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**9th INTERNATIONAL CONFERENCE ON
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**HARNESSING AI
IN INDUSTRY** **5.0**

TRANSFORMING SOCIETY

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¹British College of Applied Studies, Sri Lanka.

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Founded in 1999, the British College of Applied Studies, popularly known as BCAS Campus, has emerged as a top ranked institution for higher education and vocational education in Sri Lanka. With robust UK collaborations, it stands out in the private sector higher education with 20,000+ students and alumni up to date. BCAS has been at the forefront of addressing evolving local and global educational needs, aligning its programs with contemporary trends and demands.

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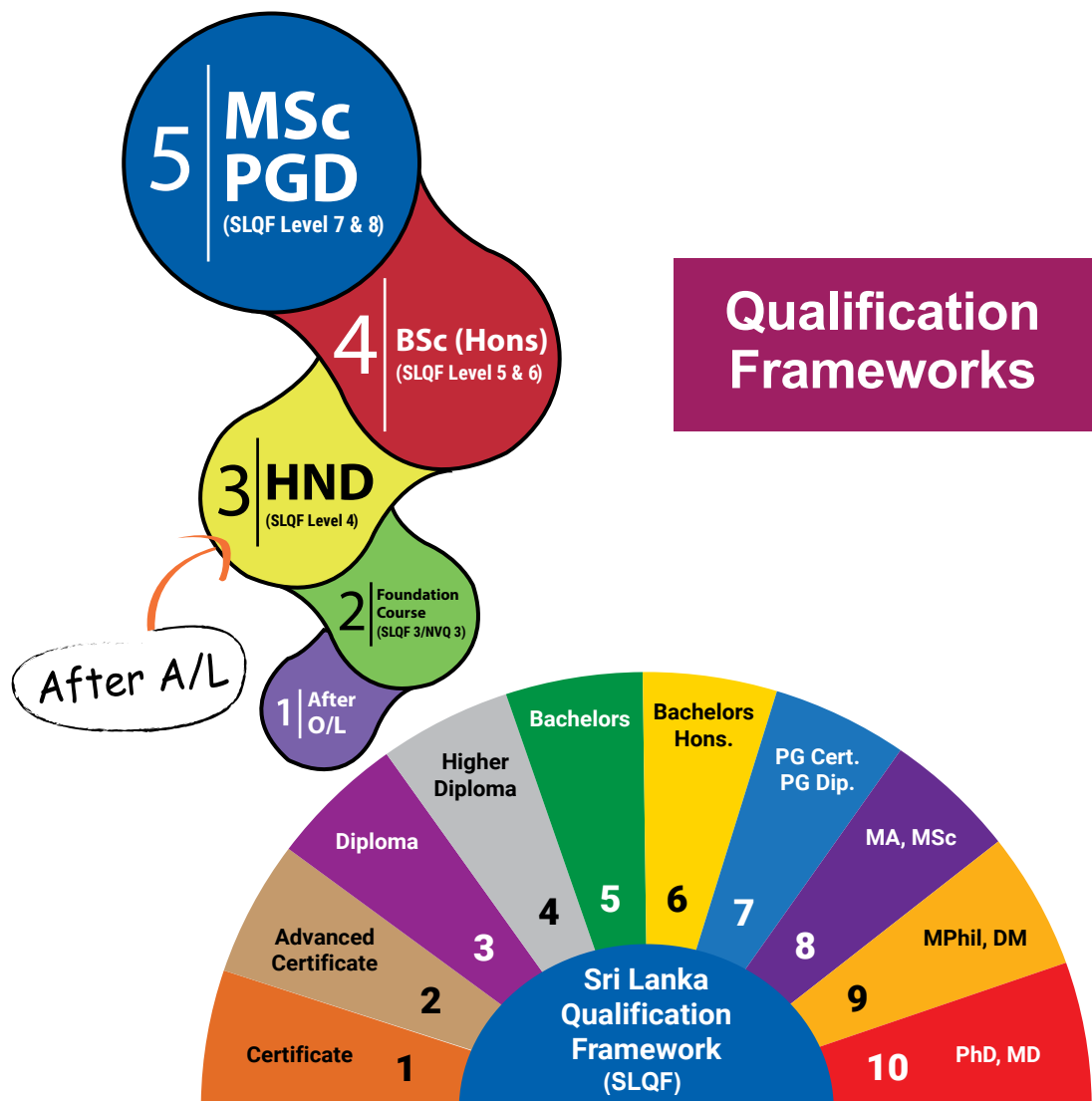


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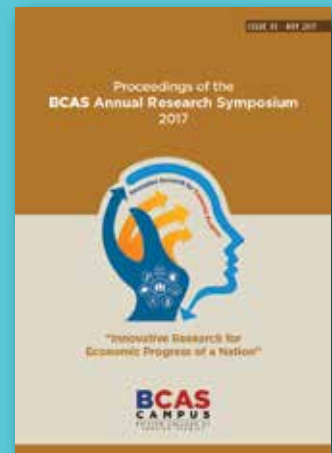




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EDITORIAL PREFACE

It is a privileged honor to present the proceedings of the 9th International Conference on Multidisciplinary Research, ICMR 2024, a pioneering platform built around the transformative theme "Harnessing AI and Industry 5.0: Transforming Society." This year's conference brings into sharp focus the profound impact of technological evolution in which the integration of artificial intelligence with Industry 5.0 is going to redefine innovation, reshape global industries, and drive the transformation of society.

This conference represents a platform that stands at a juncture of unprecedented change where thought leaders, academia, industry professionals, and policymakers come together to impart knowledge and share views on shaping the future by human-centered sustainable technologies. Research contributed to this volume stands witness to commitment, imagination, and thoroughness on the part of contributors whose work embraced the most imperative and pioneering topics for these times.

The manuscripts included in this book underwent an extensive peer-review process, ensuring academic excellence with real-world applicability. This achievement is but the result of collaborative effort on the part of our reviewers, editorial team, and contributors. Let me extend my deepest gratitude to the organizing committee and BCAS Campus for their immense support in making this event a resounding success.

I am fully confident that this proceedings book will act as a perennial source for new inspiration and collaboration by the researcher in pursuit of reaping the full benefits from AI and Industry 5.0 toward societal transformation. Let us together dream and continue in embracing both the technologies to create a future built on the three pillars of innovation, inclusiveness, and sustainability.

Warm regards,

M.A.Shashikala M.Kularatne
Editor-in-chief



Message from **The Conference Chair**

Prof. Ruvan Abeysekara,
Vice Chancellor
BCAS Campus

It is my privilege to extend a warm welcome to all of you attending the 9th International Conference on Multidisciplinary Research (iCMR 2024), hosted by BCAS Campus. As Vice Chancellor and the chair of this prestigious conference, I am delighted to witness the gathering of brilliant minds and innovative ideas under the theme "Harnessing AI in Industry 5.0: Transforming Society."

In this era, as technological advancements continue to reshape our world, the intersection of multidisciplinary research and cutting-edge innovations remains central to addressing global challenges and fostering societal well-being. iCMR 2024 provides an invaluable platform for researchers, scholars, and practitioners to explore the transformative potential of these advancements in promoting progress and prosperity across diverse domains.

The proceedings of this year's conference showcase a remarkable array of research contributions, each enriching the collective understanding of how emerging technologies can enhance the quality of life for individuals and communities worldwide. I commend the dedication, creativity, and scholarly rigor of every contributor, as your efforts are instrumental in shaping the future trajectory of multidisciplinary studies.

I also take this opportunity to express my deepest gratitude to the organizing committee, keynote speakers, and sponsors. Your unwavering support and commitment have been the cornerstone of this conference's success, creating an intellectually stimulating environment that fosters collaboration and knowledge-sharing.

As we delve into the theme "Harnessing AI in Industry 5.0: Transforming Society," I encourage all participants to actively engage in thought-provoking discussions, share your insights, and forge lasting connections that transcend the boundaries of this event. Let the exchanges and collaborations initiated at iCMR 2024 inspire innovative solutions that positively impact the society.

Wishing you a fruitful and inspiring experience at the 9th International Conference on Multidisciplinary Research (iCMR 2024).

Prof. Ruvan Abeysekara
Chairperson, iCMR 2024



Message from **The Conference Vice Chair**

Dr. Udyia Rajapakse,
Coordinator cum lecturer,
School of Health and Sciences
BCAS Campus

The British College of Applied Studies proudly presents the proceedings of the 9th International Conference on Multidisciplinary Research (iCMR 2024), a comprehensive compilation that captures the intellectual diversity and scholarly rigor of contemporary academic investigation. Since its inception in 2015, iCMR has established itself as a premier platform for scholars and industry experts to exchange knowledge and ideas.

This year's conference, themed "Harnessing AI in Industry 5.0: Transforming Society," delved into the transformative potential of Artificial Intelligence across various domains. By bringing together researchers, industry leaders, and policymakers, the conference fostered interdisciplinary discussions on the latest AI innovations, their industrial applications, and the ethical considerations associated with their deployment.

The interdisciplinary nature of these proceedings reflects the complex, interconnected world we inhabit. Researchers from Biomedical & Health Sciences, Information Technologies, Legal Studies, Finance, Business & Management, Engineering, Quantity Surveying, Hospitality & Facility Management, and Social Sciences have converged to share their most recent findings. Each contribution represents a carefully crafted exploration of contemporary challenges and potential solutions.

We extend our sincere gratitude to all participants, presenters, and organizers for their invaluable contributions to the success of iCMR 2024. We look forward to the continued growth and impact of this conference in the years to come.

Dr. Udyia Rajapakse

Vise Chairperson, iCMR2024



Message from **Conference Secretary**

Ms. Ama Kulathilake,
Head - Department of Computer Network
School of Computing
BCAS Campus

Dear Delegates, Researchers, and Esteemed Guests,

On behalf of the organizing committee, it is my privilege to welcome you to the BCAS International Conference on Multidisciplinary Research (ICMR) 2024. This year, we gather under the transformative theme, "Harnessing AI in Industry 5.0: Transforming Society," to explore the intersection of technology, humanity, and innovation.

The BCAS ICMR has always been a platform for fostering academic collaboration and knowledge sharing. In 2024, we are proud to take this vision further by focusing on how artificial intelligence can catalyze the next industrial revolution while addressing societal and environmental challenges. The diverse contributions presented at this conference are a testament to the innovative spirit and dedication of researchers from around the globe.

I extend my deepest gratitude to our keynote speakers, authors, reviewers, session chairs, and attendees who have made this event possible. A special thanks to the organizing committee and volunteers for their tireless efforts in ensuring the success of BCAS ICMR 2024.

As we embark on this intellectual journey, I encourage you to engage in meaningful discussions, build lasting collaborations, and take inspiration from the wealth of ideas presented here. Let this conference serve as a catalyst for innovation and positive change in our shared pursuit of progress and sustainability.

Ama Kulathilake

Conference Secretary, iCMR 2024



Message by **The Keynote Speaker**

Dr. Ashutosh Paturkar
Director - School of Commerce &
Business Management, Skilltech
University, Nagpur.

Technology innovation is not going to slow down. The work to manage it needs to speed up. The merger of infotech and biotech threatens the core modern values of liberty and equality. Improvements in biotechnology might make it possible to translate economic inequality into biological inequality.

Industry 5.0 which has a human-centric approach that focuses on sustainability and flexibility, unlike Industry 4.0, which prioritizes automation and digitization. At the same time the transformative convergence of software and hardware, robot and smart machines working alongside people with added resilience and sustainability goals included will address to the issues of inequality.

As Industry 5.0 seeks to add human, environmental and social aspects back into the equation, organizations will have to alter their strategies radically.

Dr. Ashutosh Paturkar

Director - School of Commerce & Business Management,
Skilltech University, Nagpur.



Message by **The Keynote Speaker**

Professor Bandara Wanninayake
Dean of the Faculty of Commerce and
Management Studies, University of
Kelaniya.

It is a privilege to extend my warmest greetings to all the participants, researchers, and industry professionals gathered for BCAS ICMR 2024. This year's theme, "Harnessing AI in Industry 5.0: Transforming Society," captures the transformative power of artificial intelligence as it integrates seamlessly with human-centric values to redefine innovation, productivity, and societal well-being.

Industry 5.0 marks a paradigm shift that emphasizes collaboration between humans and machines, moving beyond automation to prioritize creativity, sustainability, and inclusivity. AI is at the heart of this transformation, driving applications such as predictive maintenance in manufacturing, where intelligent systems anticipate and prevent equipment failures, and personalized healthcare, where AI-powered solutions enhance diagnostics and tailor treatments to individual needs. These advancements are part of a rapidly expanding global AI industry, which is projected to exceed \$200 billion by 2025, underscoring its immense impact across sectors.

At the core of these advancements lies research, which drives innovation and bridges the gap between theoretical understanding and practical applications. Collaboration between academia and industry is crucial in this process, enabling the development of solutions that are both groundbreaking and impactful. BCAS ICMR 2024 serves as a vital platform for sharing knowledge, generating and refining ideas, and building strong networks between researchers and industry leaders.

This conference is more than a gathering. It is a catalyst for dialogue, discovery, and progress. It is here that new insights will emerge, partnerships will form, and the foundation for transformative advancements will be laid.

I am honored to be part of this distinguished event and to witness the dynamic exchange of ideas and expertise that will inspire meaningful progress. Let us seize this opportunity to chart a path toward a future where AI, guided by responsibility and inclusivity, transforms Industry 5.0 into a force for societal good.

Professor Bandara Wanninayake

Dean of the Faculty of Commerce and Management Studies,
University of Kelaniya.



Message by **The Keynote Speaker**

Dr. Kaneeka Widanage

Head of the Department – Computer Science,
Faculty of Computing,
General Sir John Kotelawala Defense University.

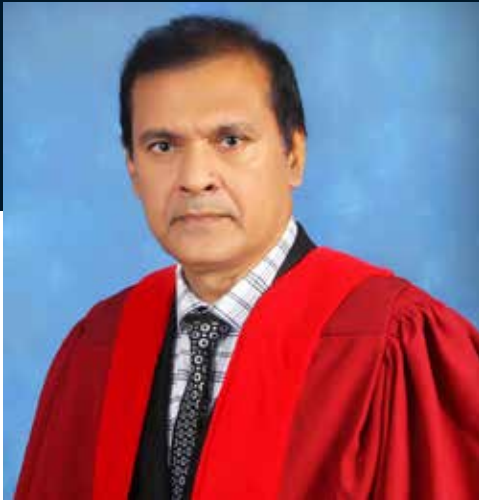
Artificial Intelligence – (AI) has depicted a resounding success across the entire globe spanning across numerous fields. Education, Healthcare, Construction, Manufacturing, Automobile likewise it can be continued up to a lengthy list. Considering this global paradigm shift taking across the entire globe, organizing a conference under the theme of “Harnessing AI in Industry 5.0: Transforming Society” can be recognized as a timely necessity. I would like to convey my gratitude to the Vice chancellor of the university and the entire steering committee behind organizing this conference.

Spreading the awareness assuring the ethical usage of the AI has been identified as a dire necessity. AI allows to approach an extra mile beyond the capacities of human capabilities. However, proper regulatory framework has to be in place to ensure the utilization of AI, only for the betterment of the mankind. AI can contribute to improve the efficiency and effectiveness of majority of the manual processes. Yet, still AI lacks emotional enactment, context specific rationalization which is vital in specific business use cases.

Appropriate utilization of AI for the automation of processes needs to be sensibly planned. Hence, literacy associated with operation of AI tools, conceptual awareness and cultural adaptation becomes a dire necessity. Now we all are living in an information era. Hence, elimination of the technologies is not recommended at all. Similarly, excessive and unbalanced engagement is also not recommended. Therefore, leveraging the correct balance of technology and human mix is a vital necessity. Hence, as emphasized in the main conference theme, harnessing the AI to the operational workflows is very important. At the same time appropriate transformation of the mentality and cultural relations of the humans is also a vital requirement. Organizing conferences under such engaging topics are a timely necessity to the country as well. I consider it as a great privileged on the opportunity offered to me to participate as the keynote speaker of this event. I wish to conduct an engaging discussion on a topic aligning with the main theme of the conference. Wishing all the very best for a remarkable and glamorous event.

Dr. Kaneeka Widanage

Head of the Department – Computer Science,
Faculty of Computing,
General Sir John Kotelawala Defense University.



Message by **The Keynote Speaker**

Prof. Sudath Warnakulasuriya
Professor and Dean – Faculty of
Nursing, University of Colombo.

In the era of Industry 5.0, the integration of artificial intelligence (AI) is not just a technological advancement; it is a transformative force that reshapes industries and society as a whole. This keynote speech explores the pivotal role of AI in enhancing human capabilities, fostering sustainable practices, and driving innovation across various sectors. By examining real-world applications and case studies, we will uncover how AI can be harnessed to create a more efficient, inclusive, and resilient society. Artificial Intelligence (AI) is revolutionizing the healthcare sector, offering transformative solutions that enhance patient care, streamline operations, and empower health care professionals. This keynote speech will further explore the profound impact of AI in healthcare, from predictive diagnostics and personalized treatment plans to advanced imaging and robotic-assisted surgeries and other health services. It will discuss how AI-powered tools are enabling early disease detection, optimizing resource allocation, and improving access to healthcare services in underserved regions so on. Emphasizing real-world applications and success stories, the speech will highlight how harnessing AI can foster a patient-centric, efficient, and equitable healthcare ecosystem, setting the stage for a healthier and more connected global society. The discussion will also address the ethical considerations and the importance of collaboration between humans and machines, emphasizing that the future of work is not about replacing humans but augmenting their potential. Join us as we envision a future where AI and humanity work hand in hand to tackle the challenges of tomorrow.

Prof. Sudath Warnakulasuriya
Professor and Dean – Faculty of Nursing,
University of Colombo.



Message by **The Keynote Speaker**

Prof. Bal Virdee

Director - Centre for Communications
Technology research group, London
Metropolitan University, UK

"I am honored to be invited as a keynote speaker at the 9th International Conference on Multidisciplinary Research (iCMR 2024), hosted by the British College of Applied Studies in Colombo. This event provides an excellent platform to discuss the latest innovations, developments, and advancements in technology. The conference theme, "Harnessing AI in Industry 5.0: Transforming Society," emphasizes the profound impact of artificial intelligence on societal progress. Such advancements are the result of dedicated efforts by researchers, and I am excited about the opportunity to engage with these insights. Additionally, the conference will spotlight research opportunities available to students at BCAS, fostering the next generation of innovators. I eagerly look forward to the presentations and discussions."

Prof. Bal Virdee

Director - Centre for Communications Technology research group,
London Metropolitan University, UK



Message by **The Keynote Speaker**

Dr. Pasan Wellalage
Senior Lecturer - Faculty of
Computing & IT,
Sri Lanka Technology Campus.

It is a great honor and privilege to be part of the 9th edition of the International Conference on Multidisciplinary Research (iCMR 2024), hosted by The British College of Applied Studies. Since its inception in 2015, this prestigious conference has been a beacon for fostering scholarly collaboration and innovation, bringing together distinguished minds from academia and industry across diverse domains.

The theme of this year's conference—spanning Biomedical & Health Sciences, Information & Technologies, Legal Studies, Finance, Business & Management, Engineering, Quantity Surveying, Hospitality & Facility Management, Education, Humanities, and Social Sciences—highlights the critical role of multidisciplinary research in addressing complex global challenges. It is a testament to how cross-disciplinary interactions can spark transformative ideas and drive impactful solutions.

As a keynote speaker, I am excited to delve into the theme of Artificial Intelligence for the Internet of Things (AI for IoT). The convergence of AI and IoT has become a cornerstone of innovation, enabling smarter, more efficient systems that transform industries and enhance everyday life. From predictive healthcare and intelligent transportation to sustainable resource management and smart cities, the possibilities are boundless. My talk will explore the cutting-edge advancements, challenges, and future directions in this field, emphasizing how AI-driven IoT can contribute to a more connected and intelligent world.

I commend the organizers for their dedication to fostering an environment that encourages knowledge sharing, collaboration, and growth. iCMR 2024 stands as a vital platform for thought leaders, researchers, and practitioners to exchange ideas and shape the future of multidisciplinary research.

I look forward to engaging with the vibrant community gathered here and exploring innovative pathways that will inspire new solutions and collaborations. Together, let us harness the power of research and technology to make a meaningful difference in our world.

Dr. Pasan Wellalage

Senior Lecturer - Faculty of Computing & IT
Sri Lanka Technology Campus.

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Session 01
Computing



Paper ID: 11

**AI-BASED SOLUTION FOR CREATING A POSTAL AREA DIVISION
MAP OF SRI LANKA
(A CASE STUDY ON NEBODA POSTAL DIVISION)**

H.G.G. Kith¹

¹British College of Applied Studies, Sri Lanka.

Abstract

In the era of Industry 5.0, the integration of artificial intelligence (AI) into traditional sectors promises transformative solutions to longstanding challenges. One such challenge in Sri Lanka is the absence of a comprehensive postal area map, which has caused inefficiencies in postal services and created logistical challenges for various public and private organizations. Traditionally, geo-spatial data in Sri Lanka is managed by the Survey Department, which has successfully developed several types of maps, including administrative, road, and tourist maps. However, creating a postal area map has proven to be a complex task due to the need for extensive land surveys, which are time-consuming, resource-intensive, and costly. This research has proposed an AI-driven approach to overcome these challenges by leveraging existing geo-spatial data, satellite imagery, and machine learning techniques to delineate postal boundaries without the need for exhaustive on-ground surveys. The AI model has analyzed historical geographic and demographic data, integrating inputs from various public databases and stakeholder organizations, to predict and create accurate postal boundaries. This solution aims to provide a cost-effective and scalable alternative to traditional land surveys, ultimately enabling the Postal Department and other stakeholders to enhance their operational efficiency and service delivery. This research seeks to contribute to the ongoing conversation of harnessing AI for societal transformation, aligning with the objectives of Industry 5.0, where human-centric and intelligent solutions address real-world problems. The proposed AI-based postal map will serve as a benchmark for similar applications in other developing countries, showcasing the power of AI in reshaping national infrastructure.

Keywords: artificial intelligence, geo-spatial, AI – driven, satellite, machine learning, postal, databases, surveys

PID: 13

DEVELOPING AN AI-DRIVEN FORENSIC FRAMEWORK: PREDICTING MEANS, MOTIVE, AND OPPORTUNITY IN PHYSICAL CRIME SCENE INVESTIGATIONS.

T.Sivakumar^{1*}, A.Lukman²,I.Ginthota³,M.Aadhil⁴, Ama Kulathilake⁵

¹*British College of Applied Studies, Sri Lanka.*

Abstract

This research addresses the application of Artificial Intelligence (AI) in physical crime forensics, extending beyond the existing AI applications in digital forensics. In crime scene investigations, various personnel such as police departments, Crime Scene Investigators (CSIs), forensic specialists, medical examiners, and detectives are involved. A significant challenge in these investigations is the time-consuming process of identifying patterns such as Means, Motive, and Opportunity (MMO). Identifying these patterns is crucial for finding the criminal. The proposed solution is to develop a framework to predict the MMO of crimes using AI. Historical crime scenes can often inform current investigations, as serial offenders may reuse patterns from past crimes, even years later. For example, a crime motivated by revenge may share at least 20% similarity with past crimes, allowing investigators to predict the motive. This system will utilize subsets of AI, specifically Machine Learning and Deep Learning. By feeding the system data from old crime scenes including identified patterns (victim's position, weapon or tool marks, location), evidence (footprints, fingerprints, tire tracks, blood marks, weapons), motives, and criminal details, the AI can predict the characteristics of current crime scenes. This AI-based approach allows for quicker pattern recognition and progression to subsequent investigation steps, saving time compared to manual methods. Additionally, the system will function as a comprehensive crime database, providing valuable support to crime investigation personnel.

Keywords: AI, Machine Learning

Paper ID 26

SMART SEEDING AND MONITORING SYSTEM FOR GREENHOUSE

Sayakkarage Priyamal^{1*}, Ama Kulathilake¹

¹British College of Applied Studies, Sri Lanka.

Abstract

The Smart Seeding and Monitoring System for greenhouses is an innovative project designed to improve the efficiency and success rates of planting seeds. It tackles the challenges of traditional greenhouse seeding methods by using advanced technologies like automation, sensors, and IoT connectivity. The project involves a clear plan that includes requirement analysis, design, implementation, and deployment, aiming to create an optimal environment for seed germination and plant growth. Key components of the system include an automated machine for sowing seeds, equipped with sensors that monitor important factors such as humidity, temperature, soil moisture, light intensity, and CO₂ levels. These sensors gather real-time data, which is then processed and analyzed through IoT platforms, allowing for remote monitoring and control. The project's work plan outlines a timeline and tasks to ensure a systematic approach to development, testing, and refinement. Additionally, recommendations and evaluations focus on the system's scalability, data analysis capabilities, integration with existing farm management systems, sustainability, user interface design, and a cost-benefit analysis. These considerations aim to boost agricultural productivity, foster sustainable farming practices, and support food security in a changing global environment.

Keywords: Smart Seeding, Greenhouse Monitoring, IoT in Agriculture, Automation in Farming Sensor Technology, Seed Germination Optimization, Real-Time Data Analysis, Sustainable Farming

Paper ID 27

SMART DRIP IRRIGATION AND REAL-TIME GRAPHICAL WEATHER DISPLAY SYSTEM WITH AN AI-DRIVEN PREDICTIVE WATERING SYSTEM FOR OPTIMAL PLANT HEALTH AND RESOURCE EFFICIENCY

Tharushi Thathsarani^{1*}, Ama Kulathilake¹

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Abstract

This research presents the development and implementation of a Smart Drip Irrigation and Real-Time Graphical Weather Display System with an AI-driven predictive watering system for optimal plant health and resource efficiency. The primary objective is to enhance water usage in agricultural practices by integrating advanced sensors, automated control mechanisms, and AI technology. The system utilizes an ESP32 microcontroller as the main module, connected to a DHT11 sensor for temperature and humidity measurements, a soil moisture sensor to monitor soil moisture levels, and a rain sensor to detect rainfall. These sensors provide real-time data, which is displayed through the Blynk application, offering users an intuitive graphical interface. The system's AI-driven predictive watering feature analyzes environmental data and forecasts irrigation needs, ensuring water is only used when necessary. This advanced automation, coupled with the real-time weather display, prevents over-irrigation, conserves water resources, and promotes sustainable farming practices. The integration of AI enhances the system's ability to maintain optimal plant health by precisely adjusting irrigation schedules based on predictive analytics. Extensive testing and field deployments have demonstrated the system's reliability and efficacy, showing significant improvements in water usage efficiency and crop yield. The successful implementation of this research underscores the transformative potential of IoT and AI technology in agriculture. Additionally, the research discusses the system's scalability, potential for future enhancements, and lessons learned during development. The modular design ensures adaptability to different agricultural settings, offering a practical and effective solution for modernizing farming practices. In conclusion, the Smart Drip Irrigation and Real-Time Graphical Weather Display System, enhanced with AI-driven predictive watering, represents a significant advancement in agricultural technology. It provides an optimized, resource-efficient approach to irrigation, improving crop production and promoting sustainable farming.

