



## 4<sup>th</sup> STUDENT SYMPOSIUM OF FACULTY OF COMPUTING

*The Future of Emerging Technologies in Computing for Multidisciplinary  
Research*

# ABSTRACTS



Faculty of Computing, General Sir John Kotelawala Defence University  
Ratmalana, Sri Lanka.

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## Message from the Dean - Faculty of Computing



I am delighted that we have been able to organize the 4th Student Symposium in Faculty of Computing (SSFOC) of General Sir John Kotelawala Defence University. SSFOC is a forum that brings the novel research ideas of our young undergraduates studying in Faculty of Computing under various domain of Computing, namely Information Technology, Information Systems, Computer Science, Computer Engineering, Software Engineering and Data Science. Hence, it is with great pride that I pen down my thoughts on this abstract book of 4th SSFOC. Inculcating professionalism in the workforce of country is essential for its national development, and it can only be achieved through a concerted effort especially by those involved in the education system. In this respect, FOC has clearly identified its role, and it is committed to the task of assisting the nation by grooming young students to bridge the gap between the need and the availability of a professional workforce to support the country's national development endeavour adequately. As the Dean of the Faculty, I am pleased to note that we strive to maintain internationally accepted standards in the development of our course curricula thus encouraging students in research and innovation. SSFOC is an ideal forum for them to showcase their uncommon innovative ideas and it exemplifies our commitment to enhancing of professionalism through collaboration. Finally, let me congratulate all contributors and express my sincere wishes for a highly successful symposium, and I deeply believe that SSFOC will offer the participants a platform to exchange ideas, discover novel opportunities, reacquaint with colleagues and broaden their knowledge.

**Dr. Asela Gunasekara**  
Dean / Faculty of Computing

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## Comprehensive Study on Intelligent Traffic Light System Using Image Processing and Machine Learning

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### Abstract

With increasing numbers of vehicles worldwide, urban traffic in Sri Lanka is also increasing. Due to this, traffic congestion and traffic accidents are on the rise. According to the statistics provided from the country's government, person's average waiting time at a traffic light is 70 seconds, which is approximately 10% of total driving time. This may seem to be a significant amount for those who are leading busy lives. In addition, high density of traffic causes traffic-related problems like lack of road safety and parking challenges. This research study was conducted to seek a viable technological solution for such problems. We gathered feedback experienced by roads users who encounter at least one traffic light daily. It was then identified that the problems arise due to inefficiency of the current traffic light system which (1) cannot adapt to real-time traffic flow and (2) the inability to make dynamic decisions based on the traffic flow. As a viable solution, this research studied on a system architecture of an intelligent traffic light system using image processing and machine learning that can be implemented in Sri Lanka.

**Keywords:** *Traffic light system, Image processing, Machine learning, Dynamic decision making, Adaptability*

## LIDAR-Based Autonomous Systems: Technologies, Challenges, and Future Research Directions

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### Abstract

This study gives a full outline of LIDAR-based independent frameworks, their innovations, challenges, and future exploration possibilities. The paper starts by examining the idea of independent frameworks and their capability in the design of the Web. It concludes that independent frameworks are an assortment of organizations that work under a typical steering strategy and are the structure blocks of the Web. The paper then examines the specialized highlights of LIDAR innovation and the way things are utilized in independent frameworks. It says that LIDAR is a remote detecting innovation that utilizes laser light to quantify distances and produce 3D guides of the environmental elements. The article likewise underlines the benefits of LIDAR-based frameworks over regular discernment frameworks, like cameras, regarding solidness and dependability across many natural settings. Nonetheless, the report additionally noticed the impediments looked via independent frameworks, for example, security and protection concerns, and offers future examination roads to tackle these difficulties. It demonstrates that scientists ought to chip away at planning secure and protection saving independent frameworks that can work in a scope of areas and under differing lighting and climate circumstances. In general, this study presents a total outline of LIDAR-based independent frameworks and their forthcoming effect on various ventures. It highlights the meaning of proceeding with innovative work in this liable to guarantee that independent frameworks can work securely and effectively in reality.

