companies. The conceptual framework was structured based on AHP and 6 main supplier selection criteria and 25 sub- criteria were identified. Twenty companies were identified as large-scale apparel manufactures in Sri Lanka. Twenty responses from questionnaire 01 and twenty responses from questionnaire 02 were collected. All the criteria were validated by industry experts and statistically tested by measuring spearman's correlation coefficient. Pairwise comparison is carried out to calculate weight for every criterion and consistency ratio is calculated to check the validity of the responses. It is analyzed that all the companies maintain a pool of suppliers for packaging categories and the majority select suppliers based on the past performance of the existing suppliers. All the sub-criteria were positively corelated with the main criteria and financial consideration, quality, and delivery are the topmost important criteria influencing in supplier selection for packaging categories in Sri Lanka. The proposed model, tailored to the Sri Lankan context, will aid procurement professionals in making decisions regarding supplier selection in the apparel industry.

Keywords: Supplier Selection, Pairwise Comparison, Analytic Hierarchy Process

Study on the Influence of Destination Attributes on Travel Decision Making of Tourists; with Special Reference to the European Tourism Market in Sri Lanka

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Abstract

This research is conducted with the utmost intention to extensively explore the influence of destination attributes on travel decision making of tourists, with special reference to the European Tourism Market in Sri Lanka. As same as many other countries across the globe Sri Lanka underwent a very difficult time with the unexpected outbreak of COVID-19. The effect on Sri Lanka was massively encompassed by consecutive hits of Easter Bombings and the Political – Economic crisis. After years of downfall in tourism industry, now it is gaining its momentum with rebounding effects by gradually bringing more and more tourist influx to Sri Lanka. At the start of this year tourists had increased significantly. European tourists are depicting a great portion of tourist influx to Sri Lanka. With this underlying potential in European tourists, it is necessary to evaluate the destination attributes which can attract them to Sri Lanka. Therefore, this investigates how six destination attributes: Attractions, Accessibility, Amenities, Accommodations, Activities & Experiences and Travel Risks & Safety can influence travel decision making of European tourists to come to Sri Lanka. This study encompasses quantitative research methodology initially planning to gather data from 384 samples of European tourists by utilizing the 5-point Likert Scale. They have been analyzed by SPSS software to do several calculations such as correlation, regression analysis, descriptive analysis etc. The final findings bring the reader's attention towards three important destination attributes: Attractions, Activities & Experiences and Travel Risks & Safety. This study may illuminate various groups of intellectuals such as academics, tourism related professionals, public & private industry stakeholders and also tourists as well.

Keywords: Attraction, Accessibility, Amenities, Accommodation, Activities & Experiences, Travel Risks & Safety, Travel Decision Making

A Study on the Impacts of Leadership Style of Managers in the Hotels on Employee Job Satisfaction; Special Reference to Five-Star Hotels in Colombo District

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Abstract

This explores the influence of managerial leadership styles on employee job satisfaction within five-star hotels in the Colombo district of Sri Lanka. This research investigates how several leadership philosophies—autocratic, democratic, laissez-faire, transactional, and transformational—affect hotel employees' job satisfaction against the backdrop of rising tourism and the industry's substantial economic contributions. The objective is to pinpoint which leadership style most positively impacts employee morale and satisfaction, thereby enhancing overall organizational effectiveness and service quality. This quantitative research engaged 127 non-managerial hotel employees from various departments through a structured questionnaire that employed a 5point Likert scale. The SPSS analysis performed correlation and regression analyses, exploring the relationships between different leadership styles and employee job satisfaction. There is a substantial correlation between transformational and democratic leadership philosophies and increased work satisfaction. In contrast, employee morale was negatively or barely affected by authoritarian and laissez-faire leadership styles. It demonstrates how crucial supportive and participatory management techniques are to creating a happy workplace and high levels of employee satisfaction. This research contributes to the existing body of knowledge by filling a noticeable gap in leadership studies within the hospitality industry in Sri Lanka, offering empirical evidence that supports the adoption of more inclusive and inspirational leadership approaches. The insights are intended to guide hotel managers in optimizing their leadership strategies to not only enhance job satisfaction but also to improve the overall productivity and service standards within the tourism and hospitality industry.

Keywords: Autocratic, Democratic, Laissez-faire, Transactional, Transformational, Job Satisfaction, Managerial Style, Leadership, Hospitality Industry, Managers.

Impact of Reverse Logistics on Environmental Sustainability with Special Reference to Tyre Industry in Western Province

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Abstract

Sri Lanka's tyre business is essential to the country's economy. However, tyres have also become an environmental burden on the country. As a result, there is no adequate disposal mechanism in place. As a result, it has become an indicator of environmental sustainability. Reverse logistics plays a significant role in increasing environmental stability. While these studies investigated the effects of reverse logistics on each business, there is a significant data gap in the tyre sector. None of the previous studies addressed the specific impact of reverse logistics on environmental sustainability in the tyre industry. The main objectives of this study to identify the impact of reverse logistics on environmental sustainability with special reference to the tyre industry and to assess the relationship between reverse logistics practices on environmental sustainability within the context of tyre industry in Western Province. The reverse logistics can be classified into several elements, including cost, time, technology, and environmental sustainability. Environmental sustainability was measured using the recycling rate. This research study focuses more on finding the relationship between environmental sustainability and reverse logistics. The data is gathered utilizing the executive to above personnel who work in these tyre organizations, particularly those who work in warehouses and logistics, supply chain, and procurement related fields. Questionnaires were used to gather 283 data from the sample analyzed by SPSS. Finally, based on the analysis results, we can conclude that there is a positive relationship between reverse logistics approaches and environmental sustainability; nevertheless, none of the factors have a significant impact on environmental sustainability. As a result, we may conclude that reverse loss analysis methodologies in environmental sustainability do not have a significant relationship with environmental sustainability in Sri Lanka's western province.

Keywords: Reverse Logistics, Environmental Sustainability, Western Province, Tyre Industry

The Impact of Sensory Marketing on the Brand Preference with Special Reference to Supermarkets in Rathnapura District, Sri Lanka

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Abstract

This study has conducted to identify the Impact of Sensory Marketing on the Brand Preference with Special Reference to Supermarkets in Rathnapura District, Sri Lanka. In the Sri Lankan context, empirical evidence on the functioning of sensory marketing practices in the supermarket industry is difficult to find. Accordingly, the goal of this study is to ascertain the impact of sensory marketing on the brand preference in supermarkets in Rathnapura district, Sri Lanka. This study aimed at increasing sensory marketing practices in supermarkets to boost supermarket's brand preference. This study mainly considers five independent variables: visual factors, gustative factors, auditory factors, tactile factors, and olfactory factors. Supermarket shoppers in Rathnapura district made up the study population. The researcher adopted a deductive approach and convenient sampling, and data were collected through a questionnaire. Statistical information was processed with SPSS software and data collected from 384 respondents were analyzed using descriptive analysis, correlation, and multiple regression analysis. This distributed questionnaire was used to gather the primary data. The research's guiding premise was the Sensory Marketing Model (SMM). This study revealed the impact of sensory marketing on the brand preference in supermarkets in Rathnapura district, Sri Lanka. Further, the regression model of the study revealed that gustative factor is the most critical sensory marketing factor that impact on brand preference in supermarkets in Rathnapura district, Sri Lanka. In the finding researcher has identified that the sensory marketing factors are impacted on supermarket shopper's supermarket brand preference.

Keywords: Sensory Marketing, Supermarket Industry, Brand Preference

A Study on the Relationship between Green Supply Chain Management Practices and Organizational Performance: Special Reference to Apparel Sector in Sri Lanka

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Abstract

In essence, a green supply chain is one that protects people and the environment along the entire network by utilizing socially and ecologically responsible methods at each connection in the chain. This study looked at the relationship between green supply chain management practices and organizational performance, Special Reference to Apparel Sector in Sri Lanka. An online survey was conducted to evaluate the hypothesis of a relationship between GSCM practices and organizational performance to executive and above level management using a sample size of 357 in the selected 5 apparel sectors in Sri Lanka. The conceptual framework was established through secondary data sources like previous literatures and journals. secondary data gathered by Employees at the top level and middle level and executive and above in the garment industries via online survey questionnaire. The researcher was able to collect 376 responses from the 5 apparel companies. Researchers use regression models to analyze the primary objective of the research. Anyway, the researcher came to know that GSCM practices have an impact on organizational performance while analyzing the data. Apart from green purchasing, the other 3 independent variables i.e. eco design, green production, and green transportation are significantly impacted.

Keywords: Eco Design, Ecologically, Green Production, Green Purchasing, Green Supply Chain Management Practices, Green Transportation.