Keywords: Smart Drip Irrigation, AI-Driven Predictive Watering, Real-Time Weather Display, IOT in Agriculture, ESP32 Microcontroller, Sustainable Farming, Water Resource Efficiency

PID 30

Enhancing Healthcare Efficiency: Development and Implementation of an RFID-Based Patient History and Medicine Management System

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Abstract

This research presents the development and implementation of an RFID-based patient history and medicine management system, along with a medicine issuing system, leveraging RFID technology. The project aims to revolutionize healthcare management by providing real-time access to patient history and medication data, ensuring seamless and efficient patient care. The system utilizes RFID cards for all patients, enabling them to effortlessly access their medical information by simply touching the RFID card to the RFID reader. The doctor, acting as the admin user, can access the patient's comprehensive medical history, including past medications and medical conditions, through the integrated database. The project focuses on achieving several objectives. Firstly, it aims to enhance patient safety and treatment accuracy by facilitating the dispensing of prescribed medicines based on the doctor's previous prescriptions stored in the database. Secondly, the system enables new patients to register conveniently, while doctors are pre-registered through the admin user account. The project utilizes Wi-Fi Module 8266, RFID reader, RFID cards and accessories to establish seamless connectivity. The literature review of this research highlights the significance of RFID technology in healthcare for patient identification, medication management, and real-time tracking of medical supplies. The methodology involves the use of modular designs, Data/Entity Models to architect the system effectively. The implementation of the artifact includes unit testing of individual components such as RFID readers, and the integration of the database for data gathering. The research identifies areas for future improvement, such as scalability to accommodate larger healthcare facilities and incorporating additional security measures to protect patient data.

Keywords: RFID Technology, Patient History Management, Medicine Management System, Healthcare Information Systems, Real-Time Data Access

Paper ID: 161

SMART PERSONALIZED HEALTH TRACKER

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Abstract

Users may monitor a variety of health data via wearables like activity trackers, scales, and sports watches, which are part of smart health systems. But there's a big disconnect between the data these devices provide and the customized health regimens people have to adhere to in order to be at their best. Present-day health data systems fall short in their ability to convert unprocessed data into actionable advice. This study describes the creation of a smart, personalized health tracker that makes use of big data, artificial intelligence (AI), and the Internet of Things (IoT) to offer suggestions and health insights that are specific to each user's requirements. The research encompassed a comprehensive examination of current health monitoring technologies and their uses in the medical field. The design of the system was based on the identification of gaps in existing solutions. Determining an architecture that combines real-time processing, sophisticated sensor data collecting, and user-friendly interfaces was part of the project. The data was analyzed using machine learning algorithms, which generated customized suggestions according to the health parameters of each individual user. Important concerns including safeguarding user data, reducing cybersecurity threats, and addressing moral dilemmas with the use of health data were well found and addressed during the development stage. The created prototype offers users a versatile, device-independent platform that effectively closes the gap between the gathering of health data and the creation of relevant health action plans. Future developments will concentrate on augmenting AI capabilities, integrating advanced biometric sensors, and improving the system's interoperability with an expanded array of health monitoring tools and services.

Keywords: AI, Big Data, Cybersecurity, Health tracker, IOT

PID: 172

SMART HEALTHCARE SYSTEM FOR PREDICTING HEART ATTACK USING BIG DATA, IOT, AND AI

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Abstract

Heart disease is one of the leading causes of death worldwide, early identification is crucial for saving life. Heart attacks are frequently caused for reasons such as coronary artery disease, high blood pressure, smoking, diabetes, obesity, stress, unhealthy diet, and genetics. The aim of this project is to create a smart healthcare system to predict heart attacks by combining Big Data, internet of things (IoT), and Artificial intelligence (AI). The smart healthcare system integrates data from wearable devices with regular medical checkup reports to better track health and detect heart attacks earlier. The system uses wearable devices to continuously track important health indicators like heart rate, blood pressure, and ECG, while also considering in users' medical data to create a personalized health analysis. These real-time measurements are collected and processed through Big Data systems, allowing for large-scale analysis of health changes and patterns. AI algorithms analyze this data, along with historical health records, to detect early signs of a potential heart attack. Systems can detect changes in a person's health and immediately alert patients and medical staff, possibly avoiding major issues before they arise. This research looks at how the system is built, how data is processed, and how accurately the AI models predict heart attacks. In addition, considers privacy and ethical concerns, ensuring that patient data is secure and compliant with healthcare laws. The ultimate goal is to make healthcare more effective, reduce the risk of heart attacks, and improve patient outcomes through smart, data-driven insights.

Keywords: Heart Disease Prediction, Smart Healthcare System, Big Data, Internet of Things (IoT), Artificial Intelligence (AI), Wearable Devices, Predictive Analytics.

ID: 175

USING BIG DATA, AI (ARTIFICIAL INTELLIGENCE) AND IOT (INTERNET OF THINGS) FOR PREDICTING CLIMATE CHANGE

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Abstract

The project aimed to advance climate science by harnessing AI, Big Data, and IoT to create accurate and reliable climate models, enhancing the understanding of climate dynamics and supporting effective climate change strategies. Climate research has undergone a transformative shift with the advent of IoT, Big Data, and AI, which offer powerful tools for capturing and analyzing the vast, complex datasets required to predict climate change. This project addresses the pressing need for precise climate forecasting, which is vital for researchers, policymakers, environmental organizations, and communities directly affected by climate-related events. Accurate models enable proactive responses, inform policy decisions, and support sustainable environmental management practices. The research project utilized AI technologies such as machine learning (ML) and computer vision, combined with IoT data, to develop an intelligent climate prediction system. This system provides real-time analysis and forecasting by integrating data from various sources, including satellite imagery, weather stations, ocean buoys, and IoT-enabled sensors. These data sources offer comprehensive insights into atmospheric conditions, ocean currents, greenhouse gas concentrations, and other critical climate indicators. Using ML techniques like time-series forecasting, convolutional neural networks (CNNs) for image analysis, and reinforcement learning for adaptive algorithms, the system was designed to predict climate patterns, identify trends, and simulate future scenarios. The project developed robust ML models for climate prediction, adaptive algorithms to enhance real-time data accuracy, and a user-friendly interface for tracking and displaying climate data. Additionally, the study examined the system's scalability and feasibility for deployment across diverse regions, evaluating both computational and infrastructural requirements. The importance of this project lies in its potential contributions to early-warning systems and long-term environmental planning. By leveraging Big Data, AI, and IoT, the system offers high predictive accuracy, valuable insights for policymakers, and proactive solutions for environmental management. This research provides an innovative approach to data integration and processing in climate science, contributing valuable tools and methodologies to the field. The key methods employed include data gathering through IoT sensors, data preprocessing and fusion techniques, machine learning model training and evaluation, and testing the system's performance across different climate scenarios to ensure reliability and accuracy.

Keywords: AI, Algorithms, Big Data, Climate, Data, IOT, Prediction, System.

PID: 185

AUTOMATING UI ISSUE DETECTION USING CONVOLUTIONAL NEURAL NETWORKS AND MACHINE LEARNING MODELS

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Abstract

In today's software industry, developers, quality assurance engineers, and project managers face considerable challenges in identifying user interface (UI) problems through manual methods. Such approaches usually manifest in time delays with human error potential. Recent inferences from Christopher Collins et al. (2021) and Soumen Pal (2024) show that automation or, more specifically, ML can improve UI testing through a reduction of manual effort with improved detection accuracy. Rini Nurani et al. (2023) also explored using CNNs to identify the UI misalignments and find promising results with minimizing manual intervention. This research proposes users to use Convolutional Neural Networks to automate UI issue detection in Sri Lanka's leading software companies. Traditionally, QA engineers and developers are engaged in manual work. Examples of possible Defects are misalignment, broken layouts, or visual inconsistencies. This study focuses on Sri Lanka, where the growing tech industry requires high-quality software solutions to remain competitive regionally and globally. Despite this demand, most Sri Lankan software companies still rely on manual UI testing methods, which can be labor-intensive and time-consuming. The study proposes to perform automatic detection of relayed issues by running CNNs screens for misalignment, so fewer hands are involved, and greater productivity and accuracy are achieved. An approach for detecting UI issues and classifying them using ML models is proposed and implemented using the Design Science Research (DSR) methodology. Data for the study was collected through a Google Forms survey targeted at QA engineers, software developers, and project managers. Aspects of finding solution strategies, and providing further development include: writing, sequencing, technical feasibility using real-life UI issues; and building a dataset over which the CNN structured architecture were trained. This helped achieve high classification accuracy in detecting and categorizing UI problems. Finally, this research lays a foundation for the automation of large UI tests, leading to better software quality and user experience. The findings also suggest that UI tests at Sri Lankan software companies could result in reduced defect rates and improvements in product quality, which is expected to considerably enhance the software delivery cycle.

Keywords: UI Issue Detection, Convolutional Neural Networks, Machine learning models, Automated UI testing, User experience.

PID: 209

NAVIGATING ETHICAL AND GOVERNANCE ISSUES IN AI: FOCUS ON TRANSPARENCY, BIAS AND SECURITY

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Abstract

Artificial intelligence (AI) refers to the development of computer systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and understanding language. AI systems utilize algorithms and data to make decisions, often improving over time through techniques like machine learning and deep learning. The rapid advancement of artificial intelligence (AI) presents significant ethical and governance challenges, especially in the areas of transparency, bias, and security. As AI systems become more embedded in critical decision-making processes, the need for clear ethical frameworks and governance structures becomes paramount. This research explores the multifaceted issues surrounding transparency, focusing on how the "black box" nature of AI models can obscure decision-making processes, thereby reducing accountability. It examines the problem of algorithmic bias, where AI systems, trained on historical data, can perpetuate existing inequalities, leading to discriminatory outcomes in sectors such as hiring, lending, and law enforcement. The study emphasizes the importance of bias mitigation strategies to promote fairness and equality in AI outcomes. Security is another vital component, as AI systems are vulnerable to both internal and external threats, including data manipulation and adversarial attacks. The research highlights the need for robust security frameworks to protect sensitive data and ensure the integrity of AI systems. Moreover, it explores how governance models can enforce ethical principles, ensuring that AI development aligns with societal values. By addressing transparency, bias, and security in tandem, this study aims to provide a comprehensive understanding of the ethical and governance issues in AI, offering practical recommendations to foster responsible AI development and deployment in various industries.

Keywords: Artificial Intelligence (AI), AI ethics, Governance, Transparency, Algorithmic bias, Fairness, Security, Bias mitigation.

PID: 211

EMPOWERING INDUSTRY 5.0: OPTIMIZING DOMAINS WITH PROMPT ENGINEERING FOR SOCIETAL TRANSFORMATION

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Abstract

The study presents a comprehensive approach on how prompt engineering highlights its application in the cyber security domain within the context of Industry 5.0, where human-centric artificial intelligence and machine collaboration are paramount. The effectiveness of AI models to respond to cybercrimes is important to increase the society's trust on the digital world. But there are a range of challenges such as poorly crafted prompts leading to inaccurate threat assessments, AI models being unable to understand and interpret the complex security contexts that includes threat vectors such as vulnerabilities in applications and user behaviors, and maintaining user privacy while handling sensitive data and addressing ethical concerns becomes crucial to building trust in these systems. The study involves rigorous data collection methods, including statistical data collection through surveys and literatures, ensuring a data-driven approach which helps determine the best practices for prompt engineering such as optimizing AI models for enhanced contextual understanding, scalable prompt engineering techniques tailored for security systems, and ethical frameworks to ensure responsible AI deployment in sensitive areas. The paper also demonstrates how effective prompt engineering can boost cybersecurity measures by illustrating particular use cases, such as automated incident response and threat detection. Hence, prompt engineering serves as a key enabler of Industry 5.0, driving innovation and enhancing societal transformation through more secure, robust systems.

Key words: Prompt Engineering, Cybersecurity, Industry 5.0, Human-Centric Artificial Intelligence, Machine Collaboration, Threat Detection

Paper ID 219

**THE ROLE OF AI IN CREATING AND REGULATING DEEPAKE
CONTENT ON SOCIAL MEDIA PLATFORMS****Sivagnanasuntharam Nivethanan^{1*}, Tharmalingam Suresh¹, Kirushanthi Vaamanan¹***¹British College of Applied Studies, Sri Lanka.***Abstract**

The development of machines that imitate the way that human thought processes is known as artificial intelligence. It is capable of actions deemed "smart". The concept of creating realistic-looking digital things, or "deepfakes", has given rise to a multitude of films on social media in the past two years. In particular, anyone may readily manufacture and spread such content online due to the low level of knowledge and equipment required to construct deepfakes. The impacts on society are broadly and significant. This article examines the deepfakes from a variety of angles, including politics, law and regulation, gender, media and society, media creation, media representations, and media audiences. A critical discussion and identification of some of these opinions' significant implications follow. The findings show that we are not prepared as a culture to handle deepfakes on any scale. Since they are still in their early stages of development and contain flaws, it is because of this that we have not yet seen any significant effects. In order to address this, a mix of technology, governance, education, and training is desperately needed. By analyzing AI-enabled multimedia deception on two different levels-first as a mass-produced, regular aspect of the information environment in democracies, and second as a highly customized tool used in conjunction with cyber operations. This research seeks to provide the required context. This research investigates how deepfakes affect people's capacity to verify the source, veracity, accuracy, and independence of information. This research tries to find out the solutions within the legal system.

Keywords: Artificial Intelligence (AI), Deepfakes, Social media, Regulation

PID: 222

THE IMPACT OF AI BIAS, IN LAW ENFORCEMENT AND CRIMINAL JUSTICE

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Abstract

This study investigates the impact of artificial intelligence (AI) bias on law enforcement and criminal justice, with an emphasis on how AI technologies influence decision-making, fairness and equity. Applications like predictive policing, risk assessment tools and sentencing algorithms can enhance efficiency and provide valuable insights. However, these systems often involve existing biases, raising serious ethical concerns about justice, transparency, and accountability. This study examines cases from several countries that include legal analysis, ethical philosophy, and empirical research. The findings show the conflict between AI efficiency and the core concepts of due process. This highlights multiple major ethical concerns such as algorithmic bias, lack of transparency, and reduced human oversight in legal decisions. Differential effects on marginalized populations are also revealed, raising issues about the existing inequities in the judicial system. Without careful design and monitoring, AI can reinforce discriminatory practices. Addressing this, the study proposes an ethical framework for the development and application of AI in the criminal justice system. Moreover, it explores the responsible use of AI in law enforcement, emphasising transparency, accountability, and fairness. This study offers practical solutions to enhance the reliability of AI systems, focusing on data sources, training methods, and decision-making processes to minimise bias and protect civil rights. It examines case examples from the United States, the United Kingdom, and China, highlighting both the benefits and drawbacks of AI in law enforcement and judicial contexts. All in all, this study provides important insights for policymakers, technologists, and legal professionals working to navigate the ethical challenges of AI in criminal justice, advocating for a future where AI promotes fairness and upholds civil rights.

Keywords: Artificial intelligence, Criminal justice system, Law enforcement, sentencing algorithms, Algorithmic bias, Transparency in AI, predict policing, marginalized populations.

PID: 227

PRACTICAL APPLICATIONS AND LIMITATIONS OF AI IN THE E-COMMERCE SECTOR

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Abstract

Artificial Intelligence (AI) in e-commerce has completely changed online shopping by improving customer experience, streamlining corporate processes, and boosting sales. Artificial Intelligence (AI) technologies, namely machine learning, natural language processing, and predictive analytics, facilitate efficient supply chain management, customized product suggestions, and chatbot-based automated customer service. AI-driven solutions also enhance dynamic pricing plans, fraud detection, and inventory forecasting, all of which increase operational security and efficiency. Even with these developments, AI's use in e-commerce is still severely constrained. Obstacles include high implementation costs, data privacy issues, and the need for large datasets for accuracy, especially for small and medium-sized businesses (SMEs). Furthermore, it could be difficult for AI systems to comprehend complex consumer behavior, which could result in inaccurate suggestions or automated interactions. Consumer confidence and regulatory compliance are also at stake due to ethical issues about data utilization and bias in algorithms. Moreover, an excessive dependence on AI may restrict human supervision and inventiveness during decision-making, which could lead to a decline in innovation. In conclusion, even if AI provides strong tools to improve e-commerce operations, its efficacy depends on how well issues like data protection, cost, and ethics are handled. AI's full potential in the e-commerce sector will require a well-balanced strategy that combines human expertise with AI-driven insights.

Keywords: Artificial Intelligence, E-commerce, Machine learning, Predictive analytics, chatbots, Data privacy, Supply chain management, Dynamic pricing, Fraud detection, Ethical AI.

PID: 231

The Impact of ChatGPT on Student Knowledge: Balancing AI Integration and Human Creativity to Safeguard Critical Thinking in Education

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Abstract

AI is at the beginning of educational modernization, particularly ChatGPT, which is becoming increasingly popular in educational settings. It is an advanced AI language model that creates content and can generate human-like responses in a simple, friendly manner. It also has made its way into classrooms and educational centers worldwide, resulting in a decreased capacity for critical thinking and memory recall. AI-based models, like ChatGPT, have great potential to progress education by facilitating students' access to knowledge and supporting specific instructional material for teachers. But there are drawbacks to more AI use as well. People could become overly dependent on AI, which could impair their ability to think critically or limit creativity and originality, leading to a loss of personal voice. In summary, generative artificial intelligence is an effective tool for higher education, but its application needs to be strategic, moral, and always focused on improving human-centered education. It also needs to align with universities' digital transformation plans. The purpose of this study is to investigate the usage of ChatGPT by students, demonstrating how ChatGPT affects student involvement, critical thinking, and problem-solving abilities. As well as highlighting the necessity of using AI wisely and supporting an integration strategy that enhances rather than replaces human mental capacities. Finally, the article discusses the results of a survey given to undergraduate college students in Jaffna. It analyzes the answers to make conclusions about the opinions of the students regarding the use of ChatGPT and its impact on teaching-learning processes, and it concludes by making some recommendations.

Keywords: AI, ChatGPT, Critical Thinking, Education

PID: 232

ANALYZE THE IMPACT OF AI ON ELECTRONIC DEVICES**S.Thuvaragan^{1*}, T.Suresh¹, J.Kirushanth¹***¹British College of Applied Studies, Sri Lanka***Abstract**

This research focuses on the role of artificial intelligence in the performance and design of electronics. Regarding the capability, the specific emerging technologies that were discussed include AI enhancing the operational capabilities of these devices to be smarter, faster, and more efficient. This research examines the advantages as well as disadvantages of incorporating AI into these technologies. Some of the ideas for further research concern the ethical issues associated with artificial intelligence and stress on prudent utilization. It also covers issues such as explaining how an AI process works within a device so the user has accurate information about it. The problem of bias in AI is examined with a focus on the problem of fairness and the incorporation of a diverse approach to the user base. Besides, the study focuses on how AI optimizes the user experience through features such as settings customization, voice control, and smart predicting for maintenance and better usability. This study also highlights the importance of proper policies and mechanisms for the proper utilization of AI without potential misuse and threats such as those posed to the electronics devices. This paper offers a detailed concept of how AI is influencing the future of electronic devices and what these advantages and threats mean. Thus, the results are useful for manufacturers, regulators, and users, underlining the importance of ethical approaches, open practices, and security measures in the context of increasing integration of AI elements in ordinary products.

Keywords: Artificial Intelligence, Electronic Devices, Ethics, Transparency, Bias, security, Governance, Cyber risks

PID: 240

ARTIFICIAL INTELLIGENT (AI)-ASSISTED PROJECT PLANNING AND RISK MANAGEMENT TOOL

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Abstract

Project planning and risk management are important to the success of small to medium-sized enterprises (SMEs). That said, traditional manual methods are often time-consuming and inefficient. This research proposes an AI-powered tool to streamline these processes. By automating routine tasks, helping with decision making, and improving risk prediction, the tool aims to greatly improve project efficiency and effectiveness for SMEs. The research will identify key areas where AI can provide the most benefit, develop the AI tool, assess its effectiveness, and address potential challenges. the AI tool can enhance decision-making by providing real-time insights and recommendations based on historical data, current trends, and predictive analytics. This helps project managers make informed decisions about project scope, schedule, budget, and resource allocation, reducing the likelihood of costly mistakes and delays. AI tool can improve risk prediction and mitigation by identifying potential risks early on and suggesting appropriate countermeasures. This helps SMEs proactively manage risks and minimize their impact on project outcomes, ensuring project success even in the face of unexpected challenges. This tool has the potential to revolutionize project management for SMEs, enabling them to deliver projects on time, within budget, and with minimal risk.

Keywords: Small to Medium-Sized Enterprises (SMEs), AI-Powered Tool, Risk Management

PID: 241

SECURING THE HYBRID FRONTIER: CYBERSECURITY CONSIDERATIONS AND BEST PRACTICES FOR SMALL MEDIUM ENTERPRISE ORGANIZATIONS IN HYBRID NETWORKING ENVIRONMENTS

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Abstract

Hybrid networking is a networking strategy that mixes different types of networks to create a single, integrated system. Networks, both wired and wireless, public and private, and various cloud computing environments can all be included. In the dynamic world of modern business, mid-sized companies have distinct cybersecurity obstacles while navigating hybrid networking setups that integrate on-site infrastructure with cloud-based solutions. With the main goal of locating, evaluating, and suggesting best practices to protect against more complex cyberattacks, this project explores the complexities of guarding this hybrid frontier. Expert interviews, case studies from mid-sized businesses that have effectively strengthened their hybrid networks, and a thorough analysis of recent research are all included in the methodology. We identify major vulnerabilities and evaluate the efficacy of different security frameworks and technologies by utilizing both qualitative and quantitative research approaches. The results of this study show an advanced understanding of the dangers unique to hybrid environments, including ransomware attacks, insider threats, and data breaches. They also highlight creative defenses like automated threat detection systems, zero-trust architecture, and advanced encryption protocols. Additionally, in order to improve cybersecurity resilience, our findings highlight the significance of thorough incident response plans, ongoing network monitoring, and personnel training. To sum up, this initiative not only provides mid-sized businesses with a strategic roadmap to strengthen their hybrid networks, but it also highlights the dynamic nature of cybersecurity and calls for constant adaptation and alertness in the face of new threats. Organizations may strengthen their security posture, guarantee business continuity, and safeguard priceless digital assets in an increasingly linked world by implementing these best practices.

Keywords: Hybrid Networking, Cybersecurity, Mid-Sized Businesses, Cloud-Based Solutions, Ransomware Attacks, Zero-Trust Architecture, Advanced Encryption Protocols

PID: 242

A Cyber-Physical Approach to Securing Budget Vehicles: Integrating Arduino-Based Digital Key Systems with Cloud Computing, Encrypted IoT Communications, and Biometric Authentication

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Abstract

Vehicle theft has become a significant concern, particularly for budget vehicles that often lack advanced security systems. This study presents an innovative solution to this problem through the development of an advanced security system using an Arduino board, a web server, and an Android application. Traditional vehicle security systems, which rely on radio waves for communication between the remote key and the vehicle, are vulnerable to interception due to the lack of encryption. To address this, the proposed system employs a multi-layered approach to enhance security and resilience. The system integrates an Arduino-based controller to convert digital signals into electric signals for vehicle control. Communication between the server and Arduino board is facilitated via a GSM/GPRS module, while a GPS module provides real-time location tracking. The web server, hosted on Google Cloud, manages user accounts and access control, utilizing two-factor authentication and secure communication keys. An Android application, equipped with biometric fingerprint authentication, serves as the digital key for secure vehicle access. Key components include relay modules for controlling door locks and alarms, shock and door sensors to detect unauthorized access, and an anti-theft alarm system. Notifications and alerts are sent to the user's mobile application and logged in a web browser using Firebase Cloud Messaging. The system also features redundancy measures, such as physical key access in case of GSM signal failure, ensuring continued functionality and user access. Implemented and tested in a real-world environment, the system demonstrates improved security through encryption and hashing for communications, and HTTPS for server interactions. This research provides a robust solution for enhancing vehicle security, offering vehicle owners a reliable, locally-installed option to protect their vehicles from theft.

Keywords: Arduino-based security system, Biometric authentication, Cloud computing, Encrypted IOT Communications, Biometric Authentication

PID: 243

CREDIT CARD FRAUD DETECTION USING MACHINE LEARNING

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Abstract

Credit cards play an essential part of our everyday life. The act of using a payment card without authorization to pay for goods or services is known as credit card fraud. Unsecured websites could provide hackers or fraudsters with access to the card's private information. Everyone engaged in the process suffers when a fraudster compromises a person's credit card: the person whose private information has been compromised, the companies (usually banks) that issue the credit card, and the retailer that completes the transaction with a purchase. Because of this, it's critical to spot fraudulent transactions right away. Machine learning (ML) models are much better than conventional fraud detection models. ML offers an insight into how users behave by understanding their app usage, payments, and transaction methods. This research aims to identify fraudulent activities in credit card transactions. It is proposed applying machine learning to detect credit card theft by identifying fraudulent transactions from valid ones using labeled data and conducted using supervised machine-learning techniques which are Logistic Regression, decision trees and K-Nearest Neighbour. Data is checked and tested for missing values, duplicate values and null values too. Then dataset is divided into training and testing data. After that, train, validate, and test sets, and establishing a baseline performance with reasonable values for hyperparameters. Tune hyperparameters before evaluating model on the test set and deploy. Compare their performance, and finalize a model. Best model based on several evaluation metrics. Its Accuracy of 0.996, Precision (0.722) and Recall (0.695) show a good balance between identifying fraudulent operations (true positives) and minimizing false positives, which is critical in fraud detection. By subjecting these machine learning model to rigorous testing on real-world datasets, it demonstrates their efficiency in detecting fraudulent activities and underscore their capacity to dynamically adjust to evolving fraud patterns.

Keywords: Credit cards, Machine learning, Fraud detection models, Logistic Regression, decision trees, K-Nearest Neighbour, Accuracy, Recall (sensitivity), F1-score, Precision

PID: 248

AN AI-BASED MALWARE DETECTION SYSTEM USING PACKETS CAPTURED BY SCAPPY TOOL

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Abstract

This research presents a novel AI-based malware detection system utilizing Scapy for packet capture and analysis. The system leverages advanced machine learning algorithms to identify malicious patterns within network traffic, enabling proactive detection and prevention of sophisticated malware attacks. By employing Scapy's powerful capabilities for packet manipulation and analysis, the proposed system offers a robust and efficient solution for safeguarding networks against emerging cyber threats, utilizing Scapy to capture and extract relevant features from network traffic, such as protocol headers, payload data, and timing information. Employing state-of-the-art algorithms like deep neural networks, recurrent neural networks, or support vector machines for accurate malware classification. Identifying and selecting the most discriminative features to enhance detection accuracy and reduce computational overhead and implementing a system capable of processing network traffic in real-time to enable timely. Rigorously evaluating the system's performance using various datasets and comparing it to existing malware detection methods. The proposed AI-based malware detection system offers a promising approach to combating the ever-evolving landscape of cyber threats. By combining the power of Scapy with advanced machine learning techniques, this system can provide organizations with a valuable tool for protecting their networks and data.