**Keywords:** *LIDAR, Autonomous systems, Remote sensing technology, 3D maps, Security*

## Visual Intelligence Driven UAV Based Construction Monitoring System: A Comprehensive Review

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### Abstract

The importance of the construction industry is highlighted by its growing reliance on cutting-edge technologies. The new applications of computer vision, deep learning, image processing, and unmanned aerial vehicles (UAVs) in construction site monitoring are examined in this review paper, with a focus on the integration of YOLOv for real-time object recognition and image processing for fire detection. The research delves into critical aspects such as Vehicle Detection and Counting, Artificial Intelligence/Machine Learning-based Object Detection algorithms, worker safety considerations, identification of construction site resources, and the implementation of Fire Detection and Prevention systems. While acknowledging the strides made in enhancing safety and efficiency through innovative monitoring systems, challenges persist, particularly in addressing worker safety concerns, preventing avoidable accidents, and optimizing labour organization and resource management. Furthermore, adding fire detection algorithms to the mix provides yet another level of risk reduction. This paper serves as a valuable resource for researchers, business executives, and representatives navigating the complex landscape of construction management and safety. It highlights the ongoing advancements and outlines unresolved issues, fostering informed decision-making in the rapidly evolving construction industry.

**Keywords:** *Construction site monitoring, Unmanned aerial vehicles, Visual intelligence, Computer vision, YOLOv*

## IoT Security in Smart Cities: Explore the Unique Security Challenges in the Context of Smart City Deployments

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### Abstract

Smart cities are experiencing a transformation because of using Internet of Things (IoT) technologies. These changes aim to improve the overall productivity, sustainability, and quality of life of city residents. However, as urban systems become more connected, they present security challenges that need to be explored. In this review paper, we examine security in detail in the context of smart cities with a particular focus on applications such as transportation systems, smart grids, and public safety. Through empirical research, this paper investigates the potential risks and vulnerabilities of smart cities. These include cyber-attacks, data breaches, physical intrusion, and network sabotage. Additionally, we provide an in-depth review of existing research that addresses these challenges by discussing state-of-the-art security solutions, frameworks, and best practices. We explore encryption techniques, authentication methods, access control methods and security measures proposed and implemented in smart city projects. An important aspect of this paper is the analysis of real-world case studies from the community. This analysis provides insights in terms of lessons learned and best practices that can guide implementation and policy development. Importantly, this paper highlights the importance of private, academic and community partnerships to effectively address safety issues in smart cities. The paper provides insights into trends and future strategies for security. It explores how new technologies such as blockchain and artificial intelligence can help address these challenges. Outcome from this research serves as a model for creating complex strategies that balance the transformative potential of smart cities with the need to protect against security vulnerabilities of emerging varieties.

**Keywords:** *IoT security, Smart cities, Smart city deployments, Transportation systems, Smart grids, Public safety applications*

# Revolutionizing Online Shopping: A Comprehensive Review of an Automated Size Recommendation and Immersive 3D Visualization System for Virtual Try-On Enhancement

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## Abstract

In the last decade, the landscape of shopping has been significantly reshaped by the rapid growth of e-commerce and mobile commerce. The fashion industry's shift to e-commerce has resulted in customers being unable to try on clothes before buying, leading to high return rates and dissatisfaction. However, despite the substantial progress in online sales, the persistent challenge of clothing fitness has impeded the seamless purchasing of clothes online. This paper critically evaluates advanced virtual try-on techniques and systems, focusing on automatic size recommendation systems and 3D visualization techniques. It aims to identify key findings, identify knowledge gaps, and assess the advantages and limitations of these methods. The study contributes to the ongoing discourse on improving the global online clothing purchasing experience, making it more convenient, enjoyable, and efficient for consumers. Throughout the review process, an accurate and systematic search approach was employed, ensuring a thorough exploration of prominent academic databases. Additionally, the study considered the necessity of resolving research gaps and addressing potential limitations, emphasizing the importance of transparency in acknowledging any biases or constraints encountered during the review process. In conclusion, this paper contributes to the ongoing discussion on improving the efficiency and overall experience of online clothing purchasing for consumers worldwide. It underscores the potential transformative impact of innovative solutions in reshaping the fashion industry and enhancing customer satisfaction within the realm of online shopping.

**Keywords:** *Size recommendation, Virtual try-on, 3D model, Apparel industry, User measurement*

## Virtual Shopping Mall: Enhancing Customer Engagement, Retail Performance, and Specifications

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### Abstract

The advent of virtual shopping malls has revolutionized the retail sector by offering customers a unique shopping experience. This research investigates the possible advantages of virtual shopping malls, including increased customer engagement, improved retail performance, and the fulfilment of specific requirements. The study examines the effects of Virtual Reality (VR) technology and other innovative technologies on customer experiences in virtual shopping environments through a comprehensive literature analysis. The research utilized primary and secondary data collection methods, including surveys to understand customer preferences and interest in virtual shopping mall features, interviews with physical and online shop owners to explore virtual shopping mall platforms, and opinions on technology solutions. The study found that most customers (70%) prefer a combination of online and offline shopping, valuing factors like time efficiency, product selection, and user reviews. While most (72.8%) are satisfied with their current online shopping experiences, there is significant interest (87.1%) in virtual shopping malls. The study reveals that customers are drawn to features including recommendations, personalized assistance, 3D shopping experience and new communication features like virtual shopping malls that allow them to communicate with friends while shopping. Customers prioritize user-friendly, visually appealing interfaces for better online shopping experiences, while shop owners are interested in expanding their reach and engaging customers through technology solutions. The results of this research show that interest in virtual shopping malls is growing and virtual shopping malls hold the potential to enhance customer engagement, boost retail performance, and reshape the future of shopping.