Logistics Service Delivery and its Impact on Logistics Performance with Special Reference to Freight Forwarding Companies in Western Province in Sri Lanka

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Abstract

The distribution of integrated logistics services has proven to be essential to a country's economy, and improving logistics performance requires an organized plan. Sri Lanka is strategically located along major shipping routes and has witnessed significant growth in its logistics industry, particularly in the Western Province, which houses the country's primary economic hub. In compliance with the World Bank, LPI is a benchmarking tool that combines six elements to determine the logistics sector's overall performance. Sri Lanka falls under a partial performer in the LPI ranking, especially compared with Asian countries. The goal of this study is to ascertain how logistics performance is affected by service quality in the context of the freight forwarding sector in Western Province. According to the LSQ scale model aims to measure nine indicators of service quality: personal contact quality, order release quantities, information quality, ordering procedure, order accuracy, order condition, order quality, order discrepancy handling, and timeliness. The researcher adopted 385 respondents using a convenience sampling approach from an unknown population who are the customers of 173 freight forwarding companies registered under SLAFFA. Data were collected through a well-structured questionnaire. The Statistical Package for Social Science (SPSS) is used to analyze the collected data using descriptive analysis, correlation, and multiple regression analysis. The findings of the Pearson correlation test indicate the logistics performance is significantly correlated with all nine variables and regression analysis identified the impact of each dimension on the logistics performance. The study concluded that all seven factors of the LSQ model would have a significant impact on the logistics performance of the freight forwarding sector, apart from ordering procedures and information quality.

Keywords: Logistics, Service Delivery, Logistics Performance, Freight Forwarding

Factors influencing on selecting a 3PL Service Provider with special reference to Sri Lankan Apparel Industry

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Abstract

Apparel is a sector that has been evolving continuously since prehistoric times. It is a basic human need. To meet these human needs the apparel sector plays a significant and dynamic role on a global scale. Although the sector relies on the services of intermediary suppliers, the essential coordinating agent for the apparel sector can be identified as 3PL service providers. Since 3PL service providers are key coordinating agents in international apparel trade, selecting a 3PL service provider is a critical component from an organizational perspective. This study aims to identify the factors that affect the selection of a 3PL service provider with special reference to the Sri Lankan apparel industry, and to examine the relationship and the impacts of each identified factor. The sample for the study consists of 385 participants, selected using the convenience sampling method. Data were collected from merchandisers and commercial department employees of Sri Lankan Apparel companies using a structured online questionnaire. Furthermore, a descriptive analysis, Cross-Tabulation, Reliability test, Factor analysis, Correlation, Regression analysis, and Hypothesis testing were conducted to identify the relationship and impacts from the independent variables. The dependent variable is selecting a 3PL service provider and independent variables are positive emotional relationship, Adaptability to customer demand fluctuations, trustworthiness and competitive pricing. At the forefront of the findings are the undeniable significance of positive emotional relationships between customers and 3PL providers, the adaptability to customer demand fluctuations, trustworthiness, and competitive pricing were identified. The research offers significant insights into the strategic imperatives driving business decisions and operational excellence by highlighting the significance of favorable emotional connections, flexibility, reliability, and competitive pricing.

Keywords: Apparel Industry, 3rd Party Logistics service provider, Supply Chain Management, Customer Satisfaction

The Influence of Service Quality on Customer Satisfaction of PickMe Food with Special Reference to Kurunegala, Sri Lanka

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Abstract

This study investigates the influence of service quality on customer satisfaction with PickMe Food, a leading online food delivery platform, in Kurunegala, Sri Lanka. The research uses Pearson Moment Correlation, Ordinary Least Square, and Descriptive Statistics to data collected from 380 participants through stratified random sampling to ensure a representative sample of the urban Kurunegala population. The research explores how the five dimensions of service quality, explained in the SERVQUAL Model, impact overall customer satisfaction with PickMe Food. By analyzing this data, the study aims to identify key areas where PickMe Food can enhance its service quality to cultivate a more satisfied customer base in Kurunegala. The findings of this research can contribute valuable insights for PickMe Food to optimize its operations and strengthen its competitive edge in the Sri Lankan online food delivery market.

Keywords: Service Quality, Customer Satisfaction, Food Delivery

Determinants of Customer Satisfaction in Air Freight Forwarding Companies in Sri Lanka

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Abstract

Air freight forwarding is the coordination of the shipments from origin to destination via air. However, there are some drawbacks related to this industry which leads to customer dissatisfaction. The main purpose is to analyze the factors that affect customer satisfaction and identify customer expectations to provide better quality services by maintaining trust in their business. Four main objectives, namely, identify the factors that affecting the customer satisfaction, identify the impact on identified factors, assess the relationship between identified factors and propose the best possible solutions to enhance the customer satisfaction in Air Freight Forwarding Companies. The dependent variable is customer satisfaction and independent variables are staff competence, staff credibility, service reliability, assurance and empathy. The sample of this study is 385 selected using convenient sampling methods. Quantitative data analysis mainly consisted of reliability, descriptive analysis, correlation analysis, regression analysis. Findings indicated staff competence and service credibility may have an insignificant impact while service reliability may have a moderate impact on customer satisfaction. Assurance of service and empathy has a significant impact on satisfaction. The study recommended that continuous staff training and communication skills enhance the staff competence. Enhance transparency about services will enhance credibility. By optimizing logistics process, adhering promised delivery schedules may enhance the service reliability. Assurance can be enhanced by adhering to industry regulations and standards. Companies should foster a customer centric culture that prioritizes empathy. Also, feedback mechanisms, and technology; embracing digital solutions may enhance satisfaction and drive growth of the business. Customer satisfaction is a critical aspect of the air freight forwarding industry in Sri Lanka, influencing customer loyalty, retention, and overall business success.

Keywords: Air Freight Forwarding, Customer Satisfaction, Service Quality, Supply Chain Management

Identifying the Factors Affecting Implementation of an E-procurement Platform (With Special Reference to Inbound Logistics Operation of Five- Star Hotels in Colombo, Sri Lanka)

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Abstract

Sri Lanka has been facing a pathetic economic and social crisis in the post Covid- 19 pandemic era. Being a country dependent on the income receiving from the tourism industry, the easter attack in 2019 and the economic crisis created through the political riots hit its main source of income hard, due to the decline in tourist arrivals. Therefore, hotels are still reviving from what those underwent and those are looking for options to cut down their costs while increasing profit margins. Since they have to offer a seamless experience to the tourist, the hotels have to maintain their quality in food and other facilities. In the global context, procurement has been identified as a core business function which reduces the operational cost in the inbound logistics operation of five- star hotels. However, this has not been studied in the local context. This research studies the identifying the factors affecting implementation of an e- procurement system (with special reference to inbound logistics operation of five-star hotels in Colombo, Sri Lanka) and the relationship of the independent variables with the dependent variable. The researcher has obtained the results through an online survey conducted among 341 respondents (the identified sample for the research) and has drawn conclusions through descriptive statistics, factor analysis, correlation and regression.

Keywords: E Procurement, Inbound Logistics, Five-Star Hotels

Investigation of Factors Affecting the Selection of Shipping Lines for Beverage Exporters in Sri Lanka (Special Ref. to Ceylon Beverage International)

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Abstract

The economy of Sri Lanka will benefit from the substantial export industry. One crucial area of Sri Lanka's export industry is the beverage industry. The first quarter of 2020 saw a 4.5% decline in performance for Sri Lanka's beverage industry. Restrictions have harmed economic activity, particularly concerning exports. In 2020 the food and beverage sector accounted for 4.7% of export earnings. In addition, selecting the most suitable shipping line plays a vital role in the export industry. Therefore, this study aims to identify the factors that affect the selection of the most appropriate shipping line for beverage export in Sri Lanka. Accordingly, this study adopted a quantitative research approach and conducted a questionnaire survey to collect the primary data. Accordingly, a total of 197 respondents who are working in the beverage export industry in Sri Lanka were answered for the questionnaire survey. The results indicated that shipping rate, customer service, reliability, operational efficiency, IT orientation and communication, and company background and reputation are the critical factors in selecting a shipping line for beverage exporters in Sri Lanka. As a result, suggestions and proposals were put out to enhance the shipping line selection process for Sri Lankan beverage exporters considering the study's results. Shipping firms should prioritize their customers' needs to reach Sri Lankan beverage exporters properly. This means setting aside funds to improve delivery efficiency, handling funds wisely, and maintain stability. Maintaining a strong business image and growing globally is necessary to enhance and resolve weak areas.