Keywords: AI-Based Malware Detection, Scapy, Packet Analysis, Machine Learning Algorithms Deep Neural Networks, Recurrent Neural Networks

PID: 249**AUTOMATED FUEL ALERT SYSTEM NEAR THE FUEL STATION
FOR VEHICLES****Saravanabavan Lakshan^{1*}, Tharmalingam Suresh¹***¹British College of Applied Studies, Sri Lanka.***Abstract**

Automated fuel alert system near the fuel station for vehicles is a mobile-based application. In this application alert for fuel status and fuel refill alert near the fuel station because most of the vehicle drivers face fuel management issues like breakdowns without fuel. Our system automated alert for fuel low levels, current fuel status, the maximum range for travel with current fuel, and suggested minimum of three nearest fuel station locations with Google map API for refilling the fuel. In this case, we are implementing some technology like IOT -for fuel level Arduino sensor and vehicle's speed or RPM sensor, ESP32 - data sent to server. Mobile application-user interface for display alert and see the summary report for fuel, Machine learning –model implementation, training the model and prediction of able to moving maximum distance. Purpose of this project most of the drivers mostly faced breakdown issues like without fuel because they have fuel tracking issues like fuel level alert. Our mobile application tracks and alerts us to the fuel level and distance between the fuel station and the current location if you miss the full this fuel station we can't move up to the next fuel station or we can move like that so this system mostly help full of all drivers any traveling gurney.

Keywords: Automated Fuel Alert, Fuel Management, Mobile Application, IoT (Internet of Things), GPS Integration, Machine Learning, Predictive Model

PID: 254

AI-POWERED MENTAL HEALTH SUPPORT ASSESSMENT

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Abstract

Mental health issues such as anxiety and depression have become a significant global health concern, affecting individuals of all ages and backgrounds. The accessibility gap for mental health professionals, due to factors like stigma, cost, and geographical location, has caused a growing need for innovative solutions that can provide accessible and affordable mental health support. This research aims to develop an AI-powered mobile application that utilises natural language processing (NLP) to assess and track users' mental health through their natural language inputs. By analysing text data for emotional cues and mental health indicators, the application can provide personalised feedback, resources, and early intervention recommendations. The core innovation of this project is in the application of advanced NLP techniques to detect sentiment, emotion, and mental health-related language. Unlike existing mental health chatbots and tracking apps, which often lack deep NLP-based analysis or fail to provide nuanced, contextualised feedback, this application will use the power of AI to offer more accurate and tailored support. To evaluate the effectiveness of the application, a combination of quantitative and qualitative methods will be used, including user feedback, surveys, and analysis of the NLP models' accuracy. By addressing the accessibility and affordability challenges in mental health care, this research seeks to contribute to a more inclusive and supportive environment for individuals struggling with mental health issues.

Keywords: Anxiety, Depression, AI-Powered Application, Natural Language Processing (NLP) Sentiment Analysis

PID: 269**PREDICTING THE OUTCOME OF THE CRICKET MATCHES USING
MACHINE LEARNING TECHNIQUES****J.Kirushanthi^{1*}***¹University of Kelaniya, Sri Lanka.***Abstract**

Predicting the outcome of sports has been established as an interesting field nowadays. Among the most widely played sports in the world is cricket. Many famous games are trying to predict the outcome more accurately. But predicting the outcome of the cricket match is a very difficult task, therefore there is less amount of recognized work for this topic. Internal factors and external factors are affecting the outcome of the cricket match. In this research, considered the internal factors. With this research, propose a novel approach for predicting the outcome of the cricket match by modelling the team based on the recent performance of its players in other matches. This approach is based on feature encoding, which assumes that there are different categories of players according to their seasonal-wise performance and models each team as a composition of the player's category. In this approach, divide this into two parts. In the first part, assign the players to the categories using the hard assignment model. In the second part, assign the players to the categories using the soft assignment model. These approaches are not tried yet in this field. And this new approach gives a considerable improvement over the baseline approach. From this approach, we can get more than 70 percent accuracy. In this conclusion, this is the highest percentage of accuracy compared with the reported accuracy in the related works.

Keywords: Cricket, Clustering, Random forest, Feature encoding, Supervised learning, SVM.

Paper ID 312

ENHANCING CYBERSECURITY WITH AI: DETECTING DEEPFAKE-BASED SOCIAL MEDIA THREATS

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Abstract

The rapid advancement of deepfake technology poses a significant threat to cybersecurity, particularly on social media platforms. Deepfakes, which manipulate digital content using AI to create hyper-realistic fake images, videos, and audio, are increasingly used for malicious purposes such as misinformation, identity theft, and online fraud. This study explores how artificial intelligence (AI) can enhance cybersecurity efforts by detecting deepfake-based threats on social media. The primary aim of this research is to investigate how AI-based systems can be employed to detect deepfake content on social media platforms and mitigate associated cybersecurity risks. It seeks to identify effective AI algorithms for real-time detection, assess their reliability, and develop a framework for reducing deepfake-related threats. Current research lacks comprehensive focus on social media platforms, where deepfake threats spread rapidly and have significant impacts. Furthermore, existing studies often overlook the integration of real-time AI detection systems scalable across large networks. This study addresses these gaps by proposing a real-time AI-driven cybersecurity framework tailored to social media environments. A mixed-methods approach is adopted, combining quantitative data on the performance of AI detection systems with qualitative insights from cybersecurity experts on practical challenges. Quantitative data will be collected by deploying AI detection models on datasets containing both real and deepfake content from platforms like Twitter and Facebook. Thematic analysis of qualitative data will highlight key challenges, opportunities, and recommendations for improving AI-based detection on social media. Preliminary findings suggest that AI-based detection systems, especially those using deep learning algorithms, achieve high accuracy in detecting deepfake content on social media. However, challenges such as false positives and computational costs remain. The study also emphasizes the need for collaboration between social media companies and cybersecurity firms to scale these systems effectively.

Keywords: Deepfake Detection, Cybersecurity, Artificial Intelligence (AI), Social Media Threats

Paper ID 315

USE OF LEARNING ANALYTICS IN HIGHER EDUCATION: CHALLENGES AND LIMITATIONS WITH THE SOLUTION STRATEGIES

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Abstract

There are burning issue within the educational sector to identify the most suitable learning patterns for the students, which cause to fed-up their studies that leads to weaken the results of them. Researchers have been investigating education, tracking student progress, analyzing data of the institutions and using evidence to improve teaching and learning for a long-time duration. "Learning analytics" has been used to forecast academic progress of the students within colleges. The utilization of the learning analytics will provide tremendous amount advantages for the learners, mentors, administrators and parents of the colleges and universities of higher education, including the ability to offer individualized course offerings, improved educational results, curriculum design, effective teaching methods and etc. However, that is very difficult to observe the utilization of learning analytics tools within the context of education in the third world countries such as Sri Lanka. Even though learning analytics is available within the developed countries, they are also struggling with some of the major challenges of it, such as, privacy issues, the extent and analysis of data issues and the ethical challenges. Among these include the creation of analytics apps that should more transparent and easily available, provide users with real control and supervision, and should be more accurately represent the realities faced by students. There are numerous suggestions for these issues has been published by several authors within the current literature, within their published journals and papers such as the solutions for several sub factors of privacy issues, the extent and analysis of data issues and also for the ethical issues. This paper has highlighted the major limitations and challenges of learning analytics, which should consider in future and also the possible solutions to make it is a comprehensive method within the learning context of the developing countries such as Sri Lanka.

Keywords: Learning analytics, Challenges of Learning Analytics, Teaching and Learning, Decision-making in higher education, Learning analytics tools, Territory education, Educational data mining

Paper ID 335

**LEVERAGING AI AND IOT FOR LANDSLIDE RISK DETECTION AND
EARLY WARNING SYSTEM FOR ENSURING HUMAN SAFETY
THROUGH REAL-TIME ALERTS AND ALARMS FOR HIGH RISKS
AREAS IN SRI LANKA**

M. I . Kodagoda^{1*}, C.J Abeyarathne¹

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Abstract

Landslides are a recurring natural disaster in Sri Lanka, posing severe risks to human lives and infrastructure, particularly in vulnerable regions like Kandy-Mawanella. The devastating Aranayaka Samsara mountain landslide exemplifies the urgent need for effective early warning systems. This research focuses on developing a robust early warning system that leverages Artificial Intelligence (AI) and Internet of Things (IoT) technology to detect and predict landslide risks. The proposed system monitors four critical factors associated with landslides: the angle of trees, mountain vibrations, soil moisture, and rainfall. IoT sensors are strategically deployed to collect real-time data on these parameters, while AI, specifically utilizing TensorFlow for machine learning, processes and analyzes the gathered information to identify potential landslide patterns. This trained model forecasts landslide probabilities, enabling timely alerts for preventative actions. To enhance community safety, the developed system features an alarming mechanism that sends real-time alert messages via mobile phones and triggers warning alarms for residents in high-risk areas, facilitating rapid evacuation and reducing loss of life. This research evaluates the effectiveness of the integrated AI-IoT approach in predicting landslides, analyzes data from past incidents, and proposes advancements for improved accuracy and response times. By combining cutting-edge technology with real-time monitoring, this study significantly contributes to disaster risk management and resilience in vulnerable regions. The findings illustrate how AI and IoT can transform traditional landslide detection into a proactive early warning system, empowering local communities and disaster management authorities to mitigate the adverse impacts of landslides. This innovative solution underscores the critical role of technology in ensuring human safety and highlights the potential of AI and IoT in enhancing natural disaster prediction and management efforts in Sri Lanka.

Keywords: Landslide detection, AI, IOT, TensorFlow, early warning system, disaster management, Kandy-Mawanella, Aranyaka Samsara, Risk Prediction, Predictive Modeling, Sensor Technology

Paper ID 278

ETHICAL IMPLICATIONS OF DATA PRIVACY IN COMPUTER NETWORKING: A LITERATURE REVIEW

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Abstract

The increasing dependence on computer networks has led to growing concerns about data privacy, especially as more personal and sensitive information is shared across digital platforms. This literature review examines the ethical implications of data privacy in computer networking, focusing on key ethical concerns such as consent, data ownership, security, and the potential for misuse. Through a comprehensive analysis of peer-reviewed articles, industry reports, and case studies, this paper explores the evolving nature of data privacy issues and their ethical dimensions. The methodology for this review includes a systematic search of academic databases such as IEEE Xplore, Springer, and Google Scholar. The inclusion criteria were restricted to works published between 2010 and 2023, with a focus on data privacy in computer networking. A thematic analysis approach was employed to identify recurring ethical concerns, which were then categorized based on their relevance to consent, user rights, data transparency, and the ethical use of data in different networking environments. Findings reveal a significant gap between technological advancements and ethical frameworks governing data privacy. While legislation like the General Data Protection Regulation (GDPR) has advanced the cause of privacy protection, many challenges remain, including ambiguities surrounding consent mechanisms, lack of user control over data, and the potential for discriminatory practices through data profiling. The review also highlights the ethical dilemmas faced by network administrators and companies regarding data breaches and the use of personal data for business gains. In conclusion, the ethical implications of data privacy in computer networking require a balanced approach that considers technological solutions, regulatory measures, and ethical guidelines to ensure user trust and data security. Further research is recommended to develop frameworks that better integrate ethical considerations into networking practices.

Keywords: Data Privacy, Ethical Implications, Computer Networking, Consent Mechanisms, GDPR (General Data Protection Regulation)

Paper ID 314

STUDYING THE ROLE OF VOICE-ACTIVATED E-LEARNING IN ENHANCING KNOWLEDGE ACQUISITION AND USER EXPERIENCE

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Abstract

E-learning has emerged as a vital platform for knowledge acquisition, particularly for marginalized groups such as visually impaired students. Defined as the use of electronic technologies to access educational content, e-learning has revolutionized traditional learning paradigms by enabling flexible and accessible educational experiences. However, visually impaired students often encounter significant barriers that hinder their ability to benefit from these technological advancements. This study explores the effectiveness of a voice-activated e-learning system for visually impaired learners in Sri Lanka, using a quantitative methodology with a sample of 80 students. While data were initially collected through a questionnaire, limitations in gathering accurate responses from visually impaired participants prompted the use of interviews as well. The combination of both methods provided a deeper understanding of key factors such as knowledge acquisition, accessibility, sufficiency, efficiency, and affordability, offering a comprehensive view of the system's impact. Findings reveal that 65% of participants lack awareness of available e-learning tools, significantly impacting their engagement. Furthermore, 58% of respondents reported that current resources are insufficient for their educational needs. Accessibility issues were prominent, with low mean scores for the availability of screen readers (1.17) and high scores related to connectivity problems (4.25). Additionally, 72% of participants noted technical difficulties despite finding voice-activated features beneficial. Affordability remains a critical barrier, as 70% expressed concerns about the costs associated with assistive technologies. Correlation analyses indicated a positive relationship between knowledge and user engagement (Pearson Correlation = 0.356), suggesting that increasing awareness can enhance interaction with e-learning systems. The alarming statistic that only 6% of visually impaired individuals achieve GCE Ordinary Level qualifications emphasizes the urgent need for innovative solutions tailored to this demographic. While factors such as availability and efficiency positively influence the education of visually impaired students through voice-activated e-learning platforms, challenges in knowledge dissemination and affordability must be addressed to create a more effective and inclusive educational environment. This research contributes valuable insights into optimizing e-learning systems to meet the needs of visually impaired learners, ultimately fostering an inclusive educational landscape that leverages technological advancements for all vision impaired students.

Keywords: Voice-Activated E-Learning, Visually Impaired Education, Inclusive Learning Technology

Poster Presentation

PID: 99

AI-Driven Password protection: Explore AI can help to detect weak passwords.

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Abstract

The use of passwords to protect sensitive data has increased as a result of the widespread use of digital platforms. But weak passwords continue to be a major cybersecurity flaw, leading to an increase in illegal access and data breaches. Because users frequently choose passwords that are predictable and easy to guess, traditional means of enforcing password policies—such as mandating a minimum length or the inclusion of special characters—are frequently insufficient. This study investigates the potential of using machine learning (AI) to improve the security of passwords through more accurate password detection. Large datasets of stolen passwords may be analyzed by AI-driven algorithms to find patterns that indicate typical password flaws like dictionary terms, repetition, and predictable sequences. AI models can anticipate a password's strength in real time by utilizing machine learning techniques. This goes beyond simple password checks and considers the password against well-known attack methods like dictionary or brute force assaults. Furthermore, AI is flexible, always enhancing its detection methods as it picks up new threats. This method provides a proactive defense by spotting weaknesses before an attacker can take advantage of them. AI can help users create better passwords by producing complex, one-of-a-kind permutations that are less vulnerable to assaults, in addition to identifying passwords that are weak. AI could also work with MFA (multi-factor authentication) systems to make sure that weak passwords are protected by extra safety precautions. The ethical issues surrounding AI-powered password security are also covered in this essay, with a focus on the necessity of privacy and openness in data processing. In the end, artificial intelligence (AI) has the power to completely transform password security by offering a dynamic, data-driven method of identifying and stopping weak passwords, thereby lowering the likelihood of security breaches in a world where connectivity is growing.

Keywords: Msulti-factor authentication, AI

PID: 213

INSIDER THREATS IN BIG DATA STORAGE SYSTEMS: MITIGATION STRATEGIES AND BEST PRACTICE IN OVERTIME RISK AND FUTURE RISK

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Abstract

Big data refers to extremely large and complex datasets that are difficult to manage, process, and analyze using traditional methods. It is characterized by high volume, velocity, and variety, often requiring advanced technologies like distributed computing, machine learning, and cloud platforms to extract valuable insights and drive decision-making. Insider threats present a critical challenge in the security of big data storage systems, given the massive volumes of sensitive information stored and processed. Insiders, whether malicious or negligent, pose a significant risk as they often have authorized access to critical systems, making traditional security measures insufficient. This research explores comprehensive mitigation strategies designed to address both current and evolving insider threats in big data environments. It emphasizes the importance of continuous monitoring, role-based access controls, and anomaly detection through machine learning to reduce over-time risks. Furthermore, it investigates the impact of robust data encryption, behavioral analytics, and zero-trust architectures in fortifying systems against future risks. The research also reviews best practices, such as implementing employee training, fostering a culture of security awareness, and integrating advanced threat detection tools, to minimize the chances of insider incidents. Future risk mitigation strategies are discussed with a focus on predictive analytics and artificial intelligence to proactively identify potential threats before they materialize. By analyzing case studies of past insider threat incidents and evaluating emerging technologies, this paper provides a holistic approach to safeguarding big data storage systems. The findings serve as a blueprint for organizations to implement both immediate and long-term protective measures, ensuring data integrity, confidentiality, and availability against insider compromises.

Keywords: Insider threats, big data storage systems, ML, Mitigation strategies, anomaly detection, Zero-trust architecture, Risk management, Future Risks.

PID: 321
Enabling Decentralized Computing for the Internet of Things

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Abstract

Edge computing is quickly becoming a key technology in the development of the Internet of Things (IoT), 5G, artificial intelligence (AI), and augmented reality (AR). This chapter explains how edge computing works in IoT systems, focusing on two main types: cloudlet computing and mobile edge computing. Unlike traditional cloud computing, where data is sent to distant servers, edge computing processes data closer to where it's created. This reduces delays and improves efficiency, which is especially important for IoT applications that need quick responses, such as smart devices and sensors. Supporting technologies like AI and lightweight virtualization make edge computing even smarter. These tools help analyze data directly at the network's edge, allowing faster decisions without overloading centralized systems. We also explore real-world examples where edge computing is making a difference. In healthcare, it helps doctors make quicker decisions by analyzing patient data in real-time. In manufacturing, it monitors production lines to improve efficiency. In agriculture, smart farming technologies use edge computing to increase crop yields, and in transportation, it optimizes routes to improve delivery times. However, there are still challenges to overcome, such as ensuring data security and developing standardized frameworks. Addressing these issues will open up new opportunities for future research and innovation, further enhancing the impact of edge computing on IoT and various industries.

Keywords: AI, AR, IOT

PID: 316

IMPLEMENTATION OF DIGITAL ENTREPRENEURSHIP IN DEVELOPING COUNTRIES: CHALLENGES AND OPPORTUNITIES

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Abstract

Entrepreneurship typically involves establishing and managing a business venture with the goal of profitability. In contrast, digital entrepreneurship joins digital technologies and the internet to create, operate, and expand business ventures in several aspects. Even though digital entrepreneurship consists of several advantages, some of the challenges has identified, when adapting within developing countries. As the methodology, the author has examined several secondary sources via internet and physical publications such as Books, newspapers, magazines, eBooks, journals, review papers, research papers, and several websites. Some of the major factors among the identified challenges such as financial issues, weak digital infrastructure, weak institutional structures etc. Finally, this paper has considered how digital entrepreneurship can be encouraged within developing nations by providing financial and technical support, improving infrastructure and talent acquisition, and so on.

Keywords: AI, Digital



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Session 02
Biomedical Sciences and Nursing



PID 06

APPLICATION OF SANOFI PASTEUR TETRAVALENT DENGUE VACCINE (CYDTDV; DENGAXIA®) FOR THE PREVENTION OF DENGUE IN SRI LANKA

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Abstract

Dengue has been recognized as a major health problem, causing substantial morbidity and mortality around the world, with recorded outbreaks dating back to 1962. Over the past three decades, the incidence of dengue has significantly increased across all serotypes (1-4). In recent years, there have also been reports of Genotype III of the DENV-3 strains and the emergence of a novel genotype of DENV-1. Strategies like community-based awareness and vector control programs, personal protective measures, and the usage of insecticides only provide a temporary impact on dengue control. Due to the unavailability of antiviral medications to date, vaccination is considered the most preferred strategy for dengue prevention. Despite the development of multiple vaccines like DNA vaccines and subunit protein vaccines, their widespread applicability requires further evaluation. Therefore, utilizing a licensed vaccine like Dengvaxia presents a reliable option to reduce the dengue burden in Sri Lanka. This literature review analyzes findings from clinical trials conducted across various countries, exploring the immunogenicity, safety profiles, and efficacy of the three-dose candidate dengue vaccine. The immunogenicity assessment was based on plaque reduction neutralization tests (PRNT₅₀), where a satisfactory immune response with persistent neutralizing antibodies was observed over a period of 5 years of follow-up. Safety was assessed by monitoring adverse events (AE), where mild solicited and very few unsolicited AEs were reported. The vaccine efficacy was determined against symptomatic virologically confirmed dengue (VCD). The efficacy against serotypes 3 and 4 was relatively higher than the efficacy against serotypes 1 and 2, with the latter being the lowest, supporting its recommendation for use in Sri Lanka to prevent outbreaks and reduce rates of hospitalization.

Keywords: Dengue, Vaccine, Immunogenicity, Efficacy, Safety profile

PID 38

**IDENTIFICATION OF THE FUTURE ROLE OF NANO BIOSENSORS
IN EARLY DETECTION OF COLORECTAL CANCER DISEASE
UTILIZING CIRCULAR MIRNA MARKERS****B. A. Y. N. Perera^{1*}, N. V. P. Anjali¹**¹ *Department of Biomedical Sciences, School of Health Sciences, British College of Applied Studies, Sri Lanka***Abstract**

Colorectal cancer is the world's third most prevalent cancer, affecting both men and women. According to an earlier study, by 2035, the number of incidents of colorectal cancer in emerging nations is expected to reach 25 million. The purpose of this review is to discuss the future role of nano biosensors utilized for circular miRNA-based biomarkers in early diagnosis of CRC and identify the forms of circular miRNA-based biomarkers used for early diagnosis of CRC. Research articles were gathered from the peer reviewed journals which were published within the specific time frame from 2010 to 2024. The inclusion criteria were relevance to the research question, relevance to the thematic content and quality data. The exclusion criteria were relevance to research question, quality of data, duplication, scope of data and thematic saturation. The selected full-text articles published between 2010 and 2024 analysed utilizing a thematic analysis process. The research study explored the various circular miRNA biomarker types and the potential role of nano biosensors in the early detection of colorectal cancer, covering the research gap in published review articles about early detection of colorectal cancer. The integration of the nano biosensors in colorectal cancers offers significant potential to enhance diagnostic precision, enable timely interventions, and ultimately improve patient outcomes. Continued research and development in this field are crucial to optimizing these technologies and translating them into clinical practice, paving the way for more effective and personalized cancer care.

Key words: Colorectal cancer, Early detection, Circular miRNA markers, Nano-biosensors, Future outlook, Nanotechnology

Paper 45

CORRELATION BETWEEN SOME MENSTRUAL ABNORMALITIES (DYSMENORRHAGIA, OLIGOMENORRHEA, MENORRHAGIA) AND SOME LIFESTYLE FACTORS AMONG WOMEN IN A SELECTED HOSPITAL

D.L.A.G.N. Liyanaarachchi
British College of Applied Studies, Sri Lanka

Abstract

The study aims to assess the prevalence of menstruation irregularities, including dysmenorrhea, oligomenorrhea, and menorrhagia, among women at a selected hospital and their correlation with some lifestyle habits. A cross-sectional study was carried out on women in Akaragama Division Hospital in Gampaha using a structured questionnaire. SPSS software was used for inferential statistics, including the Chi-square test. Fifty numbers of participants were given consent to collect their data and carry out the research. After getting consent from participants, Data was collected by a self-administered questionnaire, consisting of 19 questions in 4 sections. Results Data collected on height and weight measurements, menstrual history, lifestyle behaviors, junk food consumption, and sleeping habits were found to be associated with menstrual irregularities (dysmenorrhea, oligomenorrhea, and menorrhagia). Among 50 women most observed menstrual disorders in women were dysmenorrhea(46%), oligomenorrhea(30%), and menorrhagia(16%).76% of women reported irregular cycles. Increase BMI significantly with irregular cycles($p=0.000$). menstrual cycle length($p=0.001$) and menstrual duration flow($p=0.002$) were significant with irregular cycles in this study. Increased BMI was significantly associated with menorrhagia($p=0.043$) and oligomenorrhea($p=0.018$). However, no association with dysmenorrhea. variety types of junk food consumption amount strongly associated with dysmenorrhea($p=0.017$), oligomenorrhea($p=0.001$), and menorrhagia($p=0.002$). Junk food consumption amount is significantly associated with dysmenorrhea($p=.033$). Sleeping hours and sleeping regulations are significantly associated with dysmenorrhea($p=0.016$), ($p=0.004$), and oligomenorrhea. ($p=0.012$), ($p=0.001$). Menstrual irregularities and BMI were shown to be significantly correlated in this study. Menstrual abnormalities are significantly associated with certain sleeping habits and certain junk food habits.

Keywords: Menstruation abnormalities, Irregular cycle

PID 52

INVESTIGATION OF ANTI-INFLAMMATORY, TOXICITY AND PHYTOCHEMICAL PROFILE OF METHANOL AND ETHYL ACETATE EXTRACTS OF SELECTED POLYPORALES SECONDARY METABOLITES

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¹*British College of Applied Sciences, Sri Lanka.*

^{2*}*Spectrum Institute of Science and Technology, Sri Lanka.*

Abstract

Inflammation has been an ongoing burden for patients all over the world. Inflammation plays a key role in defending our body against harmful stimuli, which is critical for survival. Synthetic anti-inflammatory drugs, although effective, contain many harmful side effects. Many synthetic medications like nonsteroidal anti-inflammatory (NSAIDs) can cause acute and chronic toxicities that affect different physiological systems in the body. Secondary metabolites of fungi have been reported with medicinal effects in recent decades. Therefore, the aim of this study was to investigate the anti-inflammatory effects of secondary metabolites of polypore fungi extracted from an unexplored area of Sri Lanka. This research was conducted with two selected isolates: PDA7 and PDA2, utilizing methanol and ethyl acetate secondary metabolites extracts to evaluate anti-inflammatory activity using the egg albumin assay, cytotoxicity, using the brine shrimp assay, and phytochemical profiling using biochemical assays. The PDA7 methanol (15.1%, 26.06%, 25.53%, 24.67%), and ethyl acetate extracts (15%, 19%, 19%, 19%) demonstrated significantly higher anti-inflammatory activity compared to the negative control ($P < 0.05$). Contrastingly, PDA2 did not show any anti-inflammatory effects compared to the control. The four extracts showed different phytochemical profiles when tested for alkaloids, flavonoids, saponins, tannins, terpenoids and phenolic compounds. The effective doses of PDA7 secondary metabolites extracts were not significantly cytotoxic compared to the positive control (30% hydrogen peroxide) ($P < 0.05$). Hence, the outcome of the current study paves a promising potential for anti-inflammatory drugs that are naturally derived and would be an immense benefit for patients suffering from inflammatory conditions.