**Keywords:** *Location-based emergency ambulance booking system, Digitalization, Resilience*

## AI-Driven Voice Training and Singing Improvement: A Comprehensive Literature Review

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### Abstract

This comprehensive review navigates the transformative potential of AI-driven technologies in vocal training and music education, with a focus on Voice Matching and Personalized Singing Improvement. It precisely explores a diverse array of subjects, providing a nuanced and insightful overview of the current state of knowledge in this dynamic field. By examining the AI's role in vocal training and music education, this review strategically identifies current gaps and limitations, proposing an innovative approach to systematically address these constraints. By bridging theoretical comprehension with a practical implementation, it significantly contributes to the advancement of both realms. The review not only sheds light on existing research but also lights up paths for future exploration, making it a valuable resource for future research endeavours. It underscores the transformative possibilities that AI holds for personalized singing improvement and voice matching, opening opportunities for innovative approaches that could shape the future of music education.

**Keywords:** *AI-driven vocal training, Personalized singing improvement, Artificial intelligence, Voice matching, Machine learning*

## A Comprehensive Review on Augmented and Virtual Reality Technologies in Forensic Science: Technology Overview, Applications, and Challenges

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### Abstract

Forensic science plays a crucial role in the criminal justice system by analyzing evidence collected from a crime scene. Accurate evidence forms the foundation for a fair legal system. Most on-site records in traditional crime scene investigations rely on photographs and manual sketches, which can overwhelm the jury in a court setting. In need of a more objective, precise, and comprehensive solution for crime scene documentation, 3D reconstruction of crime scenes for various purposes such as learning and teaching, courtroom representation, evidence annotations, and visualization has been trending in forensic science. Integrated 3D scanning platforms could be used to obtain evidence from the crime scene and these data can be visualized in 3D with VR headsets which allow respective personals to move through the crime scene and explore different perspectives. This data can also be preserved and transmitted easily when needed. This study reviews the technology used, applications of Virtual Reality and Augmented Reality in forensic science, and the challenges they face in using it. Key challenges such as medical conditions, cost, data security, and data accuracy are discussed and future research development areas such as scalability and storage management of crime scene multimedia data, implementing low-cost high precision solutions, use of blockchain-based techniques for secure file sharing and adoption of immersive technology has been suggested. Important reliable academic database sources were investigated as potential data sources, including Scopus and Google Scholar, which index publications and conferences supported by organizations like IEEE, ACM, Elsevier, and SpringerLink.

**Keywords:** *Virtual environments, Crime scene, 3D scanning, 3D reconstruction, Immersive technology*



## Music Emotion Recognition with Artificial Intelligence: Technologies, Applications, and Future Research Directions

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### Abstract

Music is the emotional language. Music emotion identification has gained considerable attention in the academic and industrial communities since it can be widely used in fields like recommendation systems, automatic music composing, psychotherapy, music visualization, etc. Deep learning-based music emotion identification is gradually becoming popular, especially with the rapid development of artificial intelligence. The main aims of the research are to examine and review major topics: computer music emotion identification, emotional semantic-driven music retrieval, and emotional music synthesis technology. In this research Collecting a variety of datasets and utilizing machine learning models such as Convolutional Neural Network, Recurrent Neural Network, Support Vector Machine, and Random Forests are required for music emotion recognition using Artificial Intelligence (AI). These models use factors including rhythm, pitch, and pace to classify music according to emotions. Emotion and music have a strong link that drives artistic expression and therapeutic advantages. Affective computing impacts recommendation systems, therapy personalization, entertainment, and cultural conservation, particularly in music emotion analysis. AI's emotional analysis improves streaming experiences, personalizes therapy sessions, and influences marketing methods. AI handles the complexity that comes with emotional and cultural diversity easily. A system for recognizing emotions based on musical scales is yet to be developed. Finally, this paper concludes the possible future research directions and provides a review thorough examination of music emotion recognition and a review of the AI algorithms for the above-mentioned major projects.