Keywords: Beverage Industry, Beverage Export, Export, Shipping Line, Sri Lanka

Analysis of the Impact of Service Quality on Customer Satisfaction in Colombo Suburban Rail Network

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Abstract

This study aims to identify the factors influencing service quality and its impact on customer satisfaction within the Colombo suburban railway network. As Colombo acts as the central hub of Sri Lanka it is essential to understand the significance of its public transport system. The primary objective in this study is to identify the key factors impacting customer satisfaction on service quality. By focusing on the context of the Colombo suburban railway network, this research aims to provide valuable insights that can provide valuable strategies for enhancing service quality and improving overall customer satisfaction in Colombo suburban railway network. Academic literature was used to identify key variables and accordingly the SERVQUAL model is used to comprehensively assess service quality within the Colombo suburban railway network. Reliability, responsiveness, assurance, empathy, and tangibility were identified as the dimensions influencing customer satisfaction and were systematically analyzed in this study. A sample size of 425 was selected, and a proper questionnaire was distributed among the target population to gather data. Systematical analysis was carried out to the collect dataset through factor analysis, correlation analysis, and regression analysis to identify the factors with the highest impact on customer satisfaction. Based on the findings of the study, recommendations have been provided to enhance service quality within the Colombo suburban railway network. These include improve reliability, by optimizing scheduling and minimizing delays, to ensure consistent and dependable service, enhancing responsiveness by implementing efficient communication channels and addressing passenger inquiries, initiatives to improve assurance, empathy, and tangibility, to create a positive and satisfied passenger experience. By implementing these recommendations, the railway network can enhance service quality, increase passenger satisfaction, and ultimately, improve the overall quality of public transportation services in Colombo.

Keywords: Assurance, Customer Satisfaction, Empathy, Reliability, Responsiveness, Service Quality, Tangibility

The Impact of B2C Domestic Courier Solutions on Merchant Satisfaction with Special Reference to Citypak

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Abstract

This study investigates the impact of Business-to-Customer (B2C) Domestic Courier Solutions on merchant satisfaction, with a special reference on Citypak Company. To improve the overall effectiveness and efficiency of B2C domestic courier services, examining this seeks to understand factors influencing merchant satisfaction as well as provide strategic insights. The study is based on a quantitative methodology, collecting data by means of a structured questionnaire sent to merchants who are using Citypak's B2C courier services. The independent variables being tested are delivery time, service reliability, communication and customer service and technology and tracking systems used to monitor goods while the dependent variable is merchant satisfaction. The results show that merchants' satisfaction with a business entity serving them is enhanced by rapid delivery accompanied by good communication systems, thanks to the advances in technology. Research shows that the speed of delivery, reliability of service, efficient communication and advanced technology have a major impact on merchants' satisfaction. The purpose of this study was to investigate merchant satisfaction with business-to-customer (B2C) domestic courier solutions with a particular focus on Citypak.

Keywords: Business-to-Customer (B2C), Domestic Courier Solution, Delivery Time, Service Reliability, Communication and Customer Service, Technology and Tracking Systems, Merchant Satisfaction

Factors Affecting on Inbound Logistics Practices in Tire Manufacturing Industry in Western Province

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Abstract

This study examines the determinants that impact the implementation of inbound logistics strategies in the tire manufacturing sector, with a specific emphasis on the Sri Lankan environment. The study used a mixed-methods approach, incorporating both qualitative and quantitative studies to investigate the intricacies of incoming logistics operations and their influence on operational efficiency and competitiveness. The literature review presents a thorough examination of several aspects related to inbound logistics procedures, procurement strategies, transportation efficiency, warehousing, inventory management, regulatory compliance, and technology adoption within the tire manufacturing industry. Utilizing knowledge gained from prior research, this study constructs a theoretical framework to direct the investigation. The process of data gathering entails polling a total of 384 participants from diverse tire manufacturing firms in Sri Lanka, which encompass a range of operating scales and geographical areas. The sample selection is meticulously crafted to guarantee representativeness and statistical significance, encompassing logistics professionals, supply chain managers, and procurement officials as responders. The results demonstrate substantial associations among procurement procedures, transportation efficiency, warehousing, regulatory compliance, and inbound logistics performance. The study highlights the primary obstacles encountered by tire manufacturing companies in Sri Lanka, including disruptions in the supply chain, difficulties in managing inventories, and complexities related to regulations. Based on the research findings, recommendations are provided for improving inbound logistics practices in the tire manufacturing industry, including enhancing supplier relationships, optimizing transportation routes, implementing advanced inventory management systems, and ensuring compliance with regulatory requirements. Overall, this research contributes to the understanding of inbound logistics in the tire manufacturing sector.

Keywords: Inbound Logistics, Tire Manufacturing, Sri Lankan Environment, Operational Efficiency, Regulatory Compliance

Factors Affecting to Passenger Satisfaction on Colombo-Katunayake Expressway

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Abstract

Colombo –Katunayake expressway is the only expressway that provides fast access from Bandaranaike International Airport to Colombo City and from Colombo City to Bandaranaike International Airport. And it reduces traffic congestion on Negombo- Colombo Road. There is no previous research has been conducted research to identify factors affecting to passenger satisfaction of Colomo - Katunayake expressway. This study fills the literature gap by studying the factors that affect passenger satisfaction. Such factors are comfort, emergency services, safety, road signs and value for money. Deductive and quantitative has been used and developed a questionnaire using google form. The questionnaire is divided into three key parts such as respondent demographic details, identifying passenger satisfaction for factors included and the overall passenger satisfaction of the users on Colombo-Katunayake expressway. 324 responses have been collected both online and manually in this study. Research has been conducted to comprehensive data analysis part including reliability test, demographic analysis, descriptive statistics, correlation analysis, multicollinearity diagnostic test and multiple regression analysis by using SPSS statistical tool. 0.85 Cronbach's alpha value indicated in reliability test. According to demographic analysis, the majority of the passengers were men, aged in the early middle age bracket employed in the private sector and were at least bachelor's degree holders. Comfort, emergency service, safety, road signs and value for money have been indicated positive relationship towards the passenger satisfaction. According to regression analysis, safety and value for money statistically have significant impact to passenger satisfaction.

Keywords: Passenger Satisfaction, Correlation Analysis, Multiple Regression Analysis

Recovering From COVID19 and an Economic Downturn; a Case Study of Dialog Axiata Sri Lanka

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Abstract

The research problem in 2022 was to understand the poor financial performance of Dialog Axiata Sri Lanka in the year 2022 financial reporting. The loss of LKR 22 Bn indicated by Dialog was immense and included several failures of a large corporate to plan in the outset. The research revolves around understanding the primary drivers of the issues and the counter strategies that were set about in this study. The research involved a qualitative approach with interviews carried out by the researchers with the CEO Mr. Supun Weerasinghe. Further, interviews were carried out with industry leaders to assess and to map out the recovery strategies. A total of FOUR (4) interviews were carried out. In this study the following key strategies were understood [1] Treating an unfair year and the management approach to burden the financial losses in that year (e.g. Depreciation, Foreign exchange losses, apportionments) are charged to that year [2] Business strategy play of not increasing prices during hard times, competitors will be under more pressure. Ultimately Airtel was acquired by Dialog Axiata in 2024 [3] Creation of new USD revenue streams: Data centers, Software development [5] Leveraging technology for growth Fibre, 5G [6] Operational management decision to not fill carder positions for resignations – allowing for streamlining HR strength. Overall, the organization has been able to improve their operational services during the unfortunate times of COVID19 and an economic downturn. This has been purely successful due to effective (1) leadership (2) support of parent company Axiata Group, Malaysia and finally the (3) Operational financial capability of Dialog Axiata Sri Lanka to manage cashflow. This research addresses the corporate strategies for survival during an economic downturn of one of the largest corporates in Sri Lanka, and the largest FDI contributor of Sri Lanka.

Keywords: COVID19, Crisis Management, Economic Downturn, Financial Data, Dialog Axiata Sri Lanka

Impact Of Total Quality Management Practices on Operational Performance of Small and Medium Manufacturing Companies in Sri Lanka

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Abstract

As a novel concept, most managers and employees are unfamiliar with quality management practices and are hesitant to implement and invest in it. As a result, a lack of information, fear of loss, and cultural factors contribute to a limited implementation of TQM techniques. Furthermore, there are just a few studies that focus on the "influence of TQM practices on the operational performance of Small and Medium Enterprises". Although Covid-19 had a significant impact on Small and Medium Enterprises by modifying business processes and customer purchasing behavior, no study was undertaken following the epidemic. Hence, this study focused on “to identify impact of Total Quality Management on the operational performance of Sri Lankan SMEs” for fill contextual, empirical and methodological research gaps. The study applied the EFQM Excellence Model to determine the study's independent variables, which included policy and strategy, employee focus, partnership and performance, leadership, and process management. The study sample size was 385 managers of Sri Lankan small and medium businesses. The study used the positivist research philosophy to undertake a deductive, quantitative-based survey research technique over a cross-sectional time horizon. Study results that Employee focus, and Process management significantly influences the SMEs’ operational performance. Partnership and performance, policy and strategy and Leadership are not significantly influence on the SMEs’ operational performance. As a result, organizations can improve their operational performance by increasing TQM procedures in areas such as employee engagement, process management and customer management. Hence, the study recommended that focus on customer satisfaction, needs and wants and complaints, enhance the employee commitment through effective communication, rewards, and career planning, enhance employee skills and knowledge.