Keywords: Inflammation, Anti-inflammatory drugs, Natural Products, Fungi, Secondary metabolites.

PID 54

**HAIR GRAYING PATTERNS INDUCED BY PHYSICAL AND
BEHAVIORAL CHARACTERISTICS IN THE GENERAL POPULATION
IN SRI LANKA.**

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¹British College of Applied Studies, Sri Lanka.

Abstract

A well-known physiological sign of aging that is impacted by both inherited and environmental causes, hair graying frequently indicates general health and well-being. While most people consider hair graying to be a normal aspect of aging, some occurrences of premature graying raise concerns about underlying biological and lifestyle variables that can hasten this process. Specifically, it has been demonstrated that a number of behavioral and physical characteristics are associated with the occurrence of premature hair graying (PHG) in younger people. Nevertheless, little is known about the patterns of hair graying, particularly in Sri Lankans. This study intends to provide important insights into the connection between individual health features and hair graying patterns by examining the prevalence, contributory variables, and quality-of-life consequences of hair graying among Sri Lankans. Graying hair is a normal age-related phenomenon that is impacted by both genetic and environmental factors. It is a sign of general health and wellbeing. The purpose of the study is to ascertain the frequency of graying hair, pinpoint the causes, and investigate the effects on life quality. This study looks at a variety of aspects, including diet, lifestyle, medical issues, and genetic predispositions. It does this by using a thorough technique that includes surveys and statistical analyses. Significant relationships between some physical and behavioral characteristics and hair graying have been found, offering important new information for prospective treatments and future studies. A survey of 114 respondents was conducted, collecting data on socio-demographic variables, lifestyle choices, and health conditions. Statistical analyses were performed to determine significant correlations. The results show that stress, lifestyle, and heredity all play significant roles in the commencement of hair graying, which usually happens between the ages of 18 and 30. A noteworthy correlation was discovered between the occurrence of graying hair and stress levels, family medical history, and specific medical disorders such as autoimmune diseases. The significant relationships found between some physical and behavioral characteristics and hair greying offer important new information for prospective treatments and future studies.

Keywords: Hair Graying, Premature hair graying, Lifestyle Factors, Hair Care Practices, Environmental factors.

PID 60

RELATIONSHIP BETWEEN MATERNAL GUT MICROBIOME AND CRAVINGS DURING THE PREGNANCY; A COMPREHENSIVE REVIEW**M.M. Malsha Fernando^{1*}, N.V.P. Anjali¹***¹BCAS Campus, Sri Lanka.***Abstract**

Pregnant women regularly experience cravings, but much less is known about the underlying mechanisms of these cravings. Recent studies point to a feasible connection between these cravings and the mother's gut microbiota. This thorough evaluation intends to clarify the connection between the pregnant mother's gut microbiota and food cravings, emphasizing how microbial composition influences dietary preferences and nutrient consumption. A complete search of the literature was conducted using numerous databases to discover research on the connection between pregnancy-related cravings and the gut microbiota. To consider the influence of microbiome diversity, composition, and characteristics on maternal food cravings, both observational and experimental data were analyzed. There is growing evidence that modifications in the mother's gut microbiota during pregnancy may affect her dietary preferences. Cravings and dietary preferences have been linked to modifications in microbial diversity and the presence of unique bacterial strains. Through mechanisms such as the regulation of hormone levels, neurotransmitter synthesis, and metabolic activities, gut bacteria may also have an effect on these cravings. Pregnancy-related cravings and the mother's gut microbiota have a complex and multifaceted relationship. This study emphasizes the need for further investigation to elucidate the underlying mechanisms of this relationship and to explore possible treatment strategies. Understanding this connection may help improve pregnancy-related health outcomes and food recommendations. To further understand how the gut microbiota influences maternal cravings and the overall health of the pregnancy, future research should focus on longitudinal and intervention-based investigations.

Keywords: Pregnancy Cravings, Gut Microbiota, Maternal Dietary Preferences, Microbial Diversity, Hormonal Regulation, Neurotransmitter Synthesis, Metabolic Activities, Pregnancy Nutrition, Microbiome and Pregnancy

PID 110

“DEVELOPMENT OF CRISPR/Cas9-BASED ANTIMICROBIALS AGAINST *S. aureus* INFECTION.”

Dr. G.N. SILVA^{1*}, G.G.P. KAUSHALYA².

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² *Oxford Brookes University, United Kingdom*

Abstract

Staphylococcus aureus, a Gram-positive bacterium and member of the human microbiota, has developed sophisticated mechanisms to evade antimicrobial agents, including limiting drug uptake, modifying drug targets, inactivating drugs, and actively effluxing them. These intrinsic and acquired resistance strategies underscore the urgent need for alternative treatments. This study aims to develop a novel therapeutic tool targeting drug-resistant *S. aureus* using the CRISPR/Cas9 genome editing technology. Specifically, the study focuses on identifying and targeting three key drug resistance genes; *coa*, *sec*, and *blaZ* through a comprehensive literature review and sequence retrieval from the NCBI database. Specific gRNA was designed for each gene, ensuring specificity and minimizing off-target effects using tools such as Sigma-Aldrich's Oligo Evaluator. Recombinant vectors were designed by incorporating specific gRNAs into the pCasSA-Puro plasmid vector, with precise insertion confirmed via vector mapping. By knocking out the *coa*, *sec*, and *blaZ* genes, which are critical for immune evasion, virulence, and antibiotic degradation respectively, this approach aims to disrupt key resistance pathways and restore the efficacy of existing antibiotics. The successful application of CRISPR/Cas9 in this context not only offers a promising strategy for combating resistant *S. aureus* infections but also enhances our understanding of the bacterium's resistance mechanisms, paving the way for innovative therapeutic interventions.

Keywords: *S. aureus*, CRISPR/Cas9, Antibiotic, Drug resistance

PID 129

SUSTAINABLE BIOPLASTIC PRODUCTION FROM KITCHEN WASTE: UTILIZING CASSAVA PEELS, POTATO PEELS, FRUIT PEELS, EGGSHELLS, AND BAKERY WASTE

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Abstract

Concerns about the environmental impact of typical plastic manufacture have fueled interest in environmentally friendly and sustainable alternatives, including bioplastics. This research explores the feasibility of producing bioplastics from kitchen waste, specifically cassava peels, potato peels, fruit peels (banana, orange), eggshells, and bakery waste. These materials were selected due to their high availability, rich organic content, and being considered waste, making them ideal candidates for bioplastic synthesis. The study's goal is to investigate the production process, optimize the formulation, and assess the physicochemical properties of bioplastics made from these sources. The kitchen waste materials undergo a series of preprocessing steps, including hydrolysis to break down complex carbohydrates into fermentable sugars, fermentation, and polymerization. Glycerol, a biodegradable plasticizer, is added to enhance the flexibility and durability of the bioplastic, while acetic acid (vinegar) is employed to adjust the pH to 2.4, aiding in the gelatinization process and acting as a catalyst. The results demonstrated that each type of kitchen waste contributed unique properties to the bioplastics. Cassava and potato peels, rich in starch, provided a strong and flexible matrix. Banana and orange peels, containing cellulose and pectin, added rigidity and biodegradability. Eggshells, primarily composed of calcium carbonate, enhanced the mechanical strength, while bakery waste, rich in carbohydrates, facilitated efficient fermentation into polyhydroxyalkanoates (PHAs). The bioplastics produced were tested for their mechanical properties (tensile strength, flexibility), biodegradability, water absorption, and thermal stability (30°C-300°C). The findings indicated that bioplastics derived from kitchen waste not only possess comparable properties to conventional plastics but also offer significant environmental benefits, including reduced carbon footprint and enhanced biodegradability. This research underscores the potential of utilizing kitchen waste as a sustainable raw material for bioplastic production, offering a sustainable alternative to conventional plastics, and contributing to waste management and the development of eco-friendly materials.

Keywords: Sustainable Materials, PHAs, Biodegradability, Glycerol, Fermentation, Acetic Acid

PID 130

EVALUATION OF PAPAIN FROM PAPAYA (*CARICA*) AS A NATURAL MEAT TENDERIZER

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Abstract

This research evaluates the effectiveness of papain, a protease enzyme obtained from *Carica papaya*, as a natural meat tenderizer and investigates its potential commercial use. Due to its proteolytic properties, papain is viewed as a natural substitute for artificial meat tenderizers, offering benefits such as affordability and food safety. The study aims to assess the effects of pH, temperature, and enzyme concentration on papain's ability to tenderize various meats, including chicken and beef. Following the processing and purification of papain, tests were conducted with different concentrations (0.1%, 0.5%, and 1%) across acidic, neutral, and alkaline pH ranges, as well as at various temperatures (4°C to 60°C). Shear force analysis and texture profile analysis (TPA) were employed to measure the tenderness of treated meat samples, and a trained panel conducted sensory evaluations of the meat's taste, texture, and overall quality. Nutritional studies were conducted to evaluate nutrient retention after treatment. The findings indicated that papain significantly increased the tenderness of all types of meat; however, its activity was strongly influenced by temperature and pH. Optimal tenderization occurred at moderate temperatures (30–40°C) and slightly acidic pH levels; higher concentrations of papain accelerated tenderization but occasionally resulted in over-softening. Sensory assessments validated the improved texture and flavor profiles of the papain-treated meat. A cost analysis demonstrates that papain, as an inexpensive and natural source, is an economically viable option for large-scale meat processing. This study proposes papain as a natural, effective meat tenderizer with potential applications in the food industry to prevent hyper-tenderization and maintain meat quality.

Keywords: Meat texture, Plant enzymes, Proteases, Tenderness, Commercial use, *Carica*

PID 140

THE IMPACT OF CONSANGUINEOUS MARRIAGES ON GENETIC DISORDERS - A FOCUS ON β -THALASSEMIA AND AUTISM SPECTRUM DISORDER

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Abstract

Whenever two people marry consanguineously, it means they have at least one common ancestor extending beyond second cousins and double first cousins and which is prevalent in many cultures, increasing the risk of children inheriting genetic diseases, including β -thalassemia. This research aimed to determine the frequency and sociodemographic characteristics of consanguineous unions and assess their impact on β -thalassemia prevalence in Sri Lanka. Medical genetics studies the impact of inbreeding and consanguinity on human health, as these unions have been widespread throughout history. Approximately 20% of people on the planet now live in cultures that support these kinds of unions. Consanguinity is a known risk factor for autosomal recessive disorders (7.4%), so when evaluating patients for autism spectrum disorder ASD, clinicians should routinely screen for it. A severe neuropsychiatric illness with significant hereditary roots was autism spectrum disorder (ASD). The hereditary components of autism, however, vary greatly throughout individuals, with distinct loci impacting the illness to differing degrees. These genetic variables exhibited a spectrum of phenotypic expressions, or penetrance from completely penetrant point mutations to polygenic forms requiring complex interactions between genes and the environment. Autism spectrum disorders were linked to intellectual impairment, influenced by genetic abnormalities. Genetic testing is not consistently done, and families should consider it if consanguinity is suspected. Among its many problems, the well-known developmental disorder autism was marked by repetitive behaviors as well as social and communication deficits. The etiology of autism was influenced by both genetic and environmental factors, but there are currently no known specific molecular markers for the condition, making it extremely heterogeneous. Genetic research revealed a number of genes that help explain the complexities of ASD, highlighting the significance of taking sociocultural contexts into account when managing genetic disorders with focused public health interventions.

Keywords: Consanguineous marriages, Genetic diseases, β -thalassemia, Autism spectrum disorder (ASD)

PID 141

A SYSTEMATIC REVIEW OF COST-EFFECTIVE BIOMARKERS FOR EARLY CANCER DETECTION IN SRI LANKA.

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Abstract

The incidence rates of cancer are increasing in srilanka, and along with inadequate healthcare facilities, stringent early detection mechanism is in order. This study looks at investigating cost-effective biomarkers for early diagnosis of cancer that can help in improving the early detection capabilities of the Sri Lankan healthcare system. A systematic literature search in PubMed, Scopus, and Web of Science databases. Later, systematic review of recent literature and analysis of data for biomarkers such as ctDNA, serum protein markers and microRNAs as performed from local hospitals. Our findings have indicated that serum proteins, especially carcinoembryonic antigen (CEA) and alpha-fetoprotein (AFP) are good markers for gastrointestinal and liver cancers, respectively. Besides, microRNAs recently showed promise as non-invasive biomarkers with high sensitivity and specificity concerning early-stage detection of malignancies common in srilanka, such as breast and cervical cancers. We have also carried out a cost analysis, comparing the economic implications of using these biomarkers in routine screening programs with that of traditional diagnostic methods. The analysis carried out shows that integration may lead to significant cost savings by easing the economic burden resulting from late-stage cancer treatment. It supports sustainable economically viable and clinically beneficial investment in these biomarkers. This really brings into sharp focus the urgent need for public health awareness of the risks of cancer and the need for early detection. Based on available resources within local healthcare and encouraging collaboration among various stakeholders we recommend the adoption and implementation of these biomarkers as an inexpensive strategy towards improving cancer outcomes in srilanka. The findings add to the continuing discussion of accessible healthcare solutions and support the creation of policies prioritizing the early detection of cancer, which saves lives and decreases costs associated with healthcare. This research marks one of the major steps involved in providing a stratified cancer-screening strategy in srilanka, tackling challenges at the clinical and economic levels with equity.

Keywords: Cancer Detection, Biomarkers, Sri Lanka, Cost-Effectiveness, Public Health

PID 178

ASSESSMENT OF KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING ANTIMICROBIAL RESISTANCE AMONG INDIVIDUALS AGED 20-30 IN THE DIVISIONAL AREA OF ELPITIYA, SRI LANKA.

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Abstract

The excessive use and misuse of antimicrobial agents are the primary causes of antimicrobial resistance (AMR), a serious worldwide health concern. Addressing that requires a comprehensive understanding of the public knowledge, attitudes, and practices (KAP) regarding AMR. The KAP of people with AMR aged 20-30 in the Elpitiya Divisional area of Sri Lanka was evaluated for the study. This study aims to assess the knowledge, attitudes, and practices (KAP) regarding antimicrobial resistance (AMR) among young adults aged 20-30 in Elpitiya, Sri Lanka. A cross-sectional survey of 108 people was conducted using convenience sampling. Before data were collected, pre-testing and validation were done using a standardized questionnaire covering demographics, AMR knowledge, attitudes toward antimicrobials, and self-reported antibiotic usage practices. Descriptive statistics were used for data summarization and chi-square tests were used to investigate the connections between KAP scores and different demographic variables. The study showed that the participants' knowledge of AMR was extremely inadequate. The results showed that 45.4% of participants understood the importance of completing prescribed drug courses, while 34.3% were aware that antimicrobial misuse could result in resistance. Remarkably, 58.3% of respondents admitted to self-medication. The people with a higher education level had a significantly higher level of knowledge about AMR ($X^2=15.841$, $P<0.05$). Further no good practices ($X^2=19.267$, $P<0.05$). Graduate-level educated individuals exhibit higher rates of poor habits. It highlights the gap between awareness and practices. The results show how critically young adults in rural areas need focused educational programs and stronger regulations that eliminate myths and encourage safe antimicrobial use. Future research should focus on intervention studies to evaluate the long-term effects of educational interventions and policy changes on AMR trends in comparable settings.

Keywords: Antimicrobial Resistance (AMR), Knowledge, Attitudes & Practices (KAP), Antibiotic misuse, public health

PID 184

ASSOCIATION BETWEEN BLOOD GLUCOSE LEVEL AND TOTAL CHOLESTROL LEVEL IN TYPE 2 DIABETIC PATIENTS

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Abstract

Type 2 diabetes mellitus (T2DM) causes metabolic abnormalities such as dyslipidemia, which raise cardiovascular disease risk. This research examines the correlation between blood glucose level (BGL) and Total Cholesterol (TC) in T2DM patients. A cross-sectional study conducted at the Clinical Biochemistry department, Medichex (PVT)Ltd, Colombo, Sri Lanka from March to August 2024, total DM 379 patients with age >18 years. BGL and TC were assessed. Descriptive statistics, T-test, ANOVA and linear regression were analyzed using SPSS version 22 statistical software. $p < 0.05$ considered as statistically significance. Of 379 T2DM patients, 291 were pre-DM, 323 were males, and 281 were 30-60 years. The mean age, BGL, and TGL were 42 years, 122 mg/dl, and 205 mg/dl. significance ($p < 0.05$) changes were seen between pre-DM and DM in BGL (108 mg/dl vs 171 mg/dl) and TCL (208 mg/dl vs 194 mg/dl). In T2DM patients, TCL had a significance positive correlation ($p < 0.001$) with gender ($r = +0.161$) and a negative correlation with age ($r = -0.276$) and BGL ($r = -0.072$). BGL showed a significance positive correlation ($p < 0.001$) with age ($r = +0.356$) and a negative correlation with gender ($r = -0.392$). In pre-DM patients, TCL was statistically ($p < 0.001$) significance positive correlation with gender ($r = +0.187$) and BGL ($r = +0.073$) and statistically ($p < 0.001$) significance negative correlation with age ($r = -0.245$). BGL was statistically ($p < 0.001$) significance positive correlation with age ($r = +0.301$) and statistically ($p < 0.001$) significance negative correlation with gender ($r = -0.025$). Among DM patients, TCL was statistically ($p < 0.001$) significance positive correlation with gender ($r = +0.018$) and BGL ($r = +0.080$) and statistically ($p < 0.001$) significance negative correlation with age ($r = -0.259$). BGL was statistically ($p < 0.001$) significance positive correlation with age ($r = +0.080$) and statistically ($p < 0.001$) significance negative correlation with gender ($r = -0.249$). This study shows a link between BGLs and TC in T2DM patients. The finding supports the need for integrated diabetes management strategies that focus on both glucose control and lipid management to mitigate cardiovascular risk.

Keywords: T2DM, Blood glucose, Total cholesterol

PID 187

PROPERTIES OF LIMONENE AND ELEMICIN FOUND IN MYRISTICA FRAGRANS (HOUTT.) (NUTMEG)

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Abstract

Nutmeg, also called as *Myristica fragrans*, is a well-known spice for its medicinal, antimicrobial, cosmetic, culinary and therapeutic properties. Limonene and elemicin are two of the important constituents found in the nutmeg essential oil. This study focuses on examining the pharmacokinetic aspects notably the absorption, distribution, metabolism, excretion, and toxicity (ADMET) of these two components using online tools. For this study Molinspiration and pkcsn softwares were used. Canonical structures of chemical compounds were taken from PubChem online site. The study outlines that limonene is a favorable component as it exhibits pharmacokinetic properties such as high intestine absorption (95.9%), high Caco2 permeability, high VDss, a good blood-brain barrier permeability and it did not show any inhibition of the vital enzymes in the liver which aids in drug metabolism. Limonene is not a carcinogenic agent and it has shown good nuclear receptor bioactivity which indicates it may have anti-cancer properties. On the flipside, elemicin has pharmacokinetic properties which are concerning and using lethal amounts can lead to health complications. It is mutagenic and inhibits the vital CYP1A2 enzyme, causing potential erroneous interactions between medications. Even though it has a high absorption, the toxicological concerns outweigh this. Therefore usage of elemicin should be restricted as per the findings. Limonene's safety profile and its bioactivity suggest that it can be studied further and be can developed into a medication for many tumors. After analyzing the results, this study concludes that limonene is suitable for oral administration for various cancers while elemicin is not.

Keywords: ADMET, Elemicin, Limonene, Safety profile

PID 196

PIG-BASED MODELING OF HUMAN CARDIOVASCULAR DISEASES: PROSPECTS FOR CLINICAL TREATMENTS

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Abstract

Pigs are increasingly recognized as valuable preclinical models for human cardiovascular disorders due to their anatomical and physiological similarities, making them ideal for evaluating novel therapeutic strategies. This study is to investigate the dynamics of heart development, the viability of regenerative therapies, and the utility of porcine models in exploring both congenital and acquired cardiac conditions. Recent discoveries reveal that neonatal pig hearts possess a regenerative capacity comparable to that of small animals, such as rats, thus opening new avenues for cardiac repair research. However, the growth, nucleation, and maturation of cardiomyocytes vary significantly between people and pigs, which may limit the direct applicability of porcine findings to human therapies. Genetically engineered pig embryos and fetuses, gathered during seven developmental phases (days 20 to 115 of gestation), were used in the study. Three-dimensional histology reconstructions, magnetic resonance imaging (MRI), and episcopic confocal microscopy were used to provide comprehensive assessments of heart morphology. On late-stage fetuses, sequential segmental analysis was performed to map the development of heart morphogenesis. Porcupines harboring mutations in the chromatin modifier gene SAP130 were produced to simulate congenital abnormalities such as dysplasia and tricuspid atresia. The findings indicate that by day 30, the key heart growth processes such as looping and septation have finished, whereas valve maturation continues into day 42. Tricuspid dysplasia was seen in mutant pigs, and severe tricuspid atresia resulted in early embryonic mortality, mirroring features of congenital heart disease in humans. The results indicate that although pigs are reliable models for investigating the genetic and developmental components of cardiovascular disease, considerations related to the biology of cardiomyocytes must be taken into consideration when applying these findings to human treatment. In the end, porcine models provide a useful platform for advancing cell- and gene-based therapies meant to enhance the prognosis for congenital and regenerative heart disorders.

Keywords: Pigs, Preclinical models, Cardiovascular disorders, SAP130, Regenerative therapies, Cardiac repair

Paper 215

BIRTH AND MATERNAL PROFILE OF BABIES BORN IN TEACHING HOSPITAL ANURADHAPURA, SRI LANKA

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Abstract

Hospitals are the most common place of birth in Sri Lanka. A hospital based descriptive cross-sectional study was conducted to describe maternal and birth profile of babies born in postnatal wards, Obstetrics and Gynecology Unit at Teaching Hospital Anuradhapura, Sri Lanka between October to November 2023. Ethical clearance was obtained in Ethics Review Committee of Faculty of Medicine, University of Jaffna. Among the mothers attended to the postnatal wards at Teaching Hospital Anuradhapura 597 were taken as the sample of this study. Majority (51.6, n=308) of the babies were females. Most of the mothers were between the ages of 20 – 34 years (80.6%), married (99.7%), Sinhalese (81.2%) and housewives (78.2%). According to their past medical history, they had Diabetes mellitus, Bronchial asthma, Epilepsy, Hypertension, Hypothyroidism, and Psychiatric diseases, which comprised 2.5%, 10.4%, 1.7%, 1.3%, 2.8%, and 1.5% respectively. Most of them (99.0%) followed >4 antenatal clinic visits. Regarding past obstetric history, 17.4% had abortions, 17.1% had previous cesareans, and 9.5% had subfertility. The main present pregnancy complications were Pre rupture of Membrane (10.2%), and rest were Pregnancy induced Hypertension (9.4%) and gestation diabetes mellitus (9.7%), while more than half of the mothers (56.0%) were not diagnosed with pregnancy complications. More than half of the mothers (62.1%) had vaginal deliveries. The mean gestational age of the babies was 38.2 ± 2.0 weeks. The prevalence of preterm birth was 9.5%. The low prevalence of preterm birth indicates that Sri Lanka is a Low- and Middle-Income Country in which the government is the principal health-care provider and all health services are free.

Keywords: Births, Pregnancy complications, Preterm birth, Anuradhapura Hospital

PID 216

DEVELOPMENT OF A CRISPR TOOL KIT FOR THE KNOCKOUT OF CD36

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Abstract

The CRISPR-Cas9 system has revolutionized genetic engineering by enabling precise gene editing. *CD36* is a transmembrane glycoprotein which plays a crucial role in various cellular processes, including lipid metabolism and cell adhesion, and has been implicated in cancer progression. This study aims to design a CRISPR tool kit for the effective knockout of *CD36* in human cancer cells using the Homology-Directed Repair (HDR) pathway. A total of 66 sgRNAs were designed using ATUM, Horizon's CRISPR Design Tool and CHOP-CHOP Harvard with one sgRNA was selected based on the target location, on-target efficiency and minimized off-target effects. The selected sgRNA targeted the first coding exon (exon 3) to enhance knockout efficiency, as mutations in later exons may not trigger nonsense-mediated decay. The selected sgRNA exhibited 65% GC content, a T_m of 72.4°C, no secondary structure formation, and 100% sequence similarity to all mRNA variants of *CD36*, with no predicted off-target effects. The designed sgRNA was synthesized and cloned into the pSpCas9(BB)-2A-Puro vector, and the recombinant plasmid was verified through colony PCR. The donor template for HDR-mediated repair was designed to incorporate an *EcoRI* restriction site (GAATTC) and a 6xHis-tag (CATCACCATCACCATCAC-Stop) at the double-stranded break site, allowing identification of the target PCR amplicon via restriction enzyme digestion and the truncated protein via western blot. The sgRNA-cloned recombinant vector, along with the donor template, will be co-transfected into cancer cells to facilitate the precise knockout of *CD36*. This will result in a truncated *CD36* protein consisting of 18 amino acids (2.2 kDa). Knockout efficiency will be confirmed through PCR, sequencing, RT-PCR and western blot analysis. This CRISPR knockout strategy not only offers a powerful approach to uncover the role of *CD36* in tumor biology but also holds the potential for developing targeted therapeutic strategies against *CD36* in cancer treatment.

Keywords: CRISPR, *CD36*, Cancer

PID 235

RELATIONSHIP BETWEEN TOTAL CHOLESTEROL AND DIFFERENT ABO AND RH GROUP IN HEALTH ADULT

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Abstract

Total cholesterol (TC) is a key marker for cardiovascular health, with its levels influenced by genetic, dietary and physiological factors. Emerging research suggest that blood group may impact lipid metabolism. This study investigated how total cholesterol levels vary across different ABO and Rh blood groups in healthy adults. A cross-sectional study was conducted with 146 healthy adult participants (132 males and 15 females). ABO/Rh blood groups and TC were determined by standard tube method and using the Mindray BS480 fully automated biochemistry analyzer, respectively. t-Test, ANOVA and logistic regression analysis were done for data analysis using SPSS statistical software. $P < 0.05$ was considered statistically significant. A total of 146 participants, blood group O, A, B and AB had 42%, 27%, 25% and 6%, respectively. Rh factor positive and negative had 94% and 6%, respectively. Individuals with blood group AB had the highest mean TC (183 mg/dl) compared to others. Participants with blood group A had lower mean TC (180 mg/dl) than those with blood group AB, but higher than those with blood group B. Blood group B individuals had intermediate TC (175 mg/dl), lower than group AB but higher than group O. Blood group O had the lowest mean TC (172 mg/dl) among all ABO groups. The study revealed significant differences in TC among different ABO groups but not within Rh factor categories. Analysis showed no significant variation in TC between Rh-positive and Rh-negative individuals. The Rh factor did not appear to influence TC independently of ABO blood group status. The study demonstrated that TC vary significantly across ABO blood group with blood group AB individuals showing the highest levels and blood group O the lowest. These finding suggested a potential genetic or metabolic link between blood group types and TC. However, the Rh factor did not independently affect TC in this context. Understanding these variations can contribute to more personalized approaches in cardiovascular risk assessment and management.