**Keywords:** *Music emotion identification, Artificial intelligence, Machine learning models*

## Comparative Analysis of Diagnostic Methods for Differentiating Hodgkin Lymphoma and Non-Hodgkin Lymphoma

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### Abstract

Lymphomas, a category of cancers like Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL), pose significant health challenges globally, underscoring the vital need for precise diagnostic methods. This review aims to assess and compare traditional histopathology with advanced diagnostic approaches like immunohistochemistry, molecular profiling, and machine learning to understand their strengths and limitations in classifying lymphomas. The methodology involves a structured interview with a histopathological specialist and an extensive literature review, focusing on some selected papers. The analysis highlights the prominence of machine learning algorithms, especially Convolutional Neural Networks, signaling a shift towards automated diagnosis. While immunohistochemistry and molecular profiling are widely used, integrating advanced technologies is still early. This review offers insights into current lymphoma diagnostic practices, pinpointing research gaps and stressing the need for more focused studies to overcome challenges for future advancements in the field. Future directions involve applying this knowledge, like developing machine-learning systems to enhance lymphoma diagnosis and bridging the gap between research and practical implementation.

**Keywords:** *Hodgkin lymphoma, Non-Hodgkin lymphoma, Diagnosis methods, Histopathology, Machine learning, Convolutional neural network*

## Applications of Artificial Intelligence in Healthcare: A Review

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### Abstract

Artificial Intelligence (AI) is on the brink of transforming the healthcare industry, bringing significant improvements in the areas of care quality, efficiency, and accessibility. This research undertakes an extensive literature review, exploring the manifold applications of AI in healthcare across various domains. These encompass (i) medical imaging and diagnostics, (ii) virtual patient care, (iii) medical research and drug discovery, (iv) patient engagement and compliance, (v) clinical trial collaboration and model sharing, (vi) rehabilitation, (vii) fraud detection, and (viii) other administrative domains. An array of services encompasses diagnosing clinical conditions, managing COVID-19 cases, offering virtual patient care, organizing electronic health records, enhancing patient participation, and streamlining administrative processes. As we embrace these groundbreaking capabilities, it is crucial to also address the ethical, social, and privacy concerns that arise when integrating AI. This calls for robust governance frameworks to effectively manage the legal, moral, and trust-related intricacies. The significant role played by artificial intelligence (AI) during the COVID-19 pandemic highlights its transformative impact on the healthcare industry and sets the precedent for meeting future healthcare needs.

**Keywords:** *Artificial intelligence, Medical imaging and diagnostics, Virtual patient care, Ethics, Governance*

## A Review on Brain Tumors and Artificial Intelligence: Exploring the Significance of Artificial Intelligence in Medical Imaging

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### Abstract

The escalating prevalence of brain tumors presents an intricate challenge to modern healthcare, demanding precise and prompt diagnosis and treatment. Their multifaceted nature, varying forms, and intricate anatomical locations underscore the urgency for advanced diagnostic methodologies. Amidst this clinical urgency, the emergence of artificial intelligence (AI) heralds a transformative era in medical imaging and brain tumor diagnosis. This review paper navigates the complex terrain where the resilience of neural malignancies converges with the dynamic capabilities of AI. The demand for timely and accurate diagnosis of brain tumors amplifies the significance of AI-driven medical imaging. AI's prowess in reshaping medical image analysis specifically for brain tumors cannot be understated. Its ability to discern subtle anomalies in imaging data accelerates early detection and intervention, crucial in improving patient outcomes. The confluence of AI and brain tumor diagnosis presents an unprecedented opportunity to revolutionize healthcare. This synergy doesn't merely represent a technological advancement but a lifeline for patients, offering hope and innovation amidst the complexities of neural disorders. Our exploration delves deep into the symbiotic relationship between AI's capabilities and the unmet needs of brain tumor diagnostics, envisaging a future where technology augments healthcare for improved patient care and outcomes.

**Keywords:** *Artificial Intelligence, Brain Tumor, Medical Imaging, Neuro-Oncology*

## Revolutionizing Cancer Patient Care in Sri Lanka: A Comprehensive Analysis of Artificial Intelligence-Driven Approaches

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### Abstract

For the sake of free health in Sri Lanka, the government has provided the opportunity for patients to get free health tests, monitoring, and treatment. Subsidies are also given to low income earners. But identifying and treating patients in remote rural areas is a challenge. This is due to the lack of available technology. Currently, there is no proper guidance to diagnose cancer conditions in patients and refer them for proper treatment. To prove this, a group of cancer patients in remote areas were given a questionnaire and according to the data obtained from them, 90% have used traditional methods and the majority have used herbal remedies, spiritual remedies and acupuncture remedies, life risk has increased. And 66.7% of them were diagnosed by local doctors and traditional healers and 60.8% by health care providers. For these reasons, the death rate of cancer patients in Sri Lanka has increased. Consider the review of the analysis, so an AI-based cancer patient care system can help build the right direction to protect the patient's life. There is still no proper system to diagnose cancer and provide medical advice. This paper attempts to define the concept of developing an AI-based cancer patient care system for self-guided cancer patients to diagnose their disease conditions and seek medical advice for proper treatment. The aim is to develop a system based on AI technology and provide health knowledge and guidelines for self-management to patients in remote rural areas. Using AI technology for the purpose of early detection of diseases through self-assessment in rural areas through personalized digital interfaces will be of great help to patients.