Keywords: Employee focus, Leadership, Operational performance, Policy and strategy, Partnership and performance, Total Quality Management

Investigating the Moderating Impact of Financial Stress on the Relationship Between Financial Literacy and Financial Well- being of Millennials in the Financial Sector of Colombo District

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Abstract

The study used multi-dimensional constructs to operationalize the three variables, namely financial literacy, financial well-being, and financial stress. Prior research has demonstrated that financial knowledge and financial stress have a significant influence on one's financial well- being. However, there exists a certain degree of uncertainty when it comes to determining the moderating influence on an individual basis. This paper aims to evaluate the influence of financial stress on financial literacy and financial well-being among millennials. It is built upon the rational choice theory and the coping mechanisms theory to analyze this relationship. The study conducted a cross- sectional study which includes a sample of 360 individuals belonging to the millennials who are now employed in the financial sector. The study employed a self- administered questionnaire to assess the dimensions of financial well-being, which include preparedness for financial emergencies, current money management stress, and perceived financial security. Additionally, the study measured the dimensions of financial literacy, subjective financial literacy, opinion leadership, and objective financial literacy. Measures were also taken of the physiological reactions, relational/interpersonal conduct, and affective reactions related to financial stress. Structural Equation Modeling analysis was performed. Furthermore, it is stressed that the existence of financial stress dimensions affects how financial literacy aspects affect financial well-being dimensions. Consequently, by addressing the shortcomings in the application of coping mechanism theory and rational choice theory in examining the individual-level moderating effects of financial stress on financial literacy and financial well-being, this study significantly adds to the existing literature.

Keywords: Financial Well-Being, Financial Literacy, Financial Stress, Financial Sector, Millennials

Analyzing the factors affecting the customer satisfaction of reverse logistics practices in Apparel E commerce market in Colombo District, Sri Lanka

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Abstract

This study primarily focuses on analyzing a set of pre-determined factors to see how these factors influence the customer satisfaction in reverse logistics within the apparel e commerce sector in Colombo District, Sri Lanka. With the significant growth in the E commerce sector, efficient reverse logistics processors are crucial for maintain customer satisfaction. This study employs quantitative methodology, collecting primary data from over 200 respondents in Colombo District. The pre-determined factors are backed by a thorough literature review and these factors include Service Responsiveness, Technology Integration, Quality Control and Company return policies. The validity of the study is supported by a Cronbach's value of over 0.7 and an R squared value of 0.764. Demographic Analysis shows a predominant age group of 18-24, a balanced gender distribution and a significance in full-time employed respondents. It further showed that Customer Service Responsiveness to be the most influential factor through multiple tests. All in all, the study highlights the importance of being responsive, having tight quality control and being flexible with the customers to be main policies that will foster customer loyalty and customer satisfaction. The study also underscores the need for further research to explore these dynamics in different regions and industries to improve the overall optimization of Reverse Logistics.

Keywords: Reverse Logistics, Customer Satisfaction, Optimization, Apparel, E Commerce

A study on Elements Influencing Vessel Turnaround time with Special Reference to the Colombo International Container Terminal

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Abstract

Vessel Turnaround Time plays a vital role in the success of a terminal business and is a key figure when measuring terminal performance. With globalization, containerization has influenced world trade, putting container terminals under constant pressure. In a fast-growing industry being the only deep-water terminal in the region, Colombo Internation Container Terminal (CICT) competes with not just terminals but transshipment hubs such as Singapore, and Tanjung Pelepas. Thus, to remain competitive in such a fast-growing industry, CICT must satisfy its customers and Vessel Turnaround Time (VTT) remains a highly valued factor by shipping lines. Thus, a study has analyzed the elements that influence Vessel Turnaround Time (VTT) at CICT. And elements are extracted from comprehensive literature. Data were collected through an online questionnaire from the Operational Staff of Colombo International Container Terminal and 210 respondents were considered for the analysis. To achieve the primary objective of the study, a regression model was created and furthermore, correlation analysis and descriptive analysis have been used. Findings reveal that the most influenceable elements on the Vessel Turnaround Time (VTT) are Operational Delays, Safety and Regulations, and Technology and Yard Capabilities. Also, Resource Deployment and External Influences don't influence Vessel Turnaround time individually but do influence it jointly.

Keywords: Vessel Turnaround Time, Productivity, Efficiency, Throughput, Customer Satisfaction

A Study of Service Quality on Guest Behavior

(Special Reference to Registered Restaurants in Colombo District)

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Abstract

By enhancing customer satisfaction and encouraging repeat visits, restaurants can improve their profit margins and expand their market share within Sri Lanka's tourism and hospitality sector. The primary aim of this research is to investigate and evaluate the impact of service quality dimensions on guest behavior in registered restaurants within the Colombo district. To achieve this, both primary and secondary data were collected. Primary data was gathered to fill existing research gaps, while secondary data was sourced from previous studies and research articles. The study employed a cross-sectional research design and a quantitative research approach, and the researcher selected the deductive research method as well. The research identified five key service quality dimensions as independent variables namely, Tangibility, Reliability, Responsiveness, Assurance, and Empathy, with guest behavior serving as the dependent variable. The study population consisted of over 1,500 restaurant guests, from which 100 samples were randomly selected. Data was collected using closed-ended questionnaires distributed to selected restaurants in the Colombo district between March and May 2024. The researcher used SPSS version 21 for data analysis, employing descriptive analysis, correlation analysis, and ANOVA. The study explored the influence of service quality dimensions on guests' behavioral intentions. The results indicate that all five independent variables—Tangibility, Reliability, Responsiveness, Assurance, and Empathy—positively and significantly impact guest behavior in Colombo's restaurants. Among these, Tangibility and Reliability were found to have the most significant effect on guest behavior. These findings confirm a clear relationship between service quality dimensions and guest behavioral intentions. The results are expected to help restaurant owners and managers in the Colombo district address gaps between customers' perceived service quality and the actual quality of service provided.

Keywords: Service Quality, Guest Behavior, Restaurant

Conceptualize and Measure the Effect of Employee Job Satisfaction and Motivation on Profitability of Banks in New Zealand

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Abstract

Employee job satisfaction and motivation are critical factors that influence organizational success, particularly in the banking sector. Many local and foreign literature is available on the area of employee satisfaction, motivation, and profitability. Researchers have conducted many studies on this study area covering several industries. However, the impact of employee motivation and job satisfaction on the profitability of New Zealand banks for the period of 2011 to 2020 is not precisely and adequately answered. Therefore, this study focuses on addressing the existing literature gap in this study area. This study proposes an operational questionnaire, to follow a quantitative approach. A total of 500 questionnaires distributed through email, among randomly selected bankers in six selected banks in New Zealand with a view of collecting 372 duly completed responses. The correlation among the variables tested using frequency analysis and simple linear regression. The outcome of this study suggests that motivation and employee satisfaction have a positive effect on the profitability of banks. Further, the results conclude that there is a co-relation between the constructs, employee motivation with remuneration, job achievement, job security and job environment while employee satisfaction has a co-relation with job autonomy, job workload, job performance and job status. Moreover, the research findings indicate that 'remuneration' and job performance had a positive effect on the financial performance of a firm which was denoted through the profitability indices. This research was proposed during an era of global calamity. This research focuses on practical outcomes of employee motivation and employee job satisfaction on the profitability of a service organization which comes under management and HRM literature. The outcome is extremely vital for institutions to maintain the required profitability while taking care of their employees well.