Keywords: Total cholesterol, ABO blood group, Rh factor, Healthy adults

Paper ID 246

EVALUATION OF THE RELATIONSHIP BETWEEN PSYCHOLOGICAL STRESS AND FEMALE FERTILITY

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Abstract

This systematic review investigates the relationship between stress and female fertility, examining how psychological stress impacts reproductive outcomes. The study highlights the significance of understanding this relationship in the context of rising infertility rates and stress prevalence. The study outlines the comprehensive search strategy, inclusion and exclusion criteria, and data extraction processes. Studies included in the review were selected based on their focus on stress and fertility. The seven articles in the review involved quantitative measurements of stress and reproductive outcomes. Critical appraisal of the selected seven studies was conducted using the Critical Appraisal Skills Programme (CASP) tool, ensuring the reliability and validity of findings. Thematic analysis identified several key themes, including Fertility and menstrual cycle, stress and measurement, biological pathways and interventions and management. Despite some conflicting findings, the overall evidence suggests a significant correlation between stress and reduced fertility. The research findings highlight the practical implications for healthcare providers and policymakers in managing fertility issues. Psychological stress can be a significant contributing factor to fertility problems in women, which is still not fully understood. The review emphasizes the need for effective stress management strategies to improve female reproductive health outcomes. In conclusion, addressing stress in fertility treatments is essential for the overall well-being of women facing reproductive challenges. Recommendations for future research include longitudinal studies to better understand causal relationships, adopting specific stress management interventions and understanding the potential biological pathways mediating the connection between stress and fertility. This review contributes to enhance fertility treatments outcomes addressing the role of stress on female infertility.

Keywords: Stress, Anxiety, Depression, Bipolar Disorder, Female, Fertility

Paper 260

NUTRITIONAL STATUS AND ASSOCIATED DIETARY FACTORS AMONG LACTATING MOTHERS IN SOUTHERN SRI LANKA

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Abstract

In many local regions, lactating mothers encounter nutritional challenges. The aim of this study was to assess the nutritional status and associated dietary factors in these communities. A descriptive cross-sectional study was conducted in the Bope-Poddala and Galle MOH (Medical Officer of Health) areas of Galle district, Sri Lanka. Lactating mothers (n=220) who attended to maternal and child health care clinics were recruited for the study by convenience sampling technique. Height, weight, waist circumference (WC), hip circumference (HC) and mid upper arm circumference (MUAC) were measured according to standard protocols. BMI was used to assess the nutritional status of mothers. Dietary data were collected using 24-hour dietary recall. Nutrient intake was estimated using FoodBase2000 software with a database validated for Sri Lankan recipes. Accessibility to the software was facilitated by the Department of Applied Nutrition, Wayamba University of Sri Lanka. Majority of the lactating mothers were within the age group 29-40 years and unemployed. According to BMI, the prevalence of underweight and obesity was 9% and 24% respectively. Majority of the participants had a high dietary diversity score (DDS). Mean energy (1810.3 kcal), protein (58.4 g), calcium (516.7 mg), iron (11.7 mg) and fiber (11.6 g) intake were lower than the recommended dietary allowance (RDA). BMI had a positive correlation with total energy ($p=0.011$), protein ($p=0.015$), fat ($p=0.009$) and carbohydrate ($p=0.02$) intakes. WC and MUAC had positive correlations with fat intake ($p=0.003$ and $p=0.006$ respectively) while weight had positive correlations with total energy ($p=0.017$), protein ($p=0.043$), fat ($p=0.004$) and carbohydrate ($p=0.04$) intakes. The positive correlations between BMI, waist circumference, and nutrient intake highlight the impact of diet on maternal health, emphasizing the importance of meeting recommended dietary allowances. The prevalence of underweight and obesity among lactating mothers, despite a high dietary diversity score, emphasizes the need for targeted nutritional interventions and nutrition education.

Keywords: Mid Upper Arm Circumference (MUAC), Body Mass Index (BMI), Dietary Diversity Score (DDS), Recommended Dietary Allowance (RDA)

Paper 338

INVESTIGATING RAT-BORNE VIRAL INFECTIONS IN PADDY FIELD ENVIRONMENTS: PREVALENCE, RISK FACTORS, AND PREVENTION STRATEGIES

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Abstract

This research investigates rat-borne viral infections, specifically leptospirosis and hantavirus, in paddy field environments, highlighting their prevalence, associated risk factors, and necessary prevention strategies. These infections present significant public health threats in agricultural settings, where humans frequently come into contact with contaminated water, soil, and rats. The study's objectives included assessing the prevalence of these infections among patients exposed to paddy field environments, identifying pathogens, evaluating antibiotic resistance, and analyzing environmental and occupational risk factors. Field visits were conducted to collect environmental samples from areas with high rat activity, followed by pathogen identification using molecular diagnostics, including PCR and serology. Antibiotic susceptibility testing revealed resistance patterns in certain pathogens. Patient medical records were analyzed to correlate clinical symptoms with environmental contamination. A systematic review of relevant literature from 2012 to 2021 further aided in identifying risk factors associated with these infections. Results demonstrated the presence of *Leptospira* species and hantavirus in environmental samples, with several pathogens showing resistance to commonly prescribed antibiotics, raising concerns regarding treatment effectiveness. Key risk factors identified included exposure to contaminated water and mud, along with proximity to agricultural land, placing farmers at heightened risk due to occupational exposure. The findings highlight the urgent need for comprehensive preventive measures, such as health education, sanitation improvements, and tailored treatment protocols, to mitigate the incidence of rat-borne viral infections. Immediate interventions are critical to reducing public health impacts in resource-poor regions. The study underscores the importance of ongoing surveillance, community engagement, and interdisciplinary collaboration for effective control of these neglected zoonotic diseases.

Keywords: Rat-borne viruses, Leptospirosis, Hantavirus, Zoonotic diseases, Public health, Paddy fields

Paper ID 342

PREPARATION OF NANO-EMULSION OIL IN WATER FOR EFFICIENT DELIVERY OF AYURVEDIC FORMULATIONS

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Abstract

This study explores the development of a nanoemulsion of oil in water for the efficient delivery of Ayurvedic formulations. The research focuses on developing a novel drug delivery system for burn treatment using essential sesame oil enriched with five active constituents: Turmeric, Black cumin seeds, Cumin seeds, Fennel seeds, and Terminalia chebula. The goal is to improve the oil's effectiveness by creating a nanoemulsion that delivers the active ingredients directly to burned wound sites. In order to create the desired oil formulation for burn treatment, the materials and methods involve the active compounds extracted into sesame oil. Creating the nanoemulsion 7.5 mL, 2.8 mL, and 39.7 mL of essential oil, Tween 20, and distilled water are mixed respectively. A stable nanoemulsion is achieved by first forming the coarse emulsion via stirring for 40 minutes while the surfactant added dropwise and subjecting it to bath sonication for 1 hour. Using a dialysis membrane bag test, the kinetics of drug release are analyzed, and the results show that the nanoemulsion is significantly effective at releasing the drug than the oil alone. These results emphasized the increased therapeutic efficacy of the nanoemulsion in delivering active constituents and highlight the potential of nanoemulsion as a promising drug delivery system for Ayurvedic formulations, particularly in burn treatment. Further research could concentrate on optimizing formulation parameters and investigating the nanoemulsion's long-term stability.

Keywords: Nanoemulsion, Drug delivery, Ayurvedic formulations, Burn treatment, Sesame oil, Active constituents, Drug release kinetics.

Poster presentation

PID 37

ASSESSING MENSTRUAL HYGIENE KNOWLEDGE AND PRACTICES AMONG ADOLESCENT GIRLS IN JAFFNA, SRI LANKA.

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Abstract

Menstrual hygiene in rural environments is a problem that is often ignored. Adolescent females who don't follow good menstrual hygiene may be more vulnerable to long-term health problems, such as urinary tract infections and reproductive tract infections. The aim of this research is to assess the current state of knowledge and practices regarding menstrual hygiene among female adolescents enrolled in government schools in the Vadamarachchi region of the Jaffna district, ranging from grade 10 to grade 13. This study was conducted as a descriptive cross-sectional study among this age group of students. Approximately 230 students who had attained menarche during the survey period were selected using a multi-stage probability sampling method. Relevant associations of menstrual hygiene with sociodemographic characteristics, knowledge, and self-care practices were analyzed in this study. Information such as the age group of the participants, their grade level, the school's education on menstrual hygiene, the use of sanitary napkins, and WASH facilities were collected. Out of the 230 students, 96.5% of participants agreed that they have enough information regarding menstrual hygiene, such as the fact that menstrual cycles typically last around 28 days and the importance of using clean sanitary products; however, 44.3% of them did not know that inadequate menstrual hygiene increases the risk of infection. Additionally, 50% of the respondents demonstrated a good understanding of menstrual hygiene management and practices in this study. Overall, the study found that more than half of the participants have a good understanding of and adherence to menstrual hygiene management (MHM). However, there are still issues concerning reproductive and urinary health among school students. This may be because, despite having good knowledge and attitudes, some adolescent students do not follow the instructions correctly.

Keywords: Menstrual hygiene; Menstrual knowledge; Hygiene practices; Adolescent girls

Paper ID 43

Chromatographic Application in Diagnosis and Screening of Cardiovascular Diseases in Asian and European CountriesN. Ahamed^{1*}, N.V. P. Anjali¹¹*British College of Applied Studies¹, Sri Lanka.***Abstract**

Cardiovascular diseases (CVDs) are the leading cause of death worldwide, responsible for about 17.9 million deaths each year. This research studied the effectiveness of chromatographic techniques, such as high performance liquid chromatography (HPLC), mass spectrometry-gas chromatography (GCMS), and mass spectrometry-liquid chromatography (LC-MS), in diagnosing and screening CVDs in Asian and European populations. The study compared these advanced techniques to traditional methods, including electrocardiograms (ECG), echocardiography, and angiography. Through the analysis of seven major cardiovascular diseases, namely, coronary artery disease, heart failure, arrhythmias, hypertrophic cardiomyopathy, peripheral artery disease, aortic aneurysms, and valvular heart disease, a comprehensive study was conducted. High-chromatographic speed and specificity were employed in identifying these biomarkers to achieve rapid and accurate results, enabling the detection of diseases at earlier stages. Moreover, environmental and genetic factors are two of the three common elements that contribute to differing biomarker profiles between the two regions. Notably, markers correlating with coronary artery disease in Asia exhibited significantly different patterns compared to those in the European population, indicating a potential link to regional variations in diet and lifestyle factors. The study confirmed that chromatography offers a noninvasive, cost effective alternative for screening asymptomatic patients and diagnosing symptomatic ones. The evidence suggests that the incorporation of chromatographic methods into daily clinical practice can facilitate earlier diagnosis, reduce healthcare costs, and improve patient outcomes. This study adds to the growing database of evidence supporting the use of advanced biomolecular techniques in global cardiovascular care.

Keywords: Cardiovascular diseases, Chromatographic techniques, High performance liquid chromatography

PID 138

BIOPRINTING AND ORGAN ON A CHIP : THE FUTURE OF PERSONALIZED MEDICINE

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Abstract

The advancement of drug testing and in vitro research has revolutionized the field, utilizing technologies like organ-on-chip systems and 3D bioprinting to create physiologically relevant human tissue models, thereby addressing the shortcomings of animal models and conventional cell culture. Organ-on-chip devices replicate human organs' structural and functional attributes, enabling high-throughput drug screening and pathological condition examination. They integrate fluidic systems for precise control of cellular environments, supporting long-term cell culture and controlled stimulation. Bioprinting technology enhances these systems, allowing simultaneous printing of multiple materials and cell types, resulting in heterogeneous 3D structures. Research in bioprinting utilizes bioink to create biomimicking matrices, replicating tumor microenvironments, which are crucial for drug development and screening. Traditional models in oncological research are outdated due to their inability to accurately predict therapeutic outcomes. However, the use of human-induced pluripotent stem cells in organ-on-chip models is revolutionizing personalized medicine. This approach allows for more realistic reproduction of disease conditions, improving our understanding of drug interactions and enhancing predictive drug efficacy and safety in clinical settings. Focusing on improvement in clinical trials is urgent due to the transformative power of organ-on-chip and bioprinting technologies. These technologies can overcome high attrition rates and improve in vitro-in vivo correlations. However, there are still hurdles in translating these technologies into general use. Future studies should incorporate advanced representations of physiological processes into organ-on-chip designs to improve reliability and accuracy in drug discovery and disease modeling. The pivotal moment in biomedical research is the emergence of organ-on-chip and 3D bioprinting technologies, offering a promising avenue for developing more effective preclinical models. These innovations address the shortcomings of traditional models, paving the way for personalized medicine and efficient drug discovery processes. Researchers must leverage these opportunities to enhance human physiology and disease understanding in this evolving field.

Keywords: Bio printing, Organ on a chip, Bio ink, Biomimicking

PID 139

THE BLOOD-BRAIN BARRIER: CHALLENGES IN DRUG DELIVERY FOR NEUROLOGICAL DISORDERS

J.Keerthika^{1*} , S.Subangi¹*¹British College of Applied Studies, Jaffna, Sri Lanka.*

Abstract

The brain is extremely sensitive, thus maintaining the blood brain barrier (BBB), which serves as a barrier against harmful substances. The BBB helps keep it safe from toxins, bacteria, and other harmful substances in the blood that could damage it. Although it's selective permeability makes drug delivery extremely difficult, particularly when treating neurological conditions including brain tumours, Parkinson's disease, and Alzheimer's disease. The BBB's impermeability restricts the efficacy of treatments for many illnesses of the central nervous system (CNS), as many drugs are too large or don't have the right chemical structure to pass through the BBB. Even useful drugs get blocked, which means treatments for brain disorders may not be as effective as they could be. In order to improve medication penetration through the BBB, approaches include targeted ultrasound, nanoparticle mediated transport, and receptor mediated transcytosis. It also discusses the current obstacles in drug delivery to the central nervous system. Reviewing both experimental and clinical research aimed at breaching the blood-brain barrier, I assessed the effectiveness of different drug delivery systems, such as viral vectors, polymeric nanoparticles, and lipid-based carriers. Our analysis showed that receptor-mediated transcytosis and nanoparticle-based methods have demonstrated substantial promise in boosting medication bioavailability in the brain, providing hope for more successful treatment of neurodegenerative diseases. Treating neurological illnesses still presents a significant challenge in getting beyond the BBB's obstacles. Therapeutic approaches for CNS illnesses could be revolutionized and patient outcomes could be greatly improved by the development of effective and tailored drug delivery systems.

Keywords: Blood brain barrier, Neurological, Transcytosis, Neurodegenerative

PID 167

ANALYSIS OF THE SEASHELLS AS A NATURAL WATER FILTER IN FISH TANKS.

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Abstract

This research investigates the viability of seashells as a natural water filtration system for aquariums, particularly in the context of coastal regions, where water quality is often compromised due to pollution and industrial activities. The study aims to explore the potential of seashells as a sustainable and economical alternative to conventional filtration systems, which can be costly and energy intensive. The study required the preparation of two different types of aquariums crushed seashells, without seashells. It analyses essential water quality parameters like pH, turbidity and ammonia levels over a period of three weeks. This was done to see the effectiveness of seashells in removing harmful pollutants from the water like ammonia, nitrites and nitrate. The results from this experiment showed that aquariums containing seashells exhibited better water clarity and lower levels of ammonia compared to their counterpart control tanks. Seashells are mainly made of calcium carbonate and were observed to dissolve slowly, thus buffering pH and adding to waters alkalinity, which suites certain types of fish. The complex structure of the seashells supported the entrapment of organic debris and particulate matter, hence enhancing the general filtration performance. This, however required great care in order to avoid excessive rise in water hardness and alkalinity. Results indicate that seashells act not only as effective natural filters but also contribute toward environmental sustainability by reusing waste that would have been disposed of in landfills. This study showcases the potentially of seashells as eco-friendly option for aquarium filtration systems in srilanka. This method not only purifies water to a better quality for aquatic life but also provides a very feasible solution for communities in coastal areas by advocating for natural materials to be integrated into existing water management practices. Futures research is recommended to explore the long-term effects of seashells use in various aquatic environments.

Keywords: Seashells, Water Filtration, Aquariums, Environmental Sustainability

PID 168

ASSESSING THE RELATIONSHIP BETWEEN STRESS AND IMMUNE SYSTEM FUNCTION IN SRILANKAN YOUTH

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Abstract

This research focuses on young individuals from a specific educational region, examining stress in academic, social, financial, emotional, and environmental health. Stress is the body's reaction to any threat (internal or external) and is recognized for its role in impairing immune function and increasing the risk of infections and cancer, highlighting its significant impact on physical and mental health in today's world. Structured questionnaires measuring stress levels and medical tests measuring immune system characteristics were used to gather data, where higher stress levels are associated with significant changes in immune system markers. The methodology incorporates objective biomarkers of immune function, such as cell counts, cytokine levels, and other pertinent indicators, with quantitative measurements of subjective stress. Findings reveal the impact of stress on health and underscore the role that stress management plays in helping young people develop immunological resilience. A composite stress score was calculated for each respondent based on the intensity, frequency, and severity of illnesses, self-reported health status, frequency of medical consultations, and presence of chronic conditions. Chronic stress affects immunological responses via neuroendocrine and autonomic processes: it triggers the hypothalamic-pituitary-adrenal axis, raises cortisol levels, and inhibits the generation of lymphocytes, proinflammatory cytokines, and immune cell apoptosis. Moreover, increased catecholamines produced by the stimulation of the sympathetic nervous system promote inflammation while suppressing innate defenses. These interrelated effects raise the likelihood of autoimmune illnesses, reduce wound healing, decrease immunological responses, and make individuals more vulnerable to infections. The study highlights the significance of stress reduction in preserving immunological health and has implications for educational and public health initiatives aimed at reducing stress and strengthening immune resilience.

Keywords: Stress, Immune system, Psychosocial Factors, Health, Cytokine levels

PID 169

EVALUATION OF GLYCATED HEMOGLOBIN AS A DIGNOSTIC MARKER IN PRE- DIABETIC INDIVIDUALS

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Abstract

The main objective of this research was to assess the diagnostic efficacy of HbA1c in identifying pre-diabetic and diabetic individuals based on cutoff values of <5.7%, 5.7%-6.4%, and >6.5%, respectively. Blood samples were collected and assayed for HbA1c using standardized enzymatic assays. These values were then compared with the current gold standard for diabetes diagnosis to evaluate their reliability as diagnostic tools for pre-diabetes. ROC curves were used to calculate sensitivity, specificity, and predictive values to determine the performance of HbA1c as a diagnostic tool for early-stage diabetes. HbA1c is an established diagnostic marker for diabetes, reflecting the average blood glucose level over 2-3 months. It provides a longer-term perspective on blood glucose control than fasting blood glucose or oral glucose tolerance and is less susceptible to day-to-day variability. However, the role of HbA1c in identifying pre-diabetic individuals, defined by the American Diabetes Association as those with an HbA1c between 5.7% and 6.4%, remains a subject of active investigation, particularly in its role in clinical screening. Preliminary data indicated that HbA1c provides a more consistent measure of long-term glycemic control, as fasting glucose levels can fluctuate due to short-term influences such as recent meals or stress. If confirmed, HbA1c could become a more widely accepted marker for the diagnosis of pre-diabetes, allowing for earlier identification of individuals at risk of developing type 2 diabetes. This could lead to improved screening guidelines, earlier interventions, and a reduction in the overall burden of diabetes, enhancing public health efforts in the timely detection and management of the disease.

Keywords: Prediabetes, HbA1c, Diabetes Diagnosis, Blood Glucose



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Session 03
Civil & Built Environment

Paper ID: 66

EXPLORING THE ROLE OF MACHINE LEARNING IN THE OPTIMIZATION OF ENERGY EFFICIENCY IN BUILDING DESIGN AND OPERATIONS

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Abstract

The integration of machine learning (ML) in optimizing energy efficiency in building design and operations presents a transformative approach to achieving sustainability goals in the built environment. The study aims to explore the role of ML algorithms throughout the building lifecycle. Moreover, the objectives of the study included to assess the impact of ML-driven energy management systems, to identify challenges and barriers to adoption. By utilizing predictive analytics, ML algorithms can forecast energy consumption and occupancy patterns through historical data analysis, enabling proactive strategies that align energy usage with real-time demand. This capability is essential for resource allocation and operational cost reduction. The integration of renewable energy sources is another critical area where ML proves invaluable, optimizing energy usage and storage solutions while enabling participation in demand response programs. This study focuses to fill these gaps in previous literatures by providing a detailed examination of ML applications and identifying practical strategies for overcoming implementation challenges. The methodology employed in this research involved several key phases to optimize energy efficiency in smart buildings through ML. Initially, a comprehensive dataset comprising historical energy consumption, occupancy patterns, and environmental variables was collected to serve as the foundation for ML model development. Various algorithms, including supervised methods like linear regression and decision trees, as well as deep learning techniques such as neural networks, were selected for energy prediction. The data was divided into training, validation, and testing subsets, with k-fold cross-validation used to enhance model reliability. After rigorous evaluation using metrics like Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), the study revealed that ML techniques significantly improved predictive accuracy, with the best model (neural networks) achieving an MAE of 25 kWh and an R-squared value of 0.92. Furthermore, the optimization of HVAC systems through ML resulted in energy savings of up to 30% by dynamically adjusting settings based on real-time occupancy and environmental conditions, underscoring the effectiveness of data-driven approaches in enhancing energy management in smart buildings.

Keywords: Machine Learning, Energy Efficiency, Predictive Analytics, Smart Building Management Systems and Design Optimization

Paper ID: 68

AN ANALYSIS OF STRUCTURAL FAILURES IN EARLY SKYSCRAPERS: CAUSES, CONSEQUENCES, AND LESSONS FOR MODERN ENGINEERING

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Abstract

This research investigates the structural failures of three foundational skyscrapers: the Equitable Life Building (1870), the Home Insurance Building (1885), and the Tacoma Building (1889). These structures, pivotal to the evolution of high-rise architecture, encountered engineering challenges that offer insights into the limitations of early construction practices. Through archival research including original blueprints, construction records, and historical newspaper accounts this study analyzes the causes and consequences of each building's structural issues. The Equitable Life Building experienced foundational instability due to its heavy stone cladding and inadequate foundation design, underscoring the need for robust geotechnical assessments. The Home Insurance Building, the first skyscraper constructed with a steel frame, faced challenges related to load distribution and wind resistance, emphasizing the importance of managing lateral forces. Similarly, the Tacoma Building encountered material settling and inadequate expansion joints, illustrating the critical role of material selection and design flexibility in preventing structural compromise. In a comparative analysis, common themes emerge around foundation engineering, material limitations, and load management. Lessons from these cases have profoundly influenced modern engineering practices, contributing to advances in building codes, materials science, and the integration of innovative design strategies. Leveraging AI in this context, the research explores how AI-driven analysis of historical data and predictive modeling can enhance contemporary engineering standards, thus informing the design of safer, more resilient, and sustainable high-rise structures. This research aligns with the objectives of the "Harnessing AI in Industry 5.0: Transforming Society" conference, where discussions on the integration of AI in structural engineering underscore AI's potential to drive future innovations. By connecting historical failures to present-day AI-enhanced methodologies, this study contributes to a broader understanding of AI's role in shaping sustainable and resilient urban environments.

Keywords: Structural failures, Skyscrapers, Equitable Life Building, Home Insurance Building, Tacoma Building, High-rise architecture

Paper ID: 69

AN IN-DEPTH STUDY OF AI-DRIVEN BIM INTEGRATION FOR ENHANCED PROJECT MANAGEMENT IN CONSTRUCTION

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Abstract

In the realm of construction project management, the integration of Building Information Modelling (BIM) with Artificial Intelligence (AI) has emerged as a promising avenue for enhancing efficiency and effectiveness. The primary aim of this research is to explore the potential of integrating Artificial Intelligence (AI) with Building Information Modelling (BIM) to optimize project management processes in the construction industry, particularly focusing on the Sri Lankan context. The various contributions of Artificial Intelligence in enhancement of Building Information Modelling (BIM) have been thoroughly investigated in previous studies. However, there is limited research focusing on the integration of AI-driven tools within BIM platforms to optimize project management processes holistically. While the focus of this research is centered on the Sri Lankan construction industry, the findings and recommendations may have broader implications for similar contexts globally. The objectives of the study is described as follows; Investigate Current AI Applications in BIM for Construction Project Management, Assess AI-Driven BIM Integration's Impact on Key Project Management Areas and Identify Key Challenges and Considerations for AI-Driven BIM Integration. The research employs a mixed-methods approach, combining qualitative interviews and focus group discussions with quantitative surveys using a structured questionnaire distributed to construction professionals in Sri Lanka. Key findings reveal that AI-driven BIM significantly enhances cost estimation accuracy, dynamic scheduling, and resource optimization, with predictive analytics widely used to prevent cost overruns and improve risk management. However, technological barriers, skill gaps, and cultural resistance are substantial challenges to implementation. Based on these insights, recommendations include the need for accessible technology infrastructure, targeted training to bridge the skill gap, and organizational strategies to overcome resistance to change. The study suggests further research in contextualizing AI-BIM integration for other emerging markets and evaluating its long-term impact on project efficiency and sustainability in construction.

Keywords - Construction Project Management, Building Information Modelling, Artificial Intelligence, Integration

Paper ID: 75

EXPLORING HOW AI AND MACHINE LEARNING CAN BE USED TO ENHANCE THE ACCURACY OF COST ESTIMATION IN CONSTRUCTION.