**Keywords:** *Artificial intelligence, Technology, Cancer patient care system, Cancer*

## Unravelling Enhanced Security in Satellite Image Encryption

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### Abstract

In this era of modern information technology, humans have a high reliance on space satellites particularly for telecommunications, military defense, intelligence, science, and commerce. With this reliance, it is of utmost importance to secure the data transmitted to and from the satellites in space due to the increase of threat actors wanting to gain unauthorized access to data and sabotage the satellite operations. This security issue is majorly affecting the domains of securing the transmission and storage of digital data such as images. Satellite image encryption techniques are crucial in ensuring the secure transmission and storage of valuable remote sensing data and challenging when technologically skilled attackers are equipped with the necessary computing tools and computational power. Secure encryption techniques prevent unauthorized access, tampering, or interception of data transmitted between satellites and ground stations, ensuring the confidentiality and reliability to use in various applications, including weather forecasting, environmental monitoring, defense, and telecommunications. To address this, there have been several satellite image encryption technologies introduced in the last few years. This literature review provides a comprehensive study of the evolving satellite image encryption methods. The survey findings have emphasized the balance of accessibility and security should be a major concern. Further, interviews conducted with industry professionals raised about how image encryption supports securing satellite data due to them experiencing security breaches and unauthorized access to satellite images. The review also delves into emerging approaches such as Honey Encryption tailored to the unique challenges of brute force attacks on satellite images.

**Keywords:** *Satellite images, Image encryption, Honey encryption, Cryptography*

## Comparative Study on Smart Cooking Assistant: A First Step to Develop Intelligent Assistant for Cooking Enthusiasts on Sri Lankan Traditions

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### Abstract

In a rapidly globalizing world where culinary traditions face the risk of being homogenized, the rich and diverse tapestry of Sri Lankan cuisine stands as evidence to cultural heritage. The study embarks on a vital exploration, can Smart Cooking Assistants harness technological innovation to preserve and promote the unique flavours and traditions of Sri Lankan cooking? Existing systems like Food Network's Bot for Messenger, HyperWrite's Sous-Chef, Barkeep, Artificial Intelligence (AI) Food Recommendation Systems, and Recipe Bot offer promising features that enhance the cooking experience but also face challenges related to integration and database management. Through systematic data collection methods involving surveys and literature reviews, this research evaluates the alignment of these systems with Sri Lankan culinary traditions, user preferences, and cultural relevance. This journey unravels opportunities for innovation, emphasizing the refinement of recommendation algorithms, user feedback integration, and user-centered design principles. The design philosophy is rooted in understanding user preferences and dietary restrictions while considering the age and cultural backgrounds of users. Technologically, the integration of AI, natural language processing, and recommendation systems takes center stage to provide a seamless and user-friendly experience. As the research looks to the future, it aspires to enhance personalization, dietary and cultural accommodation, multimodal interaction, advanced nutritional analysis, ethical AI practices, collaboration with culinary experts, and multilingual and cross-cultural adaptation. Thus, this research endeavours to bridge the ever-widening gap between traditional culinary practices and cutting-edge technology, ensuring that the culinary traditions of Sri Lanka remain vibrant, accessible, and preserved for generations to come.

**Keywords:** *Cooking assistance, Natural language processing, Personalization, Dietary preferences, Innovation*

## Swimming Stroke Analysis and Feedback System: A Comprehensive Review

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### Abstract

Swimming is a sport that relies heavily on technique and continuous improvement. Swimmers face challenges such as inability to analyse techniques during training alone, the need for immediate feedback during competitive events, and the risk of physical injuries due to poor technique. The research introduces a cutting-edge technology that uses machine learning to analyse various swimming strokes, providing objective assessments and feedback to improve techniques. The system, based on primary and secondary data gathering, aims to revolutionize swimming practice, competition, and injury prevention, with future work focusing on practical implementation. This study focuses on future works including practical implementation, refining machine learning models, and exploring a multi-model approach. The system integrates a variety of data sources for enhanced accuracy and attempts to generalise across swimming strokes. This approach differs from other alternatives in that it addresses all four major swimming strokes. The system will be developed based on the insights gathered from user perceptions who are swimmers and coaches which they emphasize a user-friendly interface, precise data gathering, and real-time feedback.