Keywords: Job Motivation, job Achievements, Job Security, Bank Profitability

Examining the Potential of Geographical Indications to Promote Tourism Industry in Sri Lanka

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Abstract

The tourism industry plays a vital role in this global village fostering economic growth while paving the pathway to identify value of the environmental sources and the heritage. Under the Intellectual Property umbrella, Geographical Indication has the potential to stimulate tourism industry in Sri Lanka. Geographical Indications can be considered as products which identified under the originated place which possessed unique qualities due to the originated location. Colombian Coffee, Indian Basmati Rice, Portugal Port Wine, Greece Feta Cheese, France Champagne (Sparkling wine), Mexican Tequila(spirit) can be identified as frontline indications recognized at the universal level. When it comes to Sri Lanka, this is a small island which enriched with the natural sources and pleasant weather with the human resource. Sri Lankan geographical indication consist of Ceylon tea, Ceylon cinnamon, Blue Sapphire, Moratuwa furniture, Ruhunu Curd and others. Geographical Indications are powerful market tools and traditional brands which can be used to promote tourism industry. Nevertheless, Geographical Indications are being misrepresented at the international market since the ineffective implementation mechanisms and still Sri Lanka is not getting the best use of Geographical Indication due to the poor legal mechanisms. This conundrum should be examined to provide necessary amendments to strengthen the legal system and promote the tourism industry with the unique and authentic products in Sri Lanka to achieve the development goals in Sri Lanka. Qualitative methodology will be employed to achieve the objectives of this research. This study delves with doctrinal and comparative analysis methods and will use primary and secondary legal sources to conduct the research.

Keywords: Geographical Indication, Tourism, Development Goals, Sri Lanka

Study on Tourist Travel Motivation of Wellness Tourism in Sri Lanka (Special Reference to Southern Province in Sri Lanka)

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Abstract

The flourishing wellness tourism trend in Sri Lanka is set against the backdrop of the country's rich cultural legacy, varied landscapes, and age-old healing techniques. A major factor in the appeal of wellness tourism is the tranquil beaches that adorn Sri Lanka's coastline. Nestled along these lovely shores are numerous wellness centers that provide guests with a chance to mix restorative exercises with relaxation. This study aims to evaluate the relationship between travel motivations and wellness tourism in Sri Lanka. For stakeholders in Sri Lanka's tourism industry to effectively market their offerings and give visitors meaningful experiences, they must have a thorough awareness of the numerous elements impacting tourist travel motivation in wellness tourism such as relaxation and escape, Self-Development, Novelty, Attraction and Activities, Safety and Security. This study takes into account every visitor who came to Sri Lanka in the previous three months. By taking into account the sample, the researcher hopes to choose a sample using the nonprobability sampling approach; the sample size will be determined using the Morgan Table and the convenience method. 373 number of samples will be considered out of 9,816 total number of tourists visited for wellness tourism in Sri Lanka in 2023. The process of gathering and evaluating numerical data is referred to as the quantitative approach and physical questionnaires will be used to get primary data and utilize by 5-point Likert Scale. In this research will use SPSS software to calculate Pearson Correlation Analysis and Multiple Linear Regression. These findings will important implications for destination marketers, policymakers and entrepreneurs in Sri Lanka and other healthcare settings, and provide guidelines for the development of targeted strategies and supply chains to attract and manage welfare travelers effectively.

Keywords: Wellness Tourism, Travel Motivation, Ayurveda, Holistic Well – Being, Yoga & Meditation, Government Intention

Integrating Innovation for Sustainable Development: Evaluating the Impact of Green Technologies on Corporate Sustainability Practices

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Abstract

This study examines how green technologies influence corporate sustainability, emphasizing their role in fostering sustainable business practices and advancing environmental, social, and economic performance. Green technologies, defined as environmentally friendly innovations aimed at reducing carbon emissions and improving resource efficiency, are essential for addressing climate change and promoting sustainable development. However, there is a notable research gap in quantifying their impact on corporate sustainability. To bridge this gap, a mixed-methods approach was used, including a quantitative survey of 200 corporations from various industries and qualitative interviews with 30 stakeholders, such as sustainability managers and policymakers. Preliminary findings suggest that green technologies positively impact corporate sustainability, leading to reduced greenhouse gas emissions, lower energy usage, and improved waste management practices. Companies adopting these technologies also tend to engage more in community initiatives and encourage sustainable practices within their workforce. Challenges remain, including high implementation costs, technical expertise shortages, and limited access to financing. Recommendations for future research include adopting longitudinal studies, integrating diverse data sources, and using advanced analytics. This research contributes to sustainable development and innovation diffusion theory, offering valuable insights for corporations, policymakers, and researchers seeking to enhance corporate sustainability through green technologies.

Keywords: Green Technologies, Corporate Sustainability, Sustainable Development

Study on Motivation Factors Affecting Female Solo Travelers to Sri Lanka

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Abstract

This research investigates the Motivation Factors affecting Female Solo Travelers to Sri Lanka, with the aim of understanding their preferences, aspirations, and concerns within the tourism industry. As solo travel continues to gain popularity, particularly among women, it becomes essential to investigate what drives this trend in the Sri Lankan context. To address this, the study draws on established travel motivation theories and gathers data from 164 respondents through a structured questionnaire, employing a convenient sampling method. The data was analyzed using SPSS software, applying demographic analysis, descriptive analysis, correlation analysis, and regression analysis. These methods helped in identifying the specific factors that influence female solo travelers' decisions to choose Sri Lanka as their destination. The findings highlight Sri Lanka's growing reputation as a top choice for solo female travelers, as recognized by global platforms like Timeout.com. The primary objective of the research was to identify and analyze the factors driving female solo travelers, evaluate their impact, and examine how these factors relate to overall travel motivation. Additionally, the study provides policy recommendations aimed at enhancing the development of solo female travel in Sri Lanka. By understanding the motivations of this specific traveler segment, the tourism sector can be improved, creating a more inclusive and supportive environment for female solo travelers in Sri Lanka.

Keywords: Female Solo Travel, Sri Lanka Tourism, Travel Motivation, Tourism Sector, Travel Trends

Impact of Destination's Attributes on Tourists Satisfaction at Galle District in Sri Lanka

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Abstract

This research is conducted to investigate the effect of destination attributes on tourists' satisfaction with Galle district of Sri Lanka. The researcher has used 5A concepts for that. Also, it is special that this kind of research is being done during a period when the Covid-19 virus, which had a severe impact on the tourism industry around the world, had been ended but yet its repercussions yet exist in different levels. The reason for choosing such a topic is that it is the 3rd largest foreign exchange generating industry in Sri Lanka and more than 488,000 people across the country are engaged in this industry. In this research study, it examines how destination attributes should be act upon developing tourist satisfaction and their impact. This study aims to evaluate the Impact of destination attributes on Tourist Satisfaction of at Galle district Sri Lanka. To propel the research 5 independent variables: Attractions, Accessibility, and Accommodation, Amenities and Activities and 1 dependent variable as Tourist Satisfaction. Although 384 responses were required for this, within the time frame the researcher received, 239 responses were collected from 29 countries. Also, these teeth were collected from Galle Fort Wall, Kosgoda Beach, Hikkaduwa Beach and Kanneliya Rain Forest. The questionnaire has been prepared according to the 5-point Likert Scale. And upon collecting data SPSS software has been utilized to conduct analysis tests such as correlation, regression, regression analysis etc. The outcome of the research proves that all the independent variables have a significant influence on the dependent variable. Various parties such as academics, tourism related professionals, and many other people who are interested in Tourism can expand their horizons in respective areas.

Keywords: Tourism, Tourist Satisfaction, Destination Attributes

Study on Factors Affecting Tourist's Revisit Intention Towards Sri Lanka; Special Reference to Kandy Destination

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Abstract

With a focus on the destination of Kandy specifically, this study explores the variables influencing foreign visitors' desires to return to Sri Lanka. 384 foreign visitors to the destination of Kandy, Sri Lanka, were chosen as the study population's sample size. The study's objectives were to: identify the factors that influence foreign tourists' development of revisit intentions to Sri Lanka; evaluate the effect of factors that have been identified on tourists' intentions to revisit; investigate the relationship between factors that have been identified and tourists' intentions to revisit Sri Lanka; and formulate policy recommendations targeted at enhancing tourists' intentions to revisit as a travel destination. The research difficulties focused on the lack of a thorough knowledge of the elements influencing travelers' plans to return to Sri Lanka, especially with reference to Kandy. Even though Sri Lanka is becoming a more well-liked travel destination, empirical data about the variables influencing revisit intention is not available, particularly when it comes to the destination of Kandy. Convenience sampling was used in the study, and data analytic methods used included regression analysis using SPSS, descriptive statistics, and Pearson correlation. The outcomes demonstrate that travelers' intentions to return to Sri Lanka are highly influenced by the destination's image, safety and security, and visitor satisfaction. It was discovered that revisit intentions were not significantly impacted by perceived value or service quality. To improve destination competitiveness and encourage sustainable tourist growth in the destination of Kandy, Sri Lanka, tourism stakeholders can benefit greatly from the insights this research offers. The study found that while perceived value and service quality had no significant effect ($p>0.05$), foreign tourists' intentions to return to Kandy are significantly influenced by destination image, safety and security, and visitor satisfaction.