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Abstract

Accurate cost estimation is pivotal in construction project management, as it directly impacts project scheduling, budgeting, and the overall feasibility. Traditional methods for cost estimation rely heavily on historical data, expert judgment, and rigid algorithms, which often lead to inaccuracies due to unpredictable factors, human errors, and increasing complexities in project requirements. The aim of the research study is to investigate how Artificial Intelligence (AI) and Machine Learning (ML) can improve the precision and effectiveness of cost estimation in the construction sector. Furthermore, the study examines how integrating predictive analytics can enhance the accuracy of cost estimates by incorporating real-time data and external influences such as supply chain interruptions, regulatory changes, and market volatility. The methodology of this study employed a mixed-methods approach, combining a comprehensive literature review with quantitative and qualitative data collection techniques. A questionnaire survey was administered to industry professionals, including quantity surveyors and project managers, to assess current cost estimation practices and gather insights on the applicability of AI and ML tools. This was complemented by semi-structured interviews with key industry experts to delve deeper into the challenges and benefits associated with AI adoption in construction. Key findings reveal that the integration of real-time data and predictive analytics significantly enhances cost estimation accuracy, with factors like historical data integration and proactive risk management being paramount. However, the study faced limitations, including the reliance on self-reported data, potential biases in participant responses, and the challenges of generalizing findings across diverse construction contexts, particularly in emerging markets like Sri Lanka. Despite these limitations, the research underscores the transformative potential of AI and ML in improving cost estimation practices while highlighting the need for further investigation into overcoming barriers to technology adoption in the construction sector. The study aims to contribute to the success and sustainability of construction projects, particularly in the Sri Lankan context.

Keywords: Cost Estimation, Artificial Intelligence, Machine Learning, Predictive Analytics, Construction Management, Risk Management, Sri Lankan Construction Industry

Paper ID 76

AN ANALYSIS OF THE ROLE OF ARTIFICIAL INTELLIGENCE IN IMPROVING BUILDING SERVICES SIMULATION FOR THE CONSTRUCTION SECTOR

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Abstract

This study explores the role of artificial intelligence (AI) in optimizing HVAC (heating, ventilation, and air conditioning) systems within the construction sector, focusing on enhancing energy efficiency, reducing operational costs, and promoting sustainability. As the demand for energy-efficient building solutions grows, advanced methods for designing, managing, and maintaining HVAC systems are essential. The aim of the research study is to examine how AI can model, predict, and optimize the performance of HVAC systems in construction projects to improve energy efficiency and reduce costs. By analyzing vast datasets such as building usage patterns, climate data, and energy consumption metrics, AI can generate insights that enhance system efficiency. Following was identified as the objectives of the research study; 1. assess how AI can help in designing compact, efficient AC units that require minimal maintenance and are easy to replace, 2. examine how AI can model, predict, and optimize the performance of HVAC systems in construction projects to improve energy efficiency and reduce costs and 3. propose strategies for integrating AI technologies in building services simulation to improve system design, maintenance, and sustainability. Through a mixed-method approach, the study conducts a comprehensive literature review, case studies, and surveys with industry professionals to evaluate current AI applications and the potential for further integration in HVAC design. Findings indicate that AI-driven HVAC systems can achieve substantial energy savings (up to 30%), reduce maintenance costs by 15-20%, and extend equipment lifespan by 30%. However, challenges such as high initial costs and data dependency are barriers to adoption. This research underscores the transformative potential of AI in HVAC optimization, recommending its integration to meet the construction industry's growing sustainability demands.

Keywords: Artificial Intelligence, HVAC Systems, Energy Efficiency, Construction Industry, Sustainability, Predictive Modeling.

Paper ID 77

A COMPREHENSIVE STUDY ON THE APPLICATION OF AI-BASED PREDICTIVE ANALYTICS IN BIM FOR FACILITY MANAGEMENT OPTIMIZATION**M. Vijayaladsumi^{1*}, K. Vaitheki¹***¹British College of Applied Studies, Sri Lanka.***Abstract**

This study investigates the integration of Artificial Intelligence (AI) and Building Information Modelling (BIM) for predictive analytics in facility management, focusing on enhancing decision-making, optimizing maintenance processes, and improving operational efficiency. This research analyses historical data to predict potential facility issues, such as equipment failures, energy inefficiencies, and maintenance needs by leveraging BIM data and applying machine learning algorithms. The aim of this study is to investigate how AI and BIM can be integrated to support predictive maintenance and improve operational efficiency in facility management. The research objectives include evaluating the benefits of AI and BIM in energy management, cost reduction, and proposing strategies for the broader adoption of these technologies in predictive analytics. The scope of the study encompasses AI applications within BIM-enabled facilities to optimize maintenance, energy management, and operational decision-making. This study employed a mixed-methods research approach, combining quantitative analysis of existing datasets to assess the effectiveness of AI-based predictive analytics in Building Information Modeling (BIM) with qualitative insights from semi-structured interviews with facility management professionals. The quantitative results revealed a significant reduction in unplanned maintenance costs by up to 30%, enhanced energy efficiency with decreases in energy usage of 15% to 20%, and an extension of critical asset lifespans by approximately 10%. Qualitative findings highlighted challenges such as data interoperability issues, resistance to technology adoption, and a shortage of skilled personnel, underscoring the need for strategic initiatives to facilitate broader integration of AI and BIM in facility management.

Keywords: Building Information Modeling (BIM), predictive analytics, artificial intelligence, facility management, maintenance optimization, IOT integration, operational efficiency, data-driven decision making, smart buildings and asset lifecycle management.

Paper ID: 81

AN INVESTIGATION OF THE POTENTIAL OF ARTIFICIAL INTELLIGENCE TO ENHANCE THE EFFICIENCY AND EFFICACY OF RESOURCE ALLOCATION UTILISING VALUE ENGINEERING PRINCIPLES

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Abstract

This study aims to explore the integration of Artificial Intelligence (AI) with value engineering principles to improve the efficiency and effectiveness of resource allocation across various industries. By enhancing decision-making and optimizing resource use, AI has the potential to significantly reduce costs while maximizing project value. The primary objective of this research is to develop AI-driven models that apply value engineering principles for smarter resource allocation, ultimately contributing to better project outcomes. The study also seeks to evaluate how AI can streamline processes, minimize waste, and provide real-time insights into resource distribution. The scope of the research encompasses both theoretical analysis and practical applications of AI in industries such as construction and manufacturing, where resource efficiency is crucial. Case studies will be utilized to demonstrate how AI can optimize resource allocation and decision-making processes in real-world settings. A comprehensive literature review and analysis of established VE frameworks guide the research, along with an exploration of AI techniques such as machine learning and predictive analytics. Findings indicate that AI-driven models can improve resource utilization by up to 25%, reduce project delays by an average of 15%, and decrease the time required for VE assessments by approximately 40%. Additionally, the integration of AI with VE practices leads to cost savings of 12% to 18% in resource expenditures, demonstrating the potential for enhanced decision-making and project performance. Despite these positive outcomes, the research identifies limitations, including a lack of practical implementation and the need for further empirical studies. The study concludes by recommending that organizations invest in AI technologies and develop standardized methodologies for integrating AI into VE processes to fully realize the benefits of this innovative approach in resource allocation.

Keywords: Artificial Intelligence (AI), value engineering, resource allocation, machine learning, predictive analytics, decision-making, cost reduction, project management.

Paper ID: 104

DEVELOP A COST ESTIMATION APP USING (AI) AND ADVANCED TECHNOLOGIES TO AUTOMATE AND ENHANCE THE COST ESTIMATION

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Abstract

In the rapidly evolving construction industry, cost estimation remains a critical task often hindered by manual methods, frequent inaccuracies, and fluctuating material and labor costs. Traditional approaches are inefficient, leading to delays, errors, and budget overruns. This research identifies a need for a more accurate and real-time solution, addressing these inefficiencies. To bridge this gap, the project introduces "PlanCost," an advanced app designed to automate and streamline cost estimation using machine learning. The app automatically interprets architectural drawings, and generates comprehensive cost estimates with real-time updates. The project aims to develop a user-friendly AI-powered app that enhances accuracy, efficiency, and decision-making in cost estimation. Key objectives include automating the interpretation of architectural drawings, integrating real-time data for dynamic cost calculations, and utilizing predictive analytics to improve budget management. The methodology involves data collection via Google Spreadsheets issued to 50 hardware stores, 50 engineers, and 50 construction companies to gather realistic unit costs for materials, labor, and plant usage. This data is processed in the app's backend to calculate costs. Users input project information and upload architectural drawings, which the app uses to automatically calculate quantities and generate detailed estimates. The app's development and testing showed significant improvements, reducing manual errors and calculation time by over 50%. Real-time data integration enabled dynamic cost adjustments based on market fluctuations. Pilot testing highlighted the app's user-friendly interface and ability to generate detailed, printable cost estimates, improving decision-making and budgeting accuracy. "PlanCost" successfully streamlines cost estimation and offers a robust solution for modern construction planning.

Keywords: Cost estimation, AI, Machine learning, Real-time data, Automation, Construction industry, Architectural drawings, Budget management.

Paper ID: 114

AN INVESTIGATION INTO THE ROLE OF AI IN ENHANCING VALUE ENGINEERING FOR COST MANAGEMENT IN INFRASTRUCTURE PROJECTS

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Abstract

Integrating Artificial Intelligence with value engineering is revolutionizing cost management in infrastructure projects while curing most of the limitations of traditional methods. With ever-growing infrastructure projects, AI is offering new solutions by enabling project managers to make sense of large datasets, identify opportunities for cost savings, and manage resources more effectively. The aim of this study is to evaluate the multi-dimensional role of AI in improving best practices in value engineering and the cost management of infrastructure projects. Advanced algorithms allow project managers to analyze different design alternatives and costs in real-time, thus making informed choices. These informed decisions can certainly save 10% to 20% of the cost without compromising on quality (Jones, 2021). Admittedly, the adoption of AI does have challenges of its own, including general deficiency in skilled personnel and concerns related to data privacy. The objectives of this study are described as follows; to analyze the current state of value engineering in the construction industry, to assess the role of AI on Value Engineering and cost management practices and to evaluate the potential challenges and limitations of AI implementation in infrastructure projects. The scope of this research is focused on Sri Lankan construction industry, specifically infrastructure projects that utilize value engineering practices. The study employed a mixed-method approach, combining quantitative and qualitative data collection to assess AI's impact on cost management in infrastructure projects. Data was gathered through structured interviews with industry professionals, focus group discussions with stakeholders, and an analysis of case studies. Interviews provided detailed insights into AI implementation, while focus groups captured collective viewpoints on AI's role in cost estimation. The results indicate that AI significantly improves cost management by enhancing accuracy, efficiency, and cost control. Approximately 75% of surveyed professionals use AI in cost estimation, with 60% noting a 20% accuracy improvement, and 65% observing a 30% reduction in estimation time. AI tools were found to reduce cost overruns by an average of 15%. Interviews and focus groups highlighted the need for collaboration between IT and project management to fully leverage AI's benefits, while case studies showcased improvements in cost accuracy and reductions in project timelines. However, challenges like resistance to change, data quality issues, and the need for specialized training remain obstacles to wider AI adoption. Future research should consider longitudinal studies to evaluate the long-term effects of AI on cost management practices.

Keywords: Artificial Intelligence, Value Engineering, Cost Management, Infrastructure Projects, Machine Learning, Construction Industry

Paper ID: 122

PROTECTING FALLING ACCIDENTS USING SENSING TECHNOLOGY

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Abstract

The construction industry is essential to global development but also among the most hazardous sectors, with falls from heights causing 34% of construction-related fatalities in the U.S. Traditional fall protection systems often depend on worker compliance, lacking real-time adaptability. This study aims to address these limitations by developing an automated fall prevention system with deployable safety nets activated through real-time sensing technology. This research employs a systems engineering approach to design a fall prevention system that integrates human detection sensors, an automatic net deployment mechanism, and a centralized control unit. The system's core is an Arduino Uno, which controls the automatic deployment of a safety net through data from an ultrasonic sensor. When the sensor detects an object or human within a specified range, the Arduino processes the signal, activating a DC motor to deploy the net for fall protection. The prototype setup includes a simplified building model constructed from wood, emulating a multi-story structure. At the top of this model, the ultrasonic sensor monitors for movement or objects within its range, potentially detecting a person or object falling. Upon detection, the DC motor engages, triggering the deployment of the safety net, which serves as a protective mechanism akin to those used in real-world construction environments. This approach simulates an automated safety system designed to respond dynamically to fall hazards, offering a scalable method for enhancing safety in high-risk settings. Initial testing demonstrated sensor detection ranges of 10 to 50 cm, with response times between 60 to 100 ms and motor activation within 110 to 150 ms. Challenges with detecting objects at close ranges necessitated design modifications, leading to the implementation of a dual-sensor configuration, a faster motor, and optimized programming. Following these enhancements, the system achieved improved detection times as low as 60 ms and motor activation averaging 105 ms, successfully deploying the protective net even at a close distance of 5 cm with a 100% success rate. This study underscores the viability of sensor-based automated safety mechanisms for construction sites, showing promising potential for reducing fall-related incidents. Future research could explore areas such as energy efficiency, optimal sensor placement, and AI integration for predictive analytics, further bolstering worker safety.

Keywords: Construction safety, Fall prevention, Automated safety system, Real-time sensing, Ultrasonic sensors, Arduino-based control, Deployable safety net

Paper ID 123

Exploring Tensairity Technology for Lightweight and Efficient Civil Engineering Structure

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Abstract

Tensairity is an innovative lightweight structural technology that utilizes low-pressure air to stabilize compression elements and mitigate buckling. This approach marks a significant advancement over traditional construction methods, combining the benefits of tension-based fabric structures with the robustness of compression elements. The aim of this research is to explore and demonstrate the effectiveness of the Tensairity concept in creating efficient, durable, and easily deployable designs for civil engineering applications. By leveraging a combination of cylindrical air beams, compression elements, and helical cables, the project seeks to highlight the advantages of this technology. The basic Tensairity structure consists of a cylindrical air beam and other components that allow the system to support loads using minimal materials. This research involved the construction of an 8-meter span bridge to demonstrate the technology. Experimental tests were conducted to assess the structural integrity, load-bearing capacity, and stability of the Tensairity beams, focusing on their performance under varying conditions. The results showed significant weight savings and load-bearing capacity, while also maintaining compact storage and rapid setup advantages. Experimental tests confirmed that Tensairity beams could support substantial loads while remaining elastic and stable, with predictable and manageable failure behavior. the Tensairity technology demonstrates a promising solution for lightweight and efficient civil engineering structures. Its innovative use of low-pressure air not only enhances structural performance but also opens new possibilities for applications in wide-span roofs, temporary buildings, and footbridges, contributing to more sustainable construction practices.

Keywords: Tensairity, Lightweight structures, Low-pressure air, Compression elements, Buckling mitigation, Tension-based fabric structures, Air beam, Helical cables, Load-bearing capacity, Resource efficiency, Experimental testing

Paper ID: 124

INTEGRATING AI WITH BIM TO FOSTER COLLABORATION AND SUSTAINABILITY IN CONSTRUCTION PROJECTS

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Abstract

The integration of Artificial Intelligence (AI) with Building Information Modeling (BIM) holds the potential to revolutionize construction projects by fostering collaboration and enhancing sustainability. This study aims to explore how AI and BIM integration can contribute to achieving sustainability goals in construction projects. The research objectives include assessing the current level of adoption of AI and BIM technologies, investigating their role in promoting sustainability, and proposing a strategic framework to enhance collaboration and resource management through these technologies. Specifically, the study will focus on how AI may improve communication among stakeholders and optimize resource use, which can lead to reduced waste and more sustainable outcomes in construction. This research utilized a mixed-method approach, incorporating both quantitative and qualitative methods to assess the integration of Artificial Intelligence (AI) and Building Information Modeling (BIM) in the construction industry. A comprehensive literature review identified existing gaps, followed by data collection through surveys, interviews, and case studies focusing on current adoption levels of AI and BIM and their impacts on sustainability. The scope of the study includes a thorough examination of the technological, organizational, and regulatory aspects of AI-BIM integration within the construction sector. However, limitations include the study's reliance on literature and expert opinions, which may not fully capture the rapidly evolving nature of AI in the industry. Key findings from the questionnaire survey indicated strong awareness of AI and BIM technologies, with 85% of respondents familiar with them and a 75% adoption rate for BIM, though AI adoption lagged at only 30%. Significant barriers to AI-BIM integration included regulatory issues and a lack of digital literacy, with 90% of participants identifying these as major challenges. Case studies demonstrated substantial sustainability benefits, with projects achieving waste reductions of 10-20% and energy savings of up to 30%, showcasing the positive impact of AI-BIM integration on resource management and collaboration in construction projects. By addressing the identified research gaps, this study aims to contribute valuable insights into the integration of AI with BIM, ultimately fostering collaboration and driving sustainability in construction projects.

Key Words: Artificial Intelligence, HVAC Systems, Energy Efficiency, Construction Industry, Sustainability, Predictive Modeling.

Paper ID 126

**DESIGN AND EVALUATION OF AN ENERGY-GENERATING RAMP
SYSTEM FOR KINETIC ENERGY HARVESTING**

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Abstract

Roadway pavements are repeatedly subjected to two different types of energy sources solar radiation and kinetic energy from passing vehicles. Therefore, they have great potential to be utilized as sustainable energy sources. In this study, an electromagnetic speed bump energy harvester prototype was developed to harvest energy from the kinetic energy of passing vehicles and to simultaneously control vehicles' speed. The system absorbs the deflection generated by a passing vehicle and converts it to a rotating shaft that triggers an embedded generator. The electromagnetic speed bump energy harvester operates through a straightforward yet effective mechanism. When a vehicle drives over the speed bump, it causes the bump to deflect. This deflection is transferred to a rotating shaft housed within the. As the vehicle moves over the bump, the shaft rotates, activating an embedded generator. This generator converts the mechanical energy from the vehicle's motion into electrical energy. An experimental analysis is performed on the rack-and-pinion system. This system captures kinetic energy from vehicles passing over a speed bump to power street lights sustainably. When a vehicle crosses the Speed Bump Module, the Power Generator Module converts the resulting kinetic energy into 12 watts of DC electricity. This power is then stepped up by a DC Power Booster Module to a stable 24V and stored in a DC Power Bank Module with a capacity of 2.4 kWh. An Automatic Charge Controller manages the flow to prevent overcharging, and an Automatic Light Activator switches on the Street Light Module when ambient light falls below a certain level (100 lux). A fully charged power bank can keep the 60W LED street light illuminated for up to 40 hours, making it a reliable, renewable lighting solution powered by vehicle traffic. Results have shown that electrical power up to about 60 W generated when a mass of 80 kg is applied to the Vehicle Wheel Energy Harvesting System (VWEHS) system considered. Extrapolation of results confirms around 0.56 kW powers can be produced when various vehicles with different masses pass through the ramps.

Keywords: Electromagnetic Speed Bump, Sustainable Energy, Vehicle Speed Control, Pavement Energy Harvesting, Mechanical to Electrical Energy Conversion, Vehicle Wheel Energy Harvesting System (VWEHS).

Paper ID: 145

LEVERAGING AI TO IMPROVE ERGONOMICS AND REDUCE MUSCULOSKELETAL DISORDERS IN CONSTRUCTION WORKERS

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Abstract

Musculoskeletal disorders (MSDs) are prevalent among construction workers, primarily due to repetitive physical tasks, improper lifting techniques, and awkward postures. This research explores the potential of artificial intelligence (AI) to improve ergonomics and mitigate the risk of MSDs in construction workers. The study focuses on AI-driven technologies, including wearables, predictive analytics, robotics, and virtual simulations, to assess their effectiveness in reducing physical strain and enhancing worker safety and productivity. The scope of the study is limited to the construction industry, specifically examining how AI technologies can be applied to tasks such as repetitive lifting, posture correction, and workplace design optimization. The study addresses a research gap in the integration of AI for real-time ergonomic feedback and predictive injury prevention, where existing studies primarily focus on manual interventions and traditional ergonomic assessments. The research also identifies the limitations of AI implementation, such as cost, technological complexity, and the need for worker training to fully leverage AI systems. This study employs a quantitative research design to assess the effectiveness of artificial intelligence (AI) technologies in improving ergonomics and reducing the incidence of musculoskeletal disorders (MSDs) among construction workers. Conducted across multiple construction sites, the research targets a diverse workforce engaged in physically demanding tasks, particularly those involving repetitive lifting and awkward postures. Data collection involves surveys and observational assessments to evaluate movement patterns, posture, exertion levels, and MSD occurrences. The study reveals that implementing AI-driven technologies significantly reduces the incidence of musculoskeletal disorders (MSDs) among construction workers. The experimental group, using AI wearables and exoskeletons, reported a 30% decrease in MSD cases and demonstrated improved movement patterns and reduced exertion levels. Furthermore, predictive analytics enabled proactive ergonomic interventions, enhancing workplace efficiency with a 20% increase in productivity metrics. Worker feedback indicated heightened safety and comfort levels, underscoring the psychological benefits of AI technologies. The findings are expected to contribute significantly to reducing the incidence of MSDs and promoting a safer work environment in the construction industry.

Keywords: Artificial Intelligence (AI), Musculoskeletal Disorders (MSDs), Ergonomics, Construction Workers, Wearable Technology and Predictive Analytics

Paper ID: 146

EVALUATING THE EFFECTIVENESS OF AI IN CUSTOMIZING ERGONOMICS SOLUTIONS FOR CONSTRUCTION WORKS

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Abstract

Musculoskeletal disorders (MSDs) are a significant concern in the construction industry, accounting for approximately 30% of workplace injuries (Bureau of Labor Statistics, 2021). This study investigates the potential of Artificial Intelligence (AI) to provide tailored ergonomic solutions aimed at enhancing worker safety and well-being. The objectives of the study include analyze the current state of ergonomics in the construction industry, evaluate the effectiveness of artificial intelligence (AI) in customizing ergonomics solutions for construction works and propose recommendations for integrating AI technologies into ergonomics practices. The study utilized a mixed-methods approach to evaluate the effectiveness of artificial intelligence (AI) in creating ergonomic solutions for construction workers. It began with a comprehensive literature review to identify existing ergonomic challenges, followed by a controlled case study involving 250 workers, which compared traditional ergonomic methods with AI-based interventions through pre- and post-intervention surveys. Additionally, semi-structured interviews with 50 workers provided qualitative insights into satisfaction and workplace culture improvements. The implementation of AI-driven ergonomic solutions yielded significant improvements among the 250 construction workers over a six-month period. Participants reported a 35% reduction in pain levels and a 20% decrease in injury incidence, demonstrating the effectiveness of personalized ergonomic interventions in addressing musculoskeletal disorders (MSDs). Additionally, there was a 40% increase in worker satisfaction regarding ergonomic practices, contributing to enhanced compliance and understanding of ergonomic principles. Despite these positive outcomes, a notable research gap remains regarding the long-term sustainability and adaptability of AI-driven ergonomic solutions across various industrial contexts.

Keywords: Artificial Intelligence (AI), Musculoskeletal Disorders (MSDs), Ergonomic Solutions, Construction Industry, Predictive Analytics, Machine Learning, Worker Safety

Paper ID: 157

A STUDY ON AI-DRIVEN BIM INTEGRATION FOR ENHANCED DISASTER RESPONSE IN BUILT ENVIRONMENTS

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Abstract

This research aims to integrate Artificial Intelligence (AI) with Building Information Modelling (BIM) to enhance disaster response planning and mitigation in built environments. The study develops an AI-powered framework for BIM that predicts potential disaster impacts based on historical data, real-time inputs, and environmental factors. The primary objective is to leverage AI to improve situational awareness and enable real-time decision-making, resulting in quicker and more accurate responses during disasters. Historically, disaster response planning has been reactive, leading to inefficiencies and slower response times. This research seeks to address that gap by proposing a proactive, AI-driven approach that enhances disaster preparedness and coordination. This research adopts a mixed-methods approach that integrates quantitative data analysis, qualitative case studies, and simulations to develop an AI-powered framework aimed at enhancing disaster response and mitigating musculoskeletal disorders (MSDs). Data collection focuses on disaster impacts and MSDs, utilizing real-time monitoring through sensors and drones. Following data preprocessing, machine learning models are trained to predict disaster impacts and ergonomic risks, which are then integrated into Building Information Modeling (BIM) to enable real-time monitoring, damage assessments, and scenario simulations. The scope of the study includes the integration of AI with BIM to automate damage assessments, provide predictive analytics, and optimize recovery strategies. According to findings of the study, the integration of AI and BIM in the developed framework significantly improved disaster response and worker safety. The AI-enhanced BIM system achieved an impressive 85% accuracy in predicting disaster impacts, marking a notable increase compared to traditional methods. Automated risk assessments and real-time alerts contributed to a 30% reduction in response times during disaster simulations. However, limitations exist in terms of data availability, the complexity of AI models, and integration challenges with existing systems. The research gap identified lies in the lack of studies integrating AI with BIM for disaster resilience, specifically in real-time disaster management.

Keywords - Artificial Intelligence (AI), Musculoskeletal Disorders (MSDs), Ergonomics, Construction Workers, Wearable Technology and Predictive Analytics

Paper ID 158

**EXPLORING THE APPLICATION OF AI IN URBAN CONSTRUCTION
PLANNING AND DESIGN, CONTRIBUTING TO THE DEVELOPMENT
OF SMART CITIES**

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Abstract

The rapid evolution of urban environments requires innovative approaches to construction planning and design. This project aims to explore the application of Artificial Intelligence (AI) in urban construction to support the development of smart cities that enhance livability, sustainability, and community engagement. By integrating AI into urban planning, the project seeks to empower decision-makers with data-driven insights, promote greener construction practices, and encourage greater public involvement in neighborhood design. Key objectives include improving decision-making through advanced data analysis, identifying sustainable building techniques, and creating accessible tools for community feedback on urban designs. The project also aims to streamline construction processes using AI to improve efficiency and adaptability to the evolving needs of urban populations. The methodology of this study involved a mixed-methods approach, combining both quantitative and qualitative analyses to explore the role of Artificial Intelligence (AI) in urban construction and smart city development. A literature review of recent studies provided insights into AI applications, such as data-driven decision-making and resource management, while identifying challenges like stakeholder resistance. To deepen this exploration, case studies from cities like Singapore, Barcelona, and Toronto were analyzed to highlight best practices and obstacles in AI-driven urban planning. Surveys targeting urban planners, architects, engineers, and community members gauged attitudes toward AI's impact on efficiency, job displacement, and data security. In-depth interviews with professionals offered additional qualitative insights into the complexities of AI integration. Key findings reveal that AI significantly enhances efficiency and decision-making in urban construction by optimizing resource allocation, reducing project timelines, and supporting sustainable practices. Case studies demonstrated successful strategies like real-time traffic analysis and public engagement tools, underscoring AI's role in fostering transparent, adaptable urban environments. However, challenges such as job security concerns, stakeholder resistance, and data privacy issues indicate the need for stronger interdisciplinary collaboration and regulatory frameworks for ethical AI implementation.