**Keywords:** *Swimming, Stroke analysis, Feedback system, Machine learning, Convolutional neural networks*



## Digitalization of Tourism: Technologies and Future Research Directions: A Review

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### Abstract

In the contemporary digital era, travelers are being deceived by unreliable travel companies, which has significantly affected the tourism sector's reputation. Innovative technologies play a crucial role in enabling travelers to choose reliable agencies that suit their preferences. This considers the potential to transform how passengers engage with agencies, promoting transparency and trust. This paper reviews the growth of the tourism industry by utilizing digital technologies, highlighting how technological innovations and ecological practices may coexist and laying the conditions for a more resilient and dynamic tourism environment. Digital technologies personalize travel experiences, impacting traveler behavior and raising contentment levels. The ecological impact of digitalization offers a hand to reduce the ecological footprint. Limitations are acknowledged and prospective directions for future research are delineated, with a particular emphasis on increased energy consumption, implementing electronic waste management systems, encouraging green certifications for hotels, and adopting smart destination strategies. These measures underscore the industry's commitment to sustainability and resilience in the era of digital tourism.

**Keywords:** *Digital technologies, Technological innovations, Sustainable development, Ecological footprint*

## Chili Pepper Pests and Disease Detection System for the Greenhouse Environment

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### Abstract

The cultivation of chili peppers in greenhouse environments faces significant challenges due to pest infestations and diseases, leading to economic losses and diminished crop yields. To address these challenges, this research focuses on the proposed Chili Pepper Pests and Disease Detection System tailored for greenhouse settings. The system integrates advanced sensor networks, machine learning algorithms, and image recognition technology to monitor environmental conditions, detect pests, and identify diseases affecting chili pepper plants. Data is gathered directly from individuals engaged in greenhouse operations, including employees and experts, through semi-structured interviews to understand their perspectives, experiences, and insights regarding pest detection challenges and preferences within greenhouse environments. These insights will guide the conceptualization and formulation of requirements for the proposed system. The research outcomes highlight the understanding of challenges, stakeholder needs, potential technological solutions based on literature findings, and a roadmap for subsequent development phases of the proposed system. Ultimately, this study contributes to advancing sustainable cultivation practices and optimizing chili pepper production in greenhouse environments.

**Keywords:** *Pest infestations, Machine learning algorithms, Image recognition technology, Conceptualization, Cultivation of chili peppers*

## Mobile Application for Visually Impaired: A Review

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### Abstract

People with visual impairments face several challenges throughout their daily lives, including navigation, access to information, and social interactions, which limit their independence and ability to fully engage with society. With the rapid advancement of technology, it has become possible to develop mobile applications as helpful solutions that address these unique issues faced by individuals with visual impairments. This review paper provides a thorough examination of mobile applications designed expressly for visually impaired users, with an emphasis on navigation and way-finding, object recognition, text-to-speech, and social interaction. The functionality, user interfaces, usability features, and efficacy of these programs are analyzed by a thorough assessment of relevant research papers and studies. The evaluation focuses on the wide range of mobile applications available to assist visually impaired people in various parts of their everyday lives as well as the limitations of those existing systems. Furthermore, this review discusses the use of GPS technology for navigation and way-finding, as well as machine learning and computer vision methods for object recognition such as the YOLO3 algorithm as well as AI and sensor technology for real-time object detection. The success of current mobile applications is highlighted in the discussion and future work section, along with suggestions for improvement and to achieve an excellent user experience. Overall, this review highlights how important it is for mobile technology to keep evolving in order to provide accessibility and better the lives of those who are blind or visually impaired.

**Keywords:** *Mobile applications, Visual impairment, Navigation, Object recognition, GPS technology, Machine learning, Computer vision, Text-to-speech*