Keywords: Revisit Intention, Destination Image, Safety & Security, Visitor Satisfaction

Consumer Affective Skills and Brand Image of Anchor Milk Powder Sri Lanka (Conceptual Abstract)

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Abstract

This research will investigate the impact of consumer affective skills—interest, loyalty, and emotion—on the brand image of Anchor milk powder in the Kandy district of Sri Lanka. The dairy industry remains a critical component of Sri Lanka's economy, particularly in terms of rural livelihoods and food security. Within this context, Anchor continues to be a dominant brand, enjoying strong consumer loyalty. However, no prior research has explored how consumer loyalty and other affective factors influence Anchor's brand perception in the Kandy region, leading to a knowledge gap. This study will address this gap by examining how various consumer affective skills shape Anchor's brand image. Specifically, it will explore how interest, loyalty, and emotions as three components of consumer affective skills enable consumers to form a brand image of Anchor within Kandy's unique socio-economic environment. The hypotheses to be tested will propose that each consumer affective skill has a positively significant relationship with the brand image. To validate these hypotheses, questionnaires will be distributed to collect data, with 385 adults selected via convenience sampling from supermarkets and shops in Kandy. Participants will complete a structured questionnaire scored on a 5-point scale. Descriptive statistics, along with advanced statistical methods such as correlation and regression analysis, will be employed using SPSS to analyze the data and determine the strength and nature of these relationships. The findings will provide valuable insights for marketers seeking to enhance brand loyalty and brand image within the dairy category, particularly by aligning marketing strategies with consumer emotions. This research will contribute significantly not only to the academic discourse on consumer-brand relationships but also to practical marketing strategies aimed at fostering stronger consumer engagement with dairy brands in Sri Lanka.

Keywords: Brand Image, Consumer Affective Skills, Consumer Interest, Consumer Loyalty, Consumer Emotions

Impact of Employee 21st Century Skills on the Marketing Services of Finance Companies in Sri Lanka (Conceptual Abstract)

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Abstract

The study will focus on four key independent variables: Artificial Intelligence (AI), Leadership, Collaboration, and Analytical Thinking, which represent essential competencies for fostering innovation and maintaining competitiveness in today's workforce. Marketing performance, the dependent variable, will serve as a measure of how effectively these skills enhance the success of marketing services in financial institutions. Adopting a quantitative research approach, the study will aim to provide measurable insights into the relationship between these employee skills and marketing performance. Given the extensive workforce in marketing roles within financial institutions, the population will be considered too large to enumerate. A sample of 384 marketing employees will be selected using convenience sampling, ensuring timely and practical data collection while acknowledging limitations in generalizability. The Data will be collected through a structured questionnaire designed to assess employee proficiency in AI, Leadership, Collaboration, and Analytical Thinking. The questionnaire will include statements rated on a five-point Likert scale, enabling participants to evaluate the relevance and impact of these skills on marketing performance. Distribution of the questionnaire will target employees from diverse financial institutions across Sri Lanka. The findings are expected to provide valuable insights into how well-developed 21st century skills among employees enhance marketing performance in finance companies. The study will contribute for aligning employee training and development initiatives with the evolving demands of the industry, emphasizing the integration of AI, Leadership, Collaboration, and Analytical Thinking within marketing teams to boost performance. These insights will contribute to the strategic development of human resources and marketing practices in Sri Lanka's financial sector.

Keywords: AI, Collaboration, Analytical Thinking, Leadership

The Influence of Occupational Stress on Job Satisfaction: A Quantitative Analysis of Management-Level Employees in Sri Lanka's Construction Sector (Conceptual Abstract)

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Abstract

Construction industry in Sri Lanka is a sector that plays a significant role in the national economy and contributes substantially to GDP. Occupational stress, often characterized by negative emotional states such as anxiety and frustration, is a pervasive issue in this industry, with adverse impacts on health and job performance. Job satisfaction (JS) remains a critical factor in sustaining employee commitment and productivity, influencing the work environment and relationships with colleagues. The primary objective will be to identify the relationship between occupational stress and job satisfaction among managerial-level employees in the construction sector. Secondary objectives will include determining the most influential factors through which occupational stress affects job satisfaction at the managerial level. This quantitative research design's data will be collected from 385 managerial employees through structured questionnaires using convenience sampling to ensure practical and accessible data collection. The analysis will involve correlation and regression techniques, conducted using SPSS software, to examine the strength and nature of the relationships between variables. The study will be grounded in established theoretical frameworks, such as the "Person-Environment Fit Theory," "The Cognitive Relational Approach," and "Maslow's Hierarchy of Needs." These will provide a robust basis for understanding the interplay between stress and satisfaction. The findings will offer valuable insights for managerial employees and stakeholders in the construction industry, providing actionable recommendations to mitigate occupational stress and enhance job satisfaction, thereby improving overall productivity and employee well-being.

Keywords: Job Insecurity, Promotional Condition, Age Discrimination, Co-worker Corporation

Investigating the Effect of Employee Self-Efficacy on Workplace Creativity in the Sri Lankan Insurance Sector: A Quantitative Analysis (Conceptual Abstract)

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Abstract

Employee creativity is recognized as the most crucial skill to enhance the insurance organizations' competitiveness and market survival. This research will investigate the impact of employee self-efficacy on employee creativity within the insurance sector in Sri Lanka. The study will draw upon socio-cognitive theory and empirical findings to explore key dimensions of self-efficacy, including creative training, self-esteem, and emotional intelligence, as determinants of employee creativity. This research will adopt a positivist philosophy, focusing on existing knowledge about self-efficacy and its influence on creativity, and will employ a deductive research approach and a survey research strategy. Quantitative data will be collected using structured questionnaires administered to a sample of 384 insurance personnel, selected using a convenience sampling technique. The analysis will be conducted using the Statistical Package for the Social Sciences (SPSS), employing both descriptive and inferential statistical techniques. Correlation analysis will identify relationships between self-efficacy variables—creative training, self-esteem, and emotional intelligence—and employee creativity. Linear regression analysis will measure the specific impact of each independent variable on creativity as the dependent variable. The findings of this research are expected to offer valuable insights into the role of self-efficacy in fostering employee creativity in the insurance sector. These results will provide practical and managerial implications, highlighting strategies to enhance creativity among insurance employees through targeted self-efficacy improvement initiatives.

Keywords: Creativity, Emotional Intelligence, Self-Efficacy, Self-Esteem, Insurance Industry

The Best Delivery Term to Import Fabrics from India to Sri Lanka by Sea with Special Reference to Visakhapatnam Port in India

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Abstract

The recent revision of Incoterms 2020 includes eleven delivery terms for international trade, yet no single Incoterm has been identified as the most cost-effective and time-efficient for the importation of fabrics from India to Sri Lanka by sea. This study aims to fill this gap by determining the optimal Incoterm and the criteria for selection. Utilizing both quantitative and qualitative data, this research identifies CIF as the optimal delivery term. The study outlines seven critical elements in choosing an Incoterm: the cost and time for loading fabrics at the exporter's dispatch, cost and time for inland transport in India, time and cost for export customs clearance in India, time and cost for loading fabrics onto the vessel, time and cost for terminal operations at the Visakhapatnam port, time and cost for maritime transport, and cost of land and marine insurance. A non-parametric test was employed to validate these findings. This comprehensive analysis provides a valuable framework for importers in selecting the most efficient and economical Incoterm.

Keywords: CIF, Incoterms, Non- Parametric, Qualitative, Quantitative, Visakhapatnam Port

Examining the Relationship between Cognitive Skills and Internet Banking Adoption among Sri Lankan Bank Customers: A Quantitative Study (Conceptual Abstract)

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Abstract

Rise of Internet banking has changed how people think about banking all around the world. This research will examine how cognitive skills influence the adoption and usage of Internet banking in Sri Lanka, a critical aspect of the nation's evolving digital financial landscape. Cognitive skills—including digital literacy, perceived ease of use, perceived usefulness, problem-solving abilities, memory and attention, numerical skills, trust, and security awareness—will be studied as pivotal factors in determining the effective use and benefits of these services. This study will aim to assess how these skills affect customer adoption and satisfaction with Internet banking services provided by Sri Lankan banks. Data will be collected through a mixed-method approach, including surveys and detailed interviews with a sample of 350 Internet banking users from diverse backgrounds. Convenience sampling will be employed to ensure representative data collection from various banks. Data analysis will involve correlation and regression techniques using SPSS software to explore the relationships between cognitive skills and Internet banking adoption. This research will be grounded in established theoretical frameworks, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). These frameworks will provide a solid foundation for understanding the psychological and technological drivers of Internet banking usage. The findings may offer valuable insights for both researchers and practitioners. For researchers, the study will aim to advance theories of technology adoption by integrating psychological perspectives, shedding light on the cognitive factors that drive online banking behavior. For practitioners, the results will provide actionable recommendations to enhance the design and promotion of Internet banking services, ultimately shaping the future of digital banking in Sri Lanka by emphasizing the role of cognitive skills in effective utilization.