Keywords - Artificial Intelligence (AI), Smart cities, Urban construction planning, Sustainable building practices, Data-driven decision-making, Community engagement, Urban design simulations, Resource management and Stakeholder collaboration

Paper ID: 164

MACHINE LEARNING APPORACHES FOR ROAD CONDITION ASSESSMENT

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Abstract

The condition of road infrastructure is crucial for public safety, economic activity, and quality of life, demanding reliable maintenance strategies. Traditional methods for assessing road conditions are labor-intensive and prone to human error, often resulting in delays, higher costs, and safety hazards. This research investigates the integration of artificial intelligence (AI) and Internet of Things (IoT) technologies to improve road condition evaluation. A Convolutional Neural Network (CNN), trained on 15,000 labeled images, achieved 90% classification accuracy, though challenges such as a 12% false positive rate due to environmental factors persist. Additionally, K-means clustering of 75,000 sensor readings, including temperature and traffic load, categorized roads as "Stable," "Weak," or "Critical," with over 20% marked "Critical," requiring urgent maintenance. A hybrid approach, incorporating reinforcement learning with feedback from local personnel, reduced false positives by 30%, optimizing maintenance prioritization and adaptability. IoT sensors, including ultrasonic, sound, and GPS modules, continuously collect real-time data, enabling centralized processing and proactive maintenance. This study highlights the potential of AI-driven, IoT-integrated systems to transform road maintenance, enhance safety, reduce costs, and foster community involvement in infrastructure resilience.

Keywords: Road Infrastructure Maintenance, Artificial Intelligence, Internet of Things (IOT), Convolutional Neural Networks, Road Condition Evaluation, K-Means Clustering, Reinforcement Learning

Paper ID: 201

ARTIFICIAL INTELLIGENCE (AI) FOR BUILDING AND CONSTRUCTION INDUSTRY: CONTRIBUTION, OPPORTUNITIES AND CHALLENGES IN INDUSTRY 5.0

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Abstract

Artificial Intelligence (AI) is playing an increasingly significant role in advancing the building and construction industry toward Industry 5.0, a new era focused on human-centric, sustainable, and intelligent systems. AI technologies contribute to the industry by streamlining processes, optimizing resource use, and improving decision-making through automation, machine learning, and data analytics. This transformation enhances efficiency, reduces project costs, and minimizes human error, leading to more precise and timely project outcomes. Key AI-driven tools such as Building Information Modeling, robotics, and predictive maintenance systems enable superior planning, design, and construction, reshaping the future of the industry. In the context of Industry 5.0, AI presents substantial opportunities by merging human creativity with machine precision to deliver more personalized, flexible, and sustainable construction solutions. AI contributes to environmental sustainability by optimizing resource management, improving energy efficiency, and reducing waste during the building process. Predictive analytics further enhance project management by anticipating risks, minimizing delays, and ensuring smoother execution. Despite the opportunities, the construction industry faces notable challenges in adopting AI. Integrating AI with legacy systems can be complex, and the need for large volumes of high-quality data is critical for achieving reliable AI outcomes. Furthermore, the shortage of skilled professionals who can effectively operate AI technologies presents a significant hurdle. Data privacy and security concerns, as well as high initial investment costs, also hinder broader AI implementation. In addition, AI holds tremendous potential to transform the building and construction sector within Industry 5.0, paving the way for smarter, more sustainable, and innovative practices. By overcoming existing challenges, the industry can fully realize Artificial Intelligence's contributions to improving productivity, enhancing sustainability, and fostering greater innovation, ultimately driving a more resilient and efficient future for construction projects.

Keywords: Artificial Intelligence, Industry 5.0, Construction Industry, Technologies

Paper ID: 263

AN EXAMINATION OF THE APPLICATION OF ROBOTICS IN BUILDING ACTIVITIES LIKE EXCAVATION, DEMOLITION, AND BRICKLAYING

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Abstract

The construction industry is evolving with the integration of emerging technologies, and robotics is at the forefront of this transformation. This study explores and evaluates the application of robotics in specific construction tasks, including bricklaying, demolition, and excavation. The aim of the research study is to explore and evaluate the integration of robotics in construction tasks such as bricklaying, demolition, and excavation. Bock & Linner (2016) note that robotics in construction can reduce labor time by up to 60%, especially in tasks such as masonry and prefabrication. Khoshnevis (2004) suggests that technologies like contour crafting in automated construction reduce material waste, minimize labor costs, and enhance the speed of project completion. The following summarizes the study's objectives: to assess how robotics affects construction productivity, to examine the financial and practical effects of robotic integration and to evaluate the future potential of robotics in construction innovation. This study addresses the research gap in understanding how robotics can be integrated effectively into construction, considering its long-term economic and operational impacts. The methodology of this study combined both qualitative and quantitative approaches to comprehensively assess the impact of robotics in construction. Qualitative data was gathered through semi-structured interviews with industry professionals, providing insights into practical implications and challenges of robotic adoption. Quantitative data was obtained from case studies of projects utilizing robotics, focusing on performance metrics such as time, cost savings, and safety improvements. Key findings indicated that robotics can reduce labor time by up to 60%, minimize material waste by 30%, and lower overall project costs by around 20%. Additionally, robotic applications like automated bricklaying and demolition demonstrated significant efficiency improvements, while safety was enhanced as robots performed hazardous tasks, reducing on-site injuries by 60%. These findings highlight the potential of robotics to drive efficiency, productivity, and safety in construction, despite challenges such as initial costs and the need for specialized training.

Keywords: Robotics in Construction, Bricklaying Automation, Demolition Robotics, Excavation Technology, Construction Productivity, Safety in Construction, Construction Efficiency and Autonomous Construction Machines

Paper ID: 264

IMPACT OF AI ON LABOR IN CONSTRUCTION: ETHICAL CONSIDERATIONS AND WORKFORCE ADAPTATION STRATEGIES

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Abstract

The integration of Artificial Intelligence (AI) in the construction industry is reshaping the workforce and raising critical ethical concerns regarding labor displacement and adaptation. This study explores the impact of AI on labor in construction, with a focus on analyzing job role transformations, labor demand shifts, ethical considerations of workforce displacement, and strategies for workforce adaptation. Several studies suggest that while AI increases efficiency, it reduces the demand for low-skilled labor, particularly in repetitive tasks (Zhou et al., 2020). However, the demand for highly skilled workers who can operate, manage, and maintain AI systems is rising (Cheng et al., 2013). With increasing automation in tasks such as project management, planning, and construction processes, AI is poised to redefine how construction operates. The study aims to investigate how AI affects job roles at different skill levels, assess the ethical implications surrounding job loss and economic inequality, and evaluate strategies such as reskilling and upskilling programs to facilitate labor adaptation. This research addresses the existing gap in understanding the balance between AI implementation and the social responsibility of mitigating its effects on labor. The methodology of this study combined a quantitative survey and qualitative interviews to assess the impact of AI on job roles within the construction industry. The survey gathered responses from industry professionals to quantify shifts in labor demand, productivity gains, and skill requirements, while interviews provided insights into the perceived challenges and opportunities created by AI. Key findings indicate that 65% of respondents reported increased productivity due to AI, with automation contributing to a 30% reduction in project timelines. However, there was also a 40% decrease in demand for low-skilled labor, underscoring a significant shift toward mid- to high-skilled roles that require digital competencies in AI management and data analysis. Additionally, concerns about economic inequality and job security among low-skilled workers emerged, emphasizing the need for targeted reskilling and upskilling programs to bridge the skills gap and support a smoother transition for the workforce in an AI-driven environment.

Keywords: Artificial Intelligence in Construction, AI and Labor in Construction, Workforce Adaptation Strategies, Job Displacement and Automation, Ethical Implications of AI Construction Industry Automation, AI-driven Productivity and Construction Technology Reskilling

Paper ID: 275

HOW 5D BUILDING INFORMATION MODELING AFFECTS COST CONTROL AND BUDGET PLANNING IN SRI LANKAN QUANTITY SURVEYING

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Abstract

While BIM technology has transformed construction processes globally, its advanced applications, particularly 5D BIM, remain underutilized in Sri Lanka's construction sector. This study investigates the implementation and impact of 5D Building Information Modeling (BIM) on cost control and budget planning practices within Sri Lanka's quantity surveying profession. Through a mixed-method approach combining quantitative surveys (n=116) and qualitative interviews with industry experts, this research examines the current adoption levels, challenges, and potential benefits of 5D BIM integration in quantity surveying practices. The study introduces a novel 5D BIM Adoption Maturity Model contextualized for Sri Lanka, providing a framework for assessing and advancing implementation progress, while highlighting that 69% of industry practitioners remain in the initial awareness stage. The findings reveal that while 81.9% of organizations have adopted basic BIM functionalities, only 24.1% utilize 5D BIM capabilities. Organizations implementing 5D BIM reported a 52.8% improvement in cost estimation accuracy and a 55% reduction in calculation errors. However, significant implementation barriers persist, including shortage of skilled professionals (66%), inadequate training opportunities (59%), and high initial investment costs (58%). This research contributes to both theoretical understanding and practical application by identifying critical success factors for 5D BIM adoption and proposing strategic recommendations for industry stakeholders. The findings emphasize the need for government-led initiatives, standardization of BIM practices, and educational reforms to facilitate wider adoption. These insights offer valuable guidance for policymakers, construction industry leaders, and practitioners in navigating the transition toward advanced BIM implementation in Sri Lanka's construction sector.

Keywords - Digital Transformation, Project Cost Estimation, Cost Optimization, Productivity Improvement, Construction Process Efficiency, Building Life Cycle Management, Digitalization in Construction, Integrated Project Delivery, Construction Technology Adoption, BIM Implementation Strategies

Poster presentation

Paper ID: 70

ARTIFICIAL INTELLIGENCE AS A TOOL FOR SUSTAINABLE MANAGEMENT IN CONSTRUCTION SITES

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Abstract

The construction industry, while vital to global development, is one of the most resource-intensive sectors, leading to significant environmental and sustainability challenges. In Sri Lanka, the construction sector faces additional hurdles, such as resource waste, project delays, cost overruns, energy inefficiency, and the slow adoption of new technologies. This research investigates the potential of Artificial Intelligence (AI) as a tool for sustainable management on construction sites, focusing on how AI can address these critical challenges by improving efficiency, reducing waste, enhancing safety, and promoting environmental sustainability. The aim of the research study is to explore the potential of Artificial Intelligence (AI) as a tool for sustainable management in construction sites, with a focus on improving efficiency, reducing waste, enhancing safety, and promoting environmental sustainability. The study addresses the research gap regarding the limited exploration of AI in sustainable construction management in Sri Lanka. The objectives of the research study are delineated as follows: to evaluate the current application of AI technologies in construction site management, to investigate the potential of Artificial Intelligence (AI) as a mechanism for sustainable management in construction sites, emphasising the enhancement of efficiency, reduction of waste, improvement of safety, and promotion of environmental sustainability and to explore the future potential of AI in driving innovation and sustainability in the construction industry. The methodology of this study employed a mixed-methods approach, combining a systematic literature review with qualitative semi-structured interviews and a quantitative survey to comprehensively explore the potential of Artificial Intelligence (AI) in promoting sustainability in construction site management. The literature review assessed existing AI applications and their impacts on efficiency, waste reduction, and safety enhancements, while interviews with construction managers, project engineers, and AI technology providers provided insights into the barriers and challenges faced in AI implementation. The quantitative survey, distributed to a broader audience of construction professionals in Sri Lanka, revealed that only 30% of respondents actively used AI technologies, with 75% of those acknowledging improvements in project efficiency and waste reduction. However, significant concerns were noted regarding high costs and the lack of skilled personnel necessary for effective AI integration, highlighting the need for targeted training and strategic investments in the industry.

Keywords; Artificial Intelligence (AI), Sustainable management, Construction sites, Resource efficiency, Waste reduction and Environmental sustainability.

Paper ID: 71

ENHANCING CONSTRUCTION SITE SAFETY THROUGH AI-DRIVEN PREDICTIVE ANALYTICS: A STUDY ON RISK PREDICTION AND MITIGATION

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Abstract

The research focuses on utilizing AI-driven predictive analytics to enhance construction site safety, with the aim of mitigating risks and preventing accidents. This study explores how AI can identify patterns of unsafe behaviors or conditions, enabling proactive risk management. By analyzing large datasets, AI can predict potential hazards before they lead to accidents, shifting the focus from reactive to proactive safety management. Examine the potential future applications of AI in construction safety management, considering technological advancements and evolving industry standards is the aim of the research study. Following are described the objectives of the study; included Investigate and identify the primary factors contributing to accidents and safety incidents in the construction sector, leveraging AI analytics, Formulate actionable risk mitigation strategies based on predictive analytics findings, enhancing overall safety management on construction sites and examine the potential future applications of AI in construction safety management, considering technological advancements and evolving industry standards. The study addresses a critical research gap regarding the application of AI in safety management within the construction industry. The methodology of this study focused on implementing AI-driven predictive analytics to enhance safety on construction sites through comprehensive data collection, which included sensor data from wearable technologies, CCTV footage, incident reports, real-time outputs, and employee feedback. A structured data analysis was conducted to assess project safety outcomes and the predictive accuracy of the AI model, utilizing metrics such as predictive precision, false positive rates, and key performance indicators (KPIs) like worker engagement rates and incident rate comparisons. Key findings revealed a significant 35% reduction in recorded safety incidents over six months, attributed to the model's real-time hazard identification, which facilitated proactive risk management. The model demonstrated low false positive rates, increasing its reliability for site supervisors, and response times improved from 10 minutes to approximately 4 minutes per alert, enhancing workplace safety. Additionally, adopting flexible AI models adaptable to various project types and conditions can address data availability issues and scalability challenges. Lastly, fostering a proactive safety culture through regular training and awareness programs can significantly reduce workplace accidents and continuously improve safety standards.

Keywords: AI-driven analytics, Construction safety, Risk prediction, Accident mitigation, Proactive safety management.

Paper ID: 108

INNOVATING 'GO HARDWARE' AN INTELLIGENT APPROACH TO CONSTRUCTION MATERIAL PROCUREMENT USING AI AND EMERGING TECHNOLOGIES

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Abstract

Artificial intelligence (AI) is revolutionizing the construction sector by improving productivity, accuracy, and efficiency throughout every phase of a project. Previous studies on AI integration in the construction sector demonstrate its potential to address problems and inefficiencies in supply chain logistics, project management, and cost control. However, current research has limited focus on AI applications for material procurement, particularly in regional contexts like Jaffna. This research aims to design and develop an effective digital platform that enhances transparency, cost-effectiveness, and real-time communication between suppliers and contractors by streamlining the procurement process of construction materials within the Jaffna region. We introduce "Go Hardware," a pioneering app intended to revolutionize the interaction between construction professionals and suppliers. This study aims to address inefficiencies in the construction procurement process by designing a digital platform specifically for construction material procurement. The study begins with an evaluation of current procurement methods to pinpoint areas of delay and inefficiency. Following this analysis, a digital solution will be developed to streamline procurement workflows and enhance accessibility to construction resources. Additionally, strategies for integrating AI technologies are proposed, targeting improvements in procurement efficiency, cost reduction, and adherence to project timelines. The study concludes with an assessment of the anticipated impacts of these technologies on procurement processes, highlighting potential advancements in construction management practices. The objectives were achieved through a comprehensive literature review, wherein data was collected from academic journals, industry reports, and live data details from hardware shops. The Go Hardware application streamlines construction material procurement by providing a centralized platform where customers can search for local hardware shops, view detailed material information, and request quotes or bills via SMS. It simplifies the procurement process with real-time data updates, powered by a MySQL database, ensuring accurate and up-to-date information for both customers and shop owners. The platform also offers an admin portal for shop owners to manage inventory and engage with customers, while promoting local business growth. Additionally, customer support is provided through links to industry experts, enhancing user confidence and satisfaction in the procurement process. Thematic analysis was employed to analyze the literature findings critically, focusing on key areas of inefficiency and technology integration.

Keywords; AI in construction, Digital procurement, Supply chain efficiency, Construction technology, Go Hardware app, Regional construction innovation.

Paper ID: 109

SYSTEMATIC REVIEW OF AI-DRIVEN REAL-TIME HELMET DETECTION FOR ENHANCED COMPLIANCE ON CONSTRUCTION SITES

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Abstract

Helmet usage in construction is a vital safety measure; however, ensuring compliance remains challenging. AI-powered detection systems offer a promising solution by automating the monitoring process. Despite growing interest in AI for construction safety, a comprehensive analysis of real-time helmet detection tools remains scarce. This systematic review investigates the application of AI-driven real-time helmet detection systems in enhancing safety compliance on construction sites. Given the critical importance of reducing head injuries, especially in high-risk construction environments, the study aims to understand the current state of AI implementation in helmet detection systems. Although several AI systems have been developed to improve construction safety, few focus on real-time, scalable solutions specific to helmet detection. Existing studies largely cover traditional methods of safety compliance, leaving a gap in real-time, AI-driven enforcement systems. The aim of this study is to provide a detailed overview of AI technologies used for helmet detection on construction sites. The objectives include identifying AI tools in use, evaluating their effectiveness, and highlighting trends in AI adoption for safety compliance across various regions. A comprehensive literature review of over 185 peer-reviewed articles was conducted using databases such as Elsevier's Scopus. Key aspects such as AI models, application purpose, geographic location, and system performance were analysed to provide insights into the evolution of helmet detection systems. The review identified that deep learning algorithms, particularly convolutional neural networks (CNNs), dominate real-time helmet detection research. Hybrid models combining AI tools have shown significant promise in improving accuracy. However, challenges related to scalability, cost, and implementation in varying construction environments persist.

Keywords: AI-driven helmet detection, Construction safety, Real-time monitoring, compliance, CNN, Deep learning, Hybrid models.

Paper ID: 113

A REVIEW OF USAGE OF SMART MATERIALS INTEGRATING AI IN THE CONSTRUCTION FIELD

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Abstract

Smart materials transform the landscape of building design and construction by dynamically altering their properties in response to external stimuli. This review paper explores the integration of Artificial Intelligence (AI) with smart materials, emphasizing their potential to address significant challenges in civil engineering. The study acknowledges that while some smart materials have been used for an extended period, others are relatively novel and still require extensive research. A comprehensive literature review was conducted, resulting in the download of 140 articles from databases such as ScienceDirect and IOP, of which 113 were shortlisted based on their prominent applications and substantial research contributions. This paper classifies various smart materials and examines their applications across multiple fields of civil engineering. It discusses the potential benefits, such as enhanced sustainability, alongside the challenges associated with their adoption, including high costs, technical complexity, data security concerns, and the absence of standardized frameworks. Furthermore, innovative materials with the potential to revolutionize the construction industry are highlighted. To facilitate the successful integration of AI and smart materials, this review recommends strategies such as implementing pilot projects, developing cost-sharing models, and investing in training programs to cultivate a skilled workforce adept at managing AI-driven systems. By addressing these barriers, the construction industry can harness the full potential of AI-smart material integration, paving the way for more sustainable, efficient, and resilient infrastructure.

Keywords: Smart Materials, Artificial Intelligence (AI), Sustainability, Construction Industry



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Session 04
Business & Hotel Management



Paper ID 22

FACTORS INFLUENCING MOBILE BANKING SERVICE ADOPTION: A STUDY IN THE BANK OF CEYLON NEGOMBO CITY, NEGOMBO, AND NEGOMBO KOCHCHIKADE BRANCHES, SRI LANKA

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Abstract

The rapid advancement of digital technologies has revolutionized banking systems, with mobile banking emerging as a key focus in financial service delivery. This research investigates the factors influencing mobile banking service adoption, with an emphasis on the Bank of Ceylon's branches in Negombo City, Negombo, and Kochchikade, Sri Lanka. Although mobile banking is gaining increased acceptance, significant uncertainties still remain pertaining to what its determinants of adoption may be. First, this study attempts to establish the factors underlying the use of mobile banking in Sri Lanka. Second, it also tries to provide some insights into the ways the service providers may improve the facilities and applications that would lead to an improved customer experience, satisfaction, and operational efficiency. A quantitative survey methodology was amongst the customers of mobile banking usage. The data were collected through structured questionnaires, both physical and virtual, from a sample of 160 respondents across the three Bank of Ceylon Negombo region branches. The analyses used in this study consisted of statistical analyses such as Kruskal-Wallis, one-way ANOVA, and post hoc tests to analyze differences in mobile banking use with respect to the demographic factors of age, education, and gender. It was found that among those factors that have a significant influence on the adoption of mobile banking, age, education, and technology literacy are the ones. To be specific, there is a negative correlation between the consumer above the age of 50 and mobile banking adoption. Also, men were found to be more likely to use mobile banking compared to females. The significant drivers of consumer satisfaction towards mobile banking services, as highlighted by multiple regression analysis, were awareness, privacy, and security. These may be useful for the financial institutions and policymakers in Sri Lanka. Stronger awareness, better designs for the user interface, and education campaigns on this ground can therefore help in greater usage of mobile banking services. These solutions not only enhance customer satisfaction but strengthen the security framework of mobile banking. This will, thus, become crucial to comprehend the drives of adoption for banks in order to stay competitive since mobile banking is ever-evolving, moving toward an increased demand for digital financial services.

Keywords: Mobile Banking Adoption, Factors Influencing Usage, Gender Disparities, Age and Education Effects, Customer Experience

Paper ID 25

Factors Affecting ICT Adoption in Public Banks of Sri Lanka

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Abstract

This study investigates into the factors influencing the adoption of Information and Communication Technology (ICT) within Sri Lanka's public banking sector. Given the transformative potential of ICT in enhancing operational efficiency, improving customer service, and driving innovation, understanding the determinants of ICT adoption is crucial for the sector's development. The public banking sector in Sri Lanka, like many other countries, faces significant challenges in this regard, including limited technological infrastructure, high implementation costs, and insufficient employee skills. By examining these factors and their interplay, this study aims to shed light on the strategies that can facilitate successful ICT adoption and contribute to the overall competitiveness and growth of the sector. This study employed a quantitative research approach, utilizing Saunders' Onion Research Model, to investigate factors influencing ICT adoption in Sri Lanka's public banking sector. A survey of 100 employees from public banks was conducted to gather comprehensive data. The research focused on how technology infrastructure, cost of implementation, and employees' skills impact ICT adoption. The hypothesis tested hypothesized that a strong technology foundation is crucial for successful ICT use, while costs and employee skills also play significant roles. This analysis considered three important factors in the relation of ICT adoption in the public banking sector of Sri Lanka: technology infrastructure, the cost of implementation, and the skills of employees. The findings revealed that better technology infrastructure is positively linked with an increase in the adoption of ICT, meaning that investment in solid technological systems can spur greater utilization of ICT. Implementation cost, on the other hand, is not significant in affecting ICT adoption, and hence other factors rather than cost may be of more decisive importance for driving adoption. Moreover, it can be strongly observed that employees' skills and knowledge bear a very positive relation to ICT adoption, which indicates the importance of the area of training and development for the successful implementation of ICT initiatives. Based on these findings, this research recommends that public banks in Sri Lanka should prioritize strengthening their technology infrastructure to drive the adoption of ICT. A one-time investment in high-quality, scalable technology systems is a must and will provide the foundation for effective use of ICT tools. While implementation costs should still be considered, the findings suggest that cost alone should not be a major barrier to adoption. Instead, the emphasis should be placed on enhancing the skills and capabilities of employees through comprehensive training programs. By improving employee knowledge and technical expertise, public banks can better harness the full potential of ICT, thereby enhancing overall operational efficiency and service delivery.

Keywords: ICT Adoption, Public Banks, Technology Infrastructure, Technology Implementation, Positive Approach, Employers Skills

Paper ID 72

OPTIMIZING EMPLOYEE TIME MANAGEMENT: THE IMPACT OF EXCESSIVE MEETING ATTENDANCE ON EMPLOYEE PRODUCTIVITY

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Abstract

This research investigates how various meeting-related factors impact employee productivity at Cinnamon Hotels & Resorts. The study focuses on meeting culture, time management techniques, and alternative meeting schedules, aiming to identify effective strategies to enhance productivity. The study seeks to provide actionable recommendations for improving operational efficiency within the hospitality industry by understanding these dynamics. The study utilized a survey to gather data from employees at Cinnamon Hotels & Resorts regarding their experiences with meeting culture, time management, and meeting schedules. Internal consistency was evaluated using Cronbach Alpha coefficients, ensuring reliable measurements. Pearson correlation and multiple regression analyses were conducted to examine relationships between independent variables (meeting culture, time management techniques, alternative meeting schedules) and the dependent variable (employee productivity). Multicollinearity was assessed to validate the robustness of the regression model. The analysis revealed high Cronbach Alpha coefficients, indicating reliable measures for each variable. Pearson correlation coefficients showed significant negative correlations between employee productivity and all three independent variables. Multiple regression analysis indicated that the predictors explain a substantial portion of the variance in productivity. The presence of multicollinearity, particularly between Meeting Culture and Alternative Meeting Schedules, necessitated the removal of the latter variable for model stability. These findings suggest that perceived disruptions from meeting culture, inefficient time management, and alternative schedules negatively impact productivity. Recommendations include refining meeting practices and time management strategies to enhance employee productivity. The study provides valuable insights into the impact of meeting-related factors on employee productivity. The findings highlight the need for Cinnamon Hotels & Resorts to reassess and optimize their meeting practices and time management strategies. Future research should address the study's limitations by expanding the sample size, incorporating qualitative data, and exploring additional factors to gain a more comprehensive understanding of productivity dynamics in the hospitality sector.

Keywords: Meeting culture, Time management techniques, Alternative meeting schedule

Paper ID 119

ENABLERS AND CONSTRAINTS OF FEMALE ENTREPRENEURSHIP IN POST CONFLICT SITUATIONS: A CASE OF PALMYRA PRODUCT MANUFACTURERS IN JAFFN

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Abstract

The role of micro business is vital for the economic recovery of conflict affected citizen after the end of civil-war in 2009 in Sri Lanka. As such, palm-based products are seen as a major micro-business venture in Jaffna. After the end of war, many widows and female largely engage with the traditional enterprises for the economic recovery and support their family livelihood. Yet in developing countries like Sri Lanka, fulfilling the entrepreneurial dream of women is seen as a challenge. From the institutional and feminist perspectives, this study is aimed to identify the enablers and constraints faced by female entrepreneurs engaged in palmyra-based products. The study selected 20 women engaged in palmyra-based production in the area under the chankanai Divisional Secretariat Division using a convenient sampling method. The study adapted qualitative research methods and conducted in-depth interviews to collect primary data. These data were analyzed using thematic analysis. Major findings reveal that financial independence, recognition / empowerment for women, personal ambition, entrepreneurship and emancipation for women are some of the factors that are enablers to these women entrepreneurs. However, the lack of support, sociocultural barriers, work and family interface, and gender inequality were identified as constraints. It is also found that palmyra based products are diverse in nature.

Keywords: women entrepreneurship, Institutional theory, Feminist theory, Enablers, Constraints, Developing country, Palmyra products.