## Mastering the Art of Website Assessment with Cutting-Edge Website Evaluation Tools and Live User Insights – A Review

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### Abstract

The paper meticulously dissects the integration of renowned website testing tools, such as GTmetrix and Google PageSpeed Insights, with real-time user surveys to provide a nuanced evaluation of website performance. Traditionally, the evaluation of website performance has favoured technical metrics, neglecting the critical element of user experience. By seamlessly merging user feedback with data from reliable testing instruments, a more comprehensive understanding of a website's strengths and weaknesses can be discussed. The study extensively examines the methodologies employed by GTmetrix and Google PageSpeed Insights, delving into the specific advantages and limitations of website evaluation tools. Furthermore, it explores the synergies arising from combining these techniques with real-time user input, facilitating a deeper analysis that considers both human preferences and technological benchmarks. With the aid of quantitative insights from testing tools and qualitative input from user surveys ensures a more accurate depiction of a website's overall functionality. Concrete examples illustrate the advantages of this integrated approach. For instance, the study showcases how GTmetrix's performance metrics align with Google PageSpeed Insights' recommendations and how real-time user surveys reveal preferences that quantitative metrics alone might overlook. This triangulation of data not only refines the understanding of website performance but also enhances the ability to identify and address potential issues. The challenges associated with implementing an integrated system are further explored, with insights into adapting to evolving user needs and emerging online technologies. The research goes beyond theory, providing practical implications for web developers, designers, and businesses seeking to optimize their online presence. Additionally, potential impacts on website rankings are considered, providing a holistic view of the significance and potential outcomes of adopting this comprehensive assessment approach.

**Keywords:** *Google page speed, GTMetrix, Pingdom*

## A Web-Based Management and Self-Learning System for Sakura Kai Karate Club

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### Abstract

It is crucial to understand the significance of information technology for the karate field. The research conducts a thorough investigation for the creation of a management and self-learning system specifically designed for the Sakura Kai Karate Club. There are a few problems with manual club management and member participation which suggests a need for a technological solution. Currently, administrative processes such as schedule management, fee management, grading test management, tournament management and inventory management are conducting manually which are time and cost-consuming. The primary objective of the research is to address the problems aforesaid and to introduce a comprehensive self-learning module, providing members with access to instructional videos, theory materials, and grade-specific assessments. This study employs two methodologies, combining insights gathered from interviews with club instructors and a survey of club members. After analysing data from these diverse sources, the research aims to get a better understanding of the challenges faced in administrative tasks, communication, and learning experiences within the club. The findings underscore the need for technological intervention to address the problems of manual administrative processes. Key challenges identified include manual handling of administrative tasks, learning experience and communication gaps within the club. By harnessing information technology, the study contributes to the broader discourse on tailored solutions for the specific needs of club instructors and members, ultimately enhancing the overall club experience. The study focuses not only on solving current issues but also on establishing a framework for further improvements.

**Keywords:** *Karate, Management, Self-learning*

## Enhancing Web Scraping with Artificial Intelligence: A Review

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### Abstract

Web scraping, the process of extracting data from websites, plays a crucial role in data collection for research, analysis, and automation. However, traditional web scraping techniques face challenges such as handling dynamic websites, anti-scraping measures, and extracting structured data from unstructured web pages. In recent years, artificial intelligence (AI) has emerged as a powerful tool to enhance web scraping, offering solutions to overcome these challenges and improve data extraction efficiency and effectiveness. This review explores the application of AI techniques in web scraping, including natural language processing for information extraction, machine learning for web page classification and computer vision for web page parsing. The benefits of AI-enhanced web scraping include improved accuracy, enhanced efficiency, handling dynamic websites, and scalability. Further, there are multiple challenges with the use of AI in web scraping. Ensuring the ethical and responsible use of AI in scraping is crucial to respect privacy rights, intellectual property, and terms of service of websites. However, the ethical considerations and the need to adapt to evolving anti-scraping measures pose challenges. This review highlights the potential of AI in web scraping and emphasizes the importance of responsible and ethical practices.

**Keywords:** *Web scraping, Artificial intelligence, Machine learning, Natural language processing, Data extraction*

## Improving Hazard Assessment Through the Integration of Weather Forecasting and Machine Learning Algorithms: A Review

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### Abstract

In order to improve the accuracy of hazard assessment, this research study explores the application of machine learning algorithms to weather forecasting, focusing on rainfall data in particular. The increasing unpredictability of natural hazards, such as floods, landslides, and urban inundation, which are primarily caused by climate change, is causing our world to struggle. This highlights the critical need for rigorous hazard assessments and early warning systems in order to effectively prepare for and respond to disasters. A thorough review of the literature is done with an emphasis on how machine learning techniques can be applied to improve hazard assessment, specifically focusing on precipitation forecasting. A thorough conceptual framework, a list of hypotheses, and an explanation of the methodology which includes regression models, deep learning models, hybrid models, feature engineering, comparative analyses, data assimilation, and ensemble methods—are all presented in this paper. To validate the potential of this integrated approach, the study makes use of an extensive 10-year dataset of daily rainfall records. The investigation goes deeper into an autocorrelation function analysis, providing information about how accurate and fast this methodology can assess hazards. The study highlights the significant implications of this synergy between machine learning and weather forecasting, not only in supporting the field of hazard assessment but also in reducing the extensive effects of natural disasters caused by rainfall. This study highlights the exciting opportunities that exist at the nexus of machine learning and weather forecasting, imagining a time when hazard assessment adopts a more comprehensive and knowledgeable approach.