Keywords: Internet Banking, Cognitive Skills, Customer Usage, Banking Industry

08

Overseas Abstracts

The Role of Artificial Intelligence in Personalized Learning: Enhancing Student Engagement and Outcomes

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Abstract

Artificial Intelligence (AI) is transforming personalized learning by adapting educational experiences to meet the diverse needs of individual students. This study hypothesizes that AI-driven personalized learning approaches lead to increased student engagement and improved academic outcomes compared to traditional methods. By customizing content, pacing, and instructional strategies, AI enhances both engagement and achievement by addressing the unique learning styles, abilities, and needs of student's elements often missed in standardized educational approaches. Traditional methods, which may overlook individual differences, risk disengagement and inconsistent performance. In response, AI-driven platforms use data-driven insights to create individualized learning pathways, thus promoting engagement and academic success. AI-powered systems, such as adaptive learning platforms and intelligent tutoring systems, employ algorithms to analyse students' performance, behaviours, and learning preferences in real time. These systems dynamically adjust educational content to match each student's needs, delivering appropriate levels of challenge, support, or enrichment. For students who struggle, AI systems offer targeted interventions, including additional practice materials and alternative learning methods, allowing them to overcome challenges before experiencing setbacks. High-performing students benefit from advanced tasks and deeper explorations of content, which maintains their engagement and prevents boredom. This study employs a mixed-methods approach, combining quantitative data collection and qualitative analysis to evaluate AI's impact on student engagement and learning outcomes. The experimental setup includes a control group taught through traditional methods and an experimental group using AI-driven personalized platforms. Student performance scores, engagement levels, and feedback from interviews and surveys are analysed to assess AI's effectiveness in meeting diverse learning needs. One of AI's most significant benefits in personalized learning is its potential to boost student motivation. By tailoring learning experiences to individual interests and abilities, AI keeps students invested in their studies. Furthermore, AI-driven platforms provide immediate feedback, allowing students to understand their mistakes and make improvements in real time, which enhances retention compared to delayed feedback in traditional assessment methods. Preliminary findings indicate that AI-driven platforms significantly enhance student engagement and yield measurable improvements in academic performance compared to traditional methods. This study concludes by discussing these outcomes and supporting the hypothesis that AI improves both student engagement and academic success in personalized learning contexts. Although AI offers substantial advantages, challenges remain regarding data privacy, algorithmic bias, and teacher training. Addressing these is essential to ensure ethical and effective AI integration in education. AI-driven platforms present vast opportunities to increase engagement and academic performance through tailored learning, suggesting a promising future for personalized, accessible education as AI technology advances.

Keywords: AI, Personal Learning, Education

The Twilight of CSR (Corporate Social Responsibility) in tourism and hospitality industries: the case of Argentina, South America

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Abstract

The present ecological catastrophe is disrupting both the tourism sector and global trade. This issue has undoubtedly held a major place in numerous academic circles and conferences. The outlook for tourism appears bleak. The aim of this study is to investigate the decline and evolving role of Corporate Social Responsibility (CSR) practices in the tourism and hospitality industries in Argentina, South America, by examining the factors influencing this trend, the impact on stakeholders, and the implications for sustainable development within the region. The character of the tourism sector, which is controlled by an economic-centered worldview, has been called into question by certain individuals, while others have raised concerns about the urgency of adopting new sustainable forms of consumption and practices that are applied to the service industry. Recently, shared economy as well as the figure of corporate social responsibility (CSR) have had played a leading role in the configuration of a new green tourism. This chapter focuses on some Argentinian study cases based on the application of CSR programs in the fields of tourism and hospitality. The research reveals a significant decline in CSR initiatives in Argentina's tourism and hospitality industries, driven by economic challenges, weak regulations, and shifting priorities toward short-term gains. This decline has led to reduced community support and environmental degradation. However, opportunities exist to revitalize CSR by leveraging Argentina's natural and cultural assets, targeting eco-conscious tourists, and fostering collaboration among stakeholders. Strengthening regulations and promoting sustainability are critical to restoring Argentina's reputation as a sustainable tourism destination.

Keywords: Argentina Tourism, Ecological Crisis, Social Responsibility, CSR

Value Chains and Collaborations in Sustainable Tourism

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Abstract

This study explores sustainable tourism through the frameworks of value chains and collaborative partnerships, both of which are critical for reducing tourism's environmental, social, and economic impacts. Sustainable tourism is defined by its commitment to meet current needs without compromising future generations' ability to enjoy similar benefits. It emphasizes minimal environmental footprints, social responsibility, and a focus on local community well-being and cultural preservation. From sustainable sourcing and eco-friendly design to ethical marketing and green certifications, the tourism value chain covers all aspects of tourism. All stages strive to improve tourism while assuring quality, sustainability, and fair economic distribution for local populations. Sustainable value chains improve consumer experiences, market distinctiveness, and host community economies by incorporating eco-friendly practices at every stage. Collaboration among various stakeholders, governments, private businesses, non-governmental organizations, and local communities—is also essential to sustainable tourism. Such partnerships facilitate knowledge-sharing, resource-pooling, and alignment of goals to promote responsible practices. Public-private partnerships (PPPs), community engagement, and cross-industry collaborations are highlighted as effective models that benefit both economic development and conservation. For instance, partnerships in Costa Rica support national park conservation, while Iceland's collaborative approach ensures sustainable tourism that preserves natural landscapes. The study also references the Tourism Area Life Cycle (TALC) model by Richard Butler, which describes a destination's stages of development and underscores the role of sustainability in long-term viability. As destinations integrate sustainable practices, they can positively influence their development, prolonging the attraction and resilience of their tourism offerings. The study introduces emerging trends such as regenerative tourism, tech integration, and community-based initiatives. By aligning tourism with sustainability goals, businesses and destinations can foster tourism that supports local communities, safeguards ecosystems, and meets the rising demand for eco-friendly travel options. The findings provide practical insights for implementing sustainable practices that enrich tourism while benefiting both people and the planet.

Keywords: Sustainable tourism, Tourism Life Cycle, Sustainable value chains.

"Harnessing Technological Innovation for Sustainable Events and Festivals: Prospects, Challenges, and Best Practices"

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Abstract:

Technological innovation has enormous potential to promote a more socially and economically responsible industry. By reducing the environmental impact of various activities and festivals and increase sustainability. This paper explores the role of technology in promoting sustainable practices in event management from resource optimization to audience engagement. Key innovations include digital ticketing, waste management sensors, energy-saving lighting and real-time crowd management system to reduce material loss, power consumption and logistical inefficiencies. Digital tools such as virtual reality (VR) and hybrid event platforms, allows for remote participation, which reduces extensive travel and associated carbon emissions. However, there are also challenges in integrating these technologies. High-cost Data privacy concerns and the need for skilled employees can create obstacles especially for small events. Additionally, the environmental impact of digital infrastructure, such as server power consumption, it must be carefully considered to avoid undesirable consequences. This paper highlights best practices for overcoming obstacles in technology adoption, including partnerships with eco-focused tech providers and implementing data-driven sustainability metrics. The study concludes that meanwhile, technological solutions can greatly enhance sustainability of various activities and festivals, a balanced approach that takes into account ecological impacts and practical feasibility is essential. Developing industry-wide standards and promoting collaboration among stakeholders can further promote sustainable innovation, ensuring that various events and festivals contribute positively to environmental goals while delivering memorable experiences.

Keywords: Technological innovation, Sustainable development, Events and festivals, Environmental sustainability, social responsibility, Challenges.