Paper ID 176

**IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON BRAND
IMAGE: A CASE STUDY OF TILKO HOTEL**

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Abstract

Corporate social responsibility (CSR) has become an important concept in the context of the hotel industry, which is considered an important factor for the competitiveness and survival of companies, primarily because CSR affects brand image. CSR initiatives in the hospitality industry have gained importance due to the sector's direct interaction with customers. As such, this research examines the impact of corporate social responsibility on the brand image of Tilko Hotel, a hospitality company. As CSR initiatives gain more importance in creating consumer awareness, especially in the hospitality industry, these initiatives recognize the strategic role that Tilko plays in enhancing the hotel's brand image. Findings suggest that Tilko Hotel's commitment to sustainable operations, social engagement and ethical governance significantly enhances its brand image, fosters customer loyalty and positive word of mouth. Quantitative research method was used in this study. A questionnaire survey was conducted on a sample of 250 respondents. Microsoft Excel and IBM SPSS statistics 26 have been used as analytical tools. Secondary data sources such as the hotel's CSR reports and customer reviews were also analysed to provide a holistic view of vulnerability. The study indicates that there is a significant impact of corporate social responsibility on brand image. Furthermore, this case study underscores the strategic importance of CSR in the hospitality industry, demonstrating how ethical practices can serve as a competitive advantage in building a respected and trusted brand. Those who were aware of Tilko Hotel's CSR initiatives exhibited higher levels of brand satisfaction, brand awareness, perceived quality and loyalty. The study also provides recommendations for Tilko Hotel's CSR initiatives to sustain its brand image and develop strong customer relationships.

Keywords: Corporate Social Responsibility, Brand Loyalty, Brand Image, Brand Satisfaction.

Paper ID 186

THE IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON CUSTOMER SATISFACTION AND CUSTOMER LOYALTY: A CASE STUDY OF HNB BANK AT JAFFNA

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Abstract

Corporate Social Responsibility (CSR) has increasingly become a pivotal aspect of the modern business environment, driven by the belief that CSR practices enhance organizational performance by improving goodwill, social image, and customer satisfaction and loyalty. Consequently, many organizations are investing heavily in CSR strategies to achieve business success. This study investigates the impact of CSR expenditure on customer satisfaction, loyalty, and consumer volume within the banking sector in Jaffna, Sri Lanka. (Nipuni frenando , 2019) Hatton National Bank (HNB) in Jaffna was selected as the primary focus of this study, with banks chosen based on Fitch ratings. The research utilized secondary data sourced from published annual reports and official websites of the selected banks. Descriptive statistics and correlation analysis were employed to analyses the relationship between CSR costs and consumer volume. The findings reveal no significant correlation between the costs associated with CSR activities and consumer volume in the Sri Lankan banking sector. This indicates that increased CSR expenditure does not necessarily lead to a higher volume of customers. While CSR initiatives are likely to enhance other aspects of organizational performance, such as brand reputation and employee engagement, their direct impact on customer acquisition appears limited. Considering these findings, the study suggests exploring alternative strategies to increase consumer volume while implementing CSR practices in a more cost-effective manner. It emphasizes that while CSR investments are valuable for indirect organizational benefits, they should be balanced with other customer engagement strategies to maximize overall business success. The study concludes that a strategic approach to CSR, combined with targeted consumer acquisition tactics, may yield better outcomes in enhancing customer satisfaction and loyalty.

Keywords: Corporate Social Responsibility, Business Environment, Customer Satisfaction, Customer Loyalty, CSR Strategy.

Paper ID 320

IDENTIFYING TOP & BOTTOM OF STOCK MARKET: IMPACT OF MARS & MOON PLANET ON THE INDIAN STOCK MARKET WITH REFERENCE TO NIFTY 50

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Abstract

Stock market of India is considered as the biggest economy barometer in India. Investors over the years have been adopting either fundamental or technical analysis or both for building their portfolio. The biggest challenge for the investors is to know what will be the exact entry and exit point in the market and how to achieve maximum profits. It is often said that you should buy when the price of scripts fall and sell when the price of scripts is at high point. On the contrary it has been observed that due to wrong determination of entry and exit strategy by the investors, they tend to buy at rising prices and sell at falling prices. To answer this, Financial Astrology where in control of stock market through planetary movements comes into picture. In this present study a relationship is determined for study of movement of Bank Nifty with reference to determining degree (planetary movement) of moon with reference to the mars. This study is based on historical data analysis from March 2023 to March 2024.

Keywords: Financial Astrology, Planet, Security Analysis, Stock Market Astrology, Mars- Moon

Paper ID 340

ENHANCING ENERGY EFFICIENCY IN IOT NETWORKS USING AI AND BLOCKCHAIN TECHNOLOGIES: A SMART GRID PERSPECTIVE

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Abstract

In the swiftly changing realm of data-driven decision-making, the proficient analysis and visualization of intricate information is essential. This study paper examines Power BI, a premier business intelligence tool, for data analysis and interpretation within a particular industrial setting. The research is based on improving data-driven decision-making processes, especially in contexts where substantial amounts of data are produced. Nonetheless, practical insights are sometimes buried by their intricacy. The research utilizes a rigorous scientific framework, commencing with identifying key performance indicators (KPIs) pertinent to the sector being examined. Data were gathered from many sources, including both primary (surveys, interviews) and secondary (industry reports, databases) methodologies. The information was further processed and analyzed via Power BI, emphasizing the conversion of raw data into comprehensible representations for decision-makers. The analysis in Power BI encompasses many processes, including data cleansing, transformation, and the use of different analytical methods like as descriptive statistics, trend analysis, and correlation. The research emphasizes the use of Power BI's sophisticated functionalities, including real-time data integration, interactive dashboards, and drill-down capabilities, which enhance comprehension of the data. This study's results illustrate the effectiveness of Power BI in revealing concealed patterns, trends, and correlations essential for strategic decision-making. Essential insights include the detection of performance impediments, the forecasting of future trends derived from previous data, and the illustration of intricate linkages within the data. These insights are essential for maximizing operational efficiency, boosting resource allocation, and promoting overall organizational performance. This study highlights the need of incorporating sophisticated data analytics technologies like as Power BI into the decision-making processes of contemporary enterprises. By doing so, enterprises may use data as a strategic asset, fostering innovation and sustaining competitive advantage in a data-driven environment. The paper offers a framework for future research, recommending the investigation of additional analytical tools and approaches to augment data-driven decision-making.

Keywords: Data-Driven Decision-Making, Power BI, Data Visualization, Business Intelligence, Performance Analysis, Industry Insights, Strategic Decision-Making

Poster presentation

Paper ID 31

**THE IMPACT ON STUDENT COMPETENCIES BY ONLINE
EDUCATION - SPECIAL REFERENCE TO PRIVATE EDUCATION
SECTORS IN SRI LANKA**

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Abstract

The purpose of this study is to analyze the effect of online learning for the students' competency, which has an extensive use on students' performance and achievements. With this purpose, an analysis for the related study focusing on the factors that affect the students' competency in Sri Lanka in the year 2023 was carried out. In addition, this study assists on the relationship between the factors that has considered in the conceptual framework along with the online learning will be focused. This study consists of almost 100 students in total. The study conducted in Sri Lanka western province. This is an experimental study. Statistical analysis like, descriptive and inferential analysis including Pearson correlation and regression analysis are used. These analyses were done to check the significance of the variables and the relationship between the variables and to prove the hypotheses, which are the objectives of the study. The study indicates that the hypotheses in the study were accepted through the statistical analysis made. The results of the study shows that there is a medium level of impact on the students' competency and the academic performance through learning from online platforms. The test heterogeneity of the analysis has indicated the impact level do not indicate a difference in terms of the technology competency, students motivation, role of instructor, active learning, nature of the content. A quantitative research design used through an online questionnaire to satisfy the objectives of the research. In addition, the conceptual framework was established to determine the title of this study. The students' competency impact by online learning especially for the higher-level education students is covered through this study.

Keywords: Online education, Competency, Students motivation, Active learning, Academic success.

Paper 322

The Role of AI (Artificial Intelligence) in Revolutionizing the Banking Sector

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Abstract

Banking sector plays a pivotal role in modern business. The stronger the banking sector the stronger is the economy of the country. The basic function of bank includes accepting deposits giving advances and other related services. Artificial Intelligence technology has now become an essential part of the banking industry. AI is now shaping the way the banks operate and serve its customers. The banking sector is using, AI to access creditworthiness, aids in managing portfolios along with improving its customer service, security, and also provides personalized financial solutions. Artificial Intelligence (AI) is revolutionising every sector, and banking sector is no exception. The objective of research is to study the role and use of AI in banking sector with special reference to Indian banking sector the study will also analyse the challenges that occur by use of AI in this area. The nature of research uses secondary source of data.

Keywords: Artificial Intelligence, Banking, AI in Banking

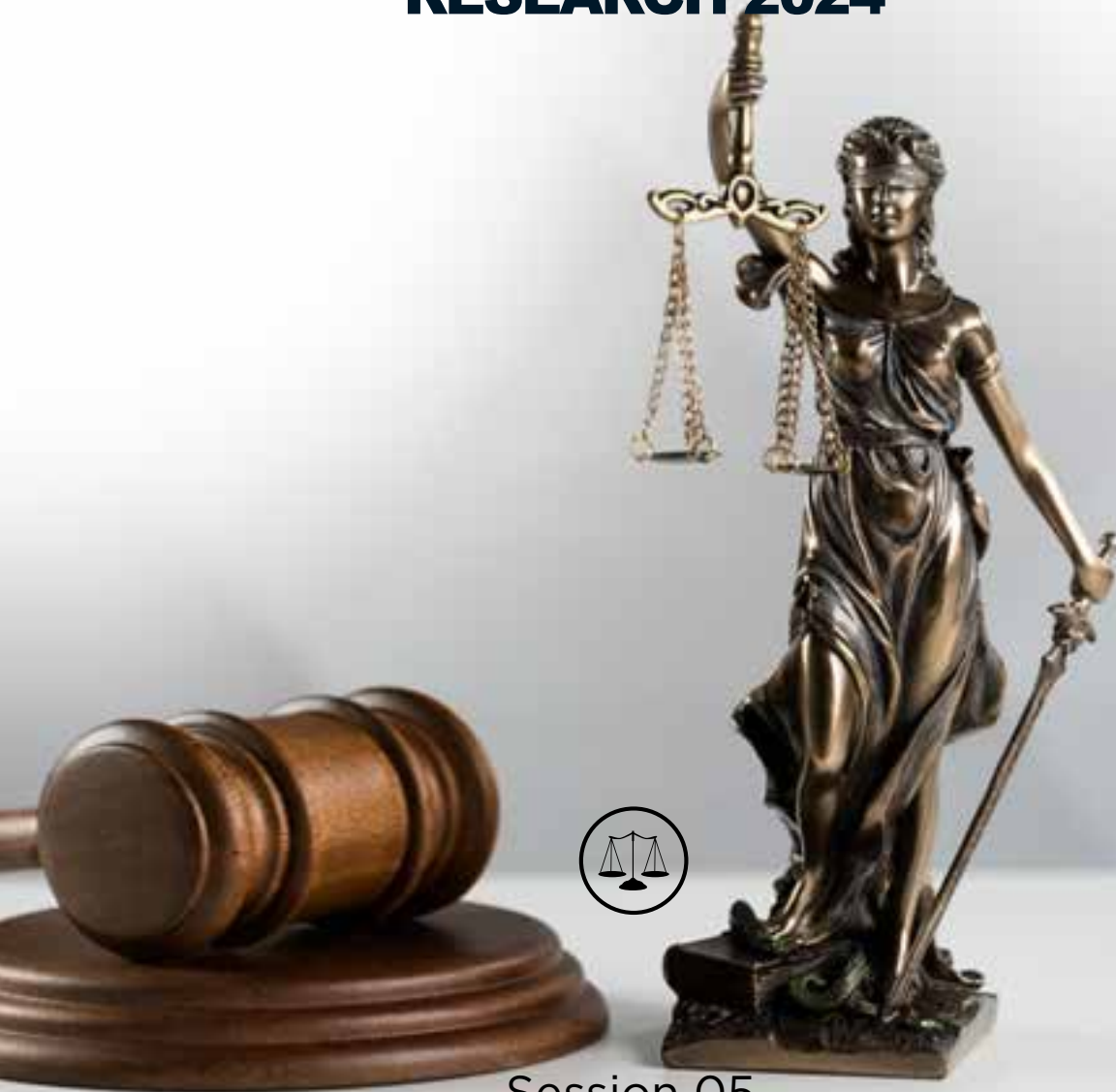


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Session 05
Legal Studies

Paper ID 8

NAVIGATING THE CHALLENGES OF DEVELOPING A CHILD-FRIENDLY JUSTICE SYSTEM IN SRI LANKA

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Abstract

In Sri Lanka a child-friendly justice system is paramount in ensuring that the rights of the children are observed, and their well-being is protected as they go through the justice process. In a child-friendly justice system, the special needs of the child are taken into consideration by having their involvement in the justice process handled in a sensitive, respectful, and efficient manner. The paper discusses some of the intricate challenges that surround the implementation and sustenance of a child-friendly justice system in Sri Lanka. It combines a rigorous empirical review of literature with an exploratory methodology toward the identification of the barriers that hamper the realisation of a child-centric legal practice. The legal challenges arise from ambiguous and inadequate national legislations and not giving due attention to children's views. Social obstacles, negative attitudes and stigma on children getting involved in the legal process, further complicate the efforts to enact a child-friendly justice system. The psychological barriers, focusing on the trauma that children experience and their vulnerability during the process, are strong impediments. That therefore raises immediate barriers in the way of developing a properly accessible and child-friendly and a sensitive justice system in Sri Lanka. The paper shall view these challenges against a critical review of existing literature, which deconstructs each of the barriers. The strategies and interventions in practice will also be assessed for their effectiveness and areas for improvement. The findings should be able to offer useful insights to national policymakers, legal practitioners, and other child advocacy organizations. It is expected that the recommendations that will be targeted in this paper will aid in the formation of an inclusive, responsive, and child-centered justice system in Sri Lanka that considers the best interests of the child before the law.

Keywords: Child, Justice, Sri Lanka, Challenges, Best-interests.

Paper ID – 188

**ANALYZING AI-GENERATED CONTENT WITH SPECIAL
REFERENCE TO COPYRIGHT OWNERSHIP OF LITERARY WORKS
IN THE SRI LANKAN CONTEXT**

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Abstract

The Artificial Intelligence (AI) is considered as the greatest achievement in the technological development that has given access to a variety of fields including literature by creating unique creative works in a fraction of the original time compared to a human. Simply, AI can be defined as a simulation of human intelligence processed through a machine such as a computer. At present, the AI-generated contents are not entertained by the copyright protection within the Sri Lankan legal framework and the AI-generated content that are created using existing copyrighted works are subjected to the controversial discussion due to their infringement of the rights of copyright owners. Furthermore, Sri Lankan legal framework does not address the violation of copyrighted work that occur through AI-generated content and in such matter applicable legal procedure is also ambiguous. The scope of AI is advanced by each, and every day and it directly affect the culture of literature by adopting AI-generated content which leads to the copyright infringement by accessing to the existing literature for generating AI based content without expressing gratitude or credits to the original owners of supported materials and disputes related to ownership of AI-generated content has become a crucial matter in a society where fierce competition has emerged. The copyrights issues in Sri Lanka mainly governs by Intellectual Property Act No. 36 of 2003; however, the act does not specifically express how this applies in a matter related to the generative-AI content nor has been amended to cater this lacuna. Therefore, it is highlighted the necessity of a new legal framework or amendment of the existing laws to protect the copyrights of literary works from the challenges of the digital world. In the investigation process, the qualitative method of research was used simultaneously with the black letter method in collecting information and analysing this lacuna. The present research will be guided to concentrate on the accuracy and effectiveness of current copyright laws in Sri Lanka to protect the rights of copyright owners against the generative-AI creations and question whether AI developing companies or its developers hold the copyrights for their own creation.

Keywords: Artificial Intelligence, Copyright, Generative AI Content, Intellectual Property, Sri Lanka

Paper ID- 339

THE INTERSECTION OF AI IN HEALTHCARE AND LEGAL LIABILITY: ADDRESSING ACCOUNTABILITY FOR DIAGNOSTIC ERRORS

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Abstract

The objective of the research was to analyze the emerging legal environment of Artificial Intelligence (AI) in healthcare, with an emphasis on legal liability for diagnostic errors. AI technologies provided a variety of advantages; however, this presented difficult legal issues, particularly concerning who was responsible for the errors or failures of AI systems. The study examined the present regulatory frameworks controlling AI in healthcare to identify any gaps or other issues that could affect the efficiency of regulation and the allocation of liability. It also examined specific case studies of diagnostic errors related to AI to determine how these instances were legally handled and the precedents they set for future cases. By emphasizing the moral and legal obligations of all parties involved, the research aimed to shed light on the consequences of AI mistakes for patients, healthcare professionals, and AI developers. Additionally, it assessed the suitability of existing liability models such as shared legal liability, professional liability, and product liability in the context of AI in healthcare. The study suggested legislative changes to strengthen accountability frameworks, such as the creation of new laws and best practices for applying AI in healthcare settings. To ensure that AI technologies were used responsibly, the research also addressed ethical issues, including informed consent and transparency. The goal of the research was to offer a comprehensive regulatory framework to manage the legal concerns related to AI in healthcare, promoting safety and confidence in these advanced technologies. The study revealed that current regulatory frameworks for AI in healthcare were inadequate in addressing liability for diagnostic errors, with gaps in responsibility allocation between AI developers, providers, and institutions, and insufficient liability models for AI-related issues. The research suggested legislative changes to establish a robust accountability framework for AI technologies in healthcare, focusing on shared responsibility, transparency, and patient rights. This aimed to promote safety, legal clarity, and public trust in AI-driven healthcare solutions.

Keywords: Artificial intelligence (AI), Healthcare, Legal liability, Diagnostic errors, Regulatory frameworks.

Paper ID- 305

BEYOND THE BENCH: ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING FAIRNESS AND TRANSPARENCY IN JUDICIAL DECISION-MAKING

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Abstract

In the pursuit of enhancing judicial decision-making, Artificial Intelligence (AI) has emerged as a transformative tool capable of revolutionizing legal processes. This study employs a qualitative research approach, primarily through a systematic literature review and comparative analysis, to investigate the potential and challenges of integrating AI into judicial decision-making. Drawing on an extensive review of academic literature, policy reports, and case law, the study explores the implementation of AI in jurisdictions such as the USA, Australia, and China. The thematic analysis of collected data identifies recurring themes such as efficiency, bias, transparency, and human oversight. While AI can improve efficiency, accessibility, and predictability, the study also acknowledges significant ethical concerns, such as the erosion of human oversight, which may adversely impact fair adjudication. Furthermore, the comparative analysis of different regulatory frameworks highlights diverse practices that can guide AI integration. The findings suggest that AI can enhance consistency in legal decisions, but maintaining fairness and transparency requires robust regulatory oversight and ongoing monitoring. This study proposes a balanced framework for AI incorporation, emphasizing human-AI collaboration, standardized regulations, comprehensive training for legal professionals, and continuous evaluation to safeguard justice.

Keywords: Artificial Intelligence, Judicial Decision-making, Legal Framework, Transparency

Poster presentation**Paper ID 18****RIISING OF JUVENILE DELINQUENCY IN SRI LANKA; IDENTIFYING CAUSES AND PROPOSING SOLUTIONS****V. Pranawan¹***¹British College of Applied Studies, Sri Lanka***Abstract**

This research was started at the outset as there was a need to scrutinize aspects and factors affecting juvenile delinquency in Sri Lanka. Juvenile Delinquency, at a glance, might seem a little obvious, but the rudimentary aspects of it are unknown to many. However, diminishing the rate could be a horrendous task. Delivery of this study was to provide recommendations that could eventually diminish juvenile delinquency in the resplendent isle of South Asia. The recommendations could provide assistance to further develop the affected area and neutralize aspects that try to hinder the successful adaptation of the same. Mixed method was followed for this study. This study utilized 5 semi-structured interviews with lawyers who deal with child-related matters and also questionnaire was issued and derived from 60 respondents, among which 33 were found valid and complete. These aids covered several deep ends that are usually not covered by certain studies. All these data were firstly analyzed and then relevant themes, and patterns, if necessary, were found. The ultimate intention of the researcher was to present the key reasons that majorly affect juvenile delinquency and then to provide reliable recommendations. As this research is majorly focused on the central regions of Sri Lanka, including Nuwara Eliya and Kandy being the most focused areas, further developments and research could be carried out to study the same aspect in other areas of the island as well. During this research, it turned out that the acts that govern the area need immense development or change. Further the school atmospheres are highly vulnerable to numerous predicaments that lead to several issues with regard to the topic. Howsoever, developments and further research could be carried out to investigate deeper into the aspect to finally propose some prototype that could help the development of the area, beyond doubt.

Keywords: Juvenile, Delinquency, Justice-system, Rehabilitation, Sri Lanka



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Session 06
Language & Education



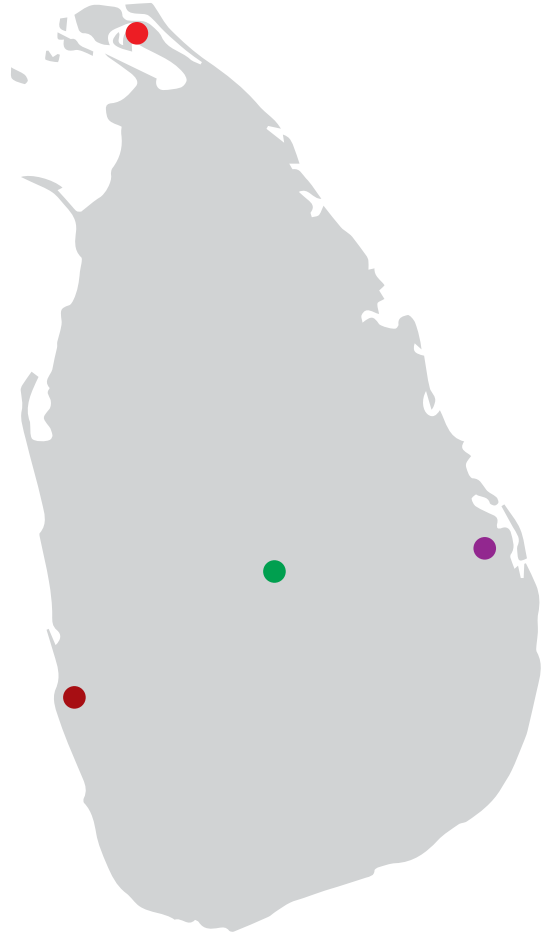
Paper ID – 277

**DEVELOPING A COMPREHENSIVE FRAMEWORK FOR
EVALUATING ENTREPRENEURIAL EDUCATION PROGRAMS IN
SRI LANKAN UNIVERSITIES: AN ASSESSMENT OF CURRICULUM,
TEACHING METHODS, AND SUPPORT SYSTEMS****P. A. Kulathilake^{1*}, Professor Ravindra, L. W. Koggalage²**¹*The IIC University of Technology, Phnom Penh, The Kingdom of Cambodia*²*Faculty of Engineering Technology, University of Vocational Technology, Ratmalana, Sri Lanka***Abstract**

This research aims to develop a comprehensive framework for evaluating entrepreneurial education programs within universities in Sri Lanka. Recognizing the pivotal role of entrepreneurship in economic development, this research assesses key components of entrepreneurial education, including curriculum design, teaching methods, extracurricular activities, and institutional support systems. A mixed-methods approach was employed, comprising a systematic literature review, surveys, interviews, and case studies of selected universities. The findings reveal significant insights into the effectiveness of current entrepreneurial education practices and identify critical areas for improvement. The proposed evaluation framework integrates both quantitative and qualitative metrics, providing a robust tool for educators and policymakers to enhance program outcomes. By tailoring the framework to the specific context of Sri Lankan higher education, this study offers practical recommendations for fostering an entrepreneurial mindset and skill set among university students. The research underscores the need for continuous adaptation and innovation in educational strategies to align with the dynamic demands of the entrepreneurial landscape.

Keywords: entrepreneurial education, evaluation framework, curriculum design, teaching methods, institutional support, student outcomes

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- BSc (Hons) in Cyber Security Management
- BSc (Hons) in Software Engineering

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- BSc (Hons) in Accountancy & Finance

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- Diploma in Hotel & Tourism Management

SCHOOL OF LEGAL STUDIES

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- LLB (Hons)

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- BSc (Hons) in Nursing

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- Postgraduate Diploma Level 7
- Global MBA
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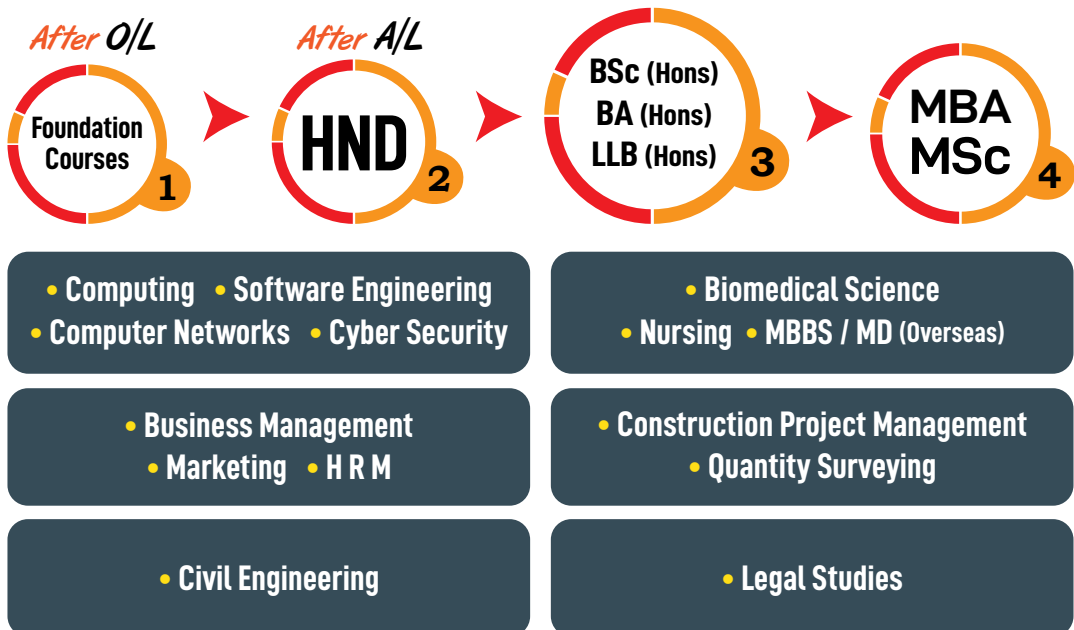
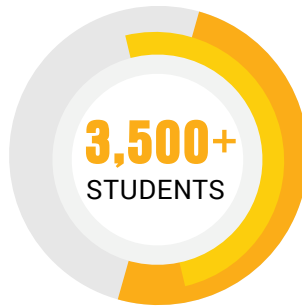
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