"Integrating Humanities and Education for a Sustainable Future: Fostering Critical Thinking and Environmental Awareness"

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Abstract

Humanities and education towards a sustainable future can only be achieved by integrating various disciplines. Environmental consciousness and critical thinking skills will need such integration of humanities and education. This abstract outlines how the humanities, consisting of history, literature, and philosophy, provide crucial insight into human values, culture, and society. In terms of ancient civilizations and the interactions with their environment, successes and failures are learned about. The disciplines also aid in the building of skills that would critically think-think through and question assumptions, analyses evidence, and even come to judgments independently. Integrating humanities and education would mean making interdisciplinary learning experiences. For example, by analyzing historical documents, the social and economic factors that are responsible for environmental degradation can be understood by the students, which would enable them to come up with new innovative solutions for present-day environmental problems. This paper also highlights the role of arts in environmental awareness. In engaging with various kinds of arts, including visual arts, music, and performance, students may learn to empathize with nature and recognize its beauty and cultural value. This paper also suggests a variety of tools that can be used, such as experiential learning, including hands-on field trips and community service activities. Including education in humanities education enables the provision of learners with understanding, know-how and principles to produce an environmentally stable future and make them agents that become active partners for action for better, equal, and livable just future.

Keywords: Sustainability, Environmental Education, Critical Thinking, Interdisciplinary Learning, Humanities, Arts

The Use of Summarized Web Reviews in Recommendation Engines: Enhancing Personalized Recommendations

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Abstract

As online reviews continue to grow at an alarming rate, recommendation strategies face significant challenges in the user-generated content space. A solution in the context of online reviews that increases the efficiency and individuality of these systems. By breaking long reviews into short notes, the tool can easily extract important information (such as product features, user opinions, and likes) to make the information easier to understand. This approach both reduces the number of calculations and increases the impact of recommendations by highlighting important points in the customer's opinions. For example, recurring themes in this context, such as durability or affordability, can tell the engine to prioritize features that match the user's profile. In addition, incorporating sentiment analysis into content allows for further filtering of recommendations, guiding users to recommended products while avoiding products that have been plagued by complaints. The engine still has its issues. There is a risk of content being misrepresented and bias being introduced through abstraction. However, advances in natural language processing and sentiment analysis have made progress in overcoming these challenges. Finally, the analyzed content is incorporated into recommendations to enhance the user experience by providing personalized and personalized recommendations. This innovation has not only revolutionized e-commerce but has also paved the way for the future of online shopping and customer engagement.

Keywords: Sentiment Analysis, online reviews, Recommendations, E-Commerce, Personalized, Natural Language Processing

Community-Driven Conservation and Sustainable Development: The Brikkho Bondhon Initiative in Bangladesh

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Abstract

Bangladesh is among the top ten countries most affected by climate change and pollution, making environmental degradation and biodiversity loss urgent worldwide challenges. Brikkho Bondhon, a rural environment and biodiversity conservation organization, has transformed sustainable development through community-driven projects. It engages local communities to protect natural resources, restore ecological balance, and improve rural livelihoods. Brikkho Bondhon prioritizes tree planting, environmental protection, and biodiversity. The nonprofit plants fruit-bearing, medicinal, and shade-providing trees to increase forest cover and carbon sinks to combat climate change. Brikkho Bondhon's contributions to the United Nations Sustainable Development Goals (SDGs) notably SDG 1 (Poverty Alleviation), SDG 13 (Climate Action), and SDG 15 (Life on Land)—are profound. By combining grassroots activism with strategic environmental policies, the organization demonstrates a replicable model for sustainable development. The aim of this study is to analyze the Brikkho Bondhon Initiative in Bangladesh as a model for community-driven conservation and sustainable development, including its strategies, benefits, and contributions to environmental preservation, community empowerment, and SDG achievement. The major finding of the research is that the Brikkho Bondhon Initiative in Bangladesh showcases the power of community-driven conservation in achieving sustainable development. By promoting reforestation, biodiversity restoration, and sustainable livelihoods like agroforestry and eco-tourism, it has reduced environmental harm and empowered local communities. The initiative fosters social cohesion and aligns with key Sustainable Development Goals, including climate action and poverty reduction. Despite challenges like limited funding and policy support, it serves as a replicable model for balancing environmental protection with socio-economic growth.

Keywords: Brikkho Bondhon, Sustainable Development, Community-Driven Conservation

Luxury Tourism: A new Trend in Tourism Industry

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Abstract

Luxury Tourism designed to satisfy the lavish travel expectations of high-net-worth individuals. This travel segment is changing and evolving almost as fast as it's growing -– a third faster than any other travel segment, to be precise the growth rate in outbound luxury trips would have been 6.2%, which is almost one-third greater than what had been the forecast for overall tourism (4.8%) (Amadeus, 2016). Needless to say, the ongoing situation drastically changed the plans of the whole industry, including of course those of the luxury travel market. However, even before the pandemic began there were interesting shifts and new trends rising in this niche sector that are worthwhile to be discussed and reviewed. Probably the most important factors that led to the "new luxury" are the stages of maturation the market had reached in general and the switch in consumers' values from owning to experiencing and being, alongside the rearrangements in age groups that are interested and can afford it (Conrady, Ruetz and Aeberhard, 2020). The main aim of this study is to understand the concept of luxury tourism and discuss the current trends and characteristics. The basic components and concepts of today's luxury travel will be analyzed in order to understand whether and how the market changed in the past years and what the future holds for it. In order to understand the Luxury Tourism, the study will be based on some case studies in Europe such as: Greece, France. The main research questions are: What is the main concept, characteristics, and the components of luxury tourism? What are the characteristics of typical luxury travellers? How the Luxury Tourism becomes a new trend of Tourism industry?

Keywords: Luxury Tourism, Traveler, New trend, Tourism industry

An obstacle to the achievement of the millennium development goals is the issue of child labor in developing countries

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Abstract

The issue of child labor remains a significant and growing challenge, particularly in developing countries where poverty persists. This research highlights the strong correlation between child labor and poverty, emphasizing the urgent need to address this issue in the context of the Millennium Development Goals (MDGs). Key areas of focus include poverty eradication, universal education, gender equality, combating HIV/AIDS, and fostering global partnerships for development. The study underscores the importance of understanding household labor supply decisions in relation to labor markets and public interventions. Such insights are critical for designing effective programs aimed at achieving the MDGs. Research on child labor offers valuable, yet underutilized, knowledge for policymakers working on education and poverty reduction initiatives. This article explores how expanded access to education and improved welfare programs can play a pivotal role in reducing child labor. By linking these interventions to broader developmental goals, the research provides actionable insights for policymakers to combat child labor and promote sustainable development.

Keywords: Child Labour, MDGs, Poverty, Developing countries, Child Rights

Evaluation of English for Occupational Purposes (EOP): A Study of Perspectives from Students, Lecturers, and Experts in Tourism Education

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Abstract

The rapid development of the tourism industry necessitates a focus on sustainability, which relies not only on natural resources, quality products, and infrastructure but also on the level of service and the overall tourist experience. Ensuring tourist satisfaction requires effective communication, particularly through foreign language skills tailored to meet the occupational demands of tourism professionals. This study investigates the teaching of English for tourism vocational purposes by conducting a needs analysis survey with 498 students and evaluating its effectiveness through an assessment questionnaire with 20 lecturer-experts. The research highlights the critical role of foreign language education in enhancing tourism-related services and vocational training. The study incorporates a review of relevant literature, defines key concepts such as vocational education and tourism training, and outlines the research methodology. Findings derived from non-parametric statistical tests, including Chi-square, Kruskal-Wallis, and Kendall W, reveal that the current curriculum's methods and techniques are insufficient to meet students' needs. The research emphasizes that language education should focus on developing practical communication skills and abilities to align with industry demands. This study concludes by presenting actionable recommendations to improve English language teaching for tourism purposes, emphasizing the importance of integrating effective communication skills into tourism education to support industry growth and sustainability.

Keywords: Needs assessment, English for occupational purposes (EOP), Foreign Languages

Soft skills are vital for the development of well-rounded individuals

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Abstract

In today's ever-evolving world, sustaining success has become increasingly challenging due to rapid changes in the global economy and geopolitical landscape. This dynamic environment demands a shift from reliance solely on subject knowledge to an integrated approach that combines technical expertise with essential soft skills. Professionals now require a blend of core competencies and interpersonal abilities to navigate complex challenges effectively. The research underscores the critical role of soft skills in creating well-rounded individuals, vital for both personal and professional success. It highlights that while organizations and economies strive to develop world-class talent, achieving this requires a balanced focus on technical knowledge and softer attributes, such as communication, adaptability, and emotional intelligence. Historical evidence from successful nations and companies reveals that their achievements stem from this holistic approach to workforce development. As organizations face an abundance of talent and opportunities, the need for a comprehensive approach to nurturing individuals has never been more pressing. This study explores the significance of integrating soft skills into professional training, emphasizing their role in preparing individuals to tackle the challenges of an ever-changing world and fostering sustainable success.

Keywords: Soft skills, Professional life, Stakeholders



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