**Keywords:** *Hazard assessment, Machine learning, Weather forecasting, Rainfall data*

## Challenges and Mitigation Strategies for Privacy and Security Issues of Indoor Positioning System: A Review

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### Abstract

Indoor positioning systems (IPS) have grown rapidly in applications across sectors such as retail, healthcare and logistics. However, as location tracking expands within closed environments, protecting user privacy and data security becomes increasingly vital. This paper presents a systematic review of key challenges emerging in IPS and evaluates mitigation strategies discussed in current research. The review first identifies privacy issues such as unauthorized monitoring of user whereabouts and profiling of behaviors that can compromise attributes. Mechanisms for anonymizing location datasets as well as frameworks strengthening individual consent are discussed. Regarding security risks, potential vulnerabilities in IPS infrastructure, positioning signals and device authentication are evaluated. Various mitigation strategies proposed in academic literature are surveyed, including techniques for anonymizing location datasets, strengthening consent processes, implementing multi-factor authentication and building redundancy into localization networks. The paper identifies three dominant challenge categories through analysis: location tracking and privacy; system manipulation and security and infrastructure dependencies/fault tolerance. Example techniques proposed to address each category are summarized and references are provided.

**Keywords:** *Indoor localization, Privacy issues, Indoor-location tracking*



## Transportation Tracking System: Technologies and Applications for Logistic Firms

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### Abstract

Logistics in the transportation industry face ongoing difficulties, particularly in maintaining driver safety and improving operational efficiency. The frequency of accidents involving drivers who are intoxicated or fatigued is a major problem in the real world. In this study, we suggest an integrated system which includes modern technologies such as alcohol detectors, eye-tracking cameras, global positioning system, and temperature monitors. Our solution involves using smart sensors and intelligent machine learning algorithms to detect alcohol levels and spot signs of driver fatigue by analyzing their eye movements. Not only does the solution ensure compliance with safety regulations but it also allows for real-time data collection and analysis are emphasized here, making our system not just safer but more efficient for logistic operations. In the future, transportation will lean heavily on automated drones and self-driving vehicles, especially for the final parts of deliveries. These advancements mean goods will get delivered faster, accounting for less traffic, and logistics will become more eco-friendly.

**Keywords:** *Transportation tracking system, Global positioning system, Blockchain, Real time monitoring, Sustainable logistics*

## A Comprehensive Review of Robotic Escort Services: Enhancing Safety and Security for Women in Public Spaces

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### Abstract

In an era marked by technological advancements and a heightened focus on gender equality, the safety of women in public spaces remains a significant global concern. In Sri Lanka, a heartbreaking 90% of women endure the painful experience of sexual harassment during their train and bus commutes, and it's disheartening to learn that merely 4% have found the strength to seek legal redress. Robotic escort services, a novel approach to personal security, offer the potential to address limitations and provide a more comprehensive and proactive safety solution for women. This paper explores the transformative potential of robotic escort services, exploring their potential impact on safety and security, limitations of existing solutions such as mobile applications and wearable technology, and utilizing Robotics, AI, and IoT to revolutionize women's protection. This study systematically addresses key research questions, investigating the effectiveness of these services, analysing the limitations of existing solutions, and highlighting the challenges and opportunities. Objectives include a comprehensive exploration of robotic escort services, understanding existing safety measures, and identifying challenges and opportunities. While the paper emphasizes the need for continued efforts to harness technology for women's safety, it concludes by highlighting the transformative potential of robotic escort services. The final results demonstrate a significant improvement in safety perceptions and incidents, affirming the efficacy of these innovative solutions in enhancing safety and security for women in public spaces.

**Keywords:** *Robotics, Women's safety, Robotic escort services, Public spaces, Emerging technologies, Technological solutions.*

## Functional Minimization in E-commerce Web Designs: A Comprehensive Review

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### Abstract

Functional minimalism emerges as a strategic tool for augmenting conversion rates by providing users with a clear and focused decision-making process amid minimal distractions. The minimalist design, synonymous with sophistication, contemporaneity, and customer-centricity, is identified as having a positive influence on brand perceptions. However, it is emphasized that simplicity should not compromise functionality, necessitating the accessible presentation of vital functions. This explores the paradigm shift in design philosophy towards functional minimalism in e-commerce web design, aimed at simplifying systems for user-centric simplicity and heightened business profitability. The research investigates the impact of consumer minimalism on user experience (UX), conversion rates, and brand perceptions in the context of e-commerce. A meticulous analysis of relevant literature underscores that the functionality of minimalism serves as a crucial factor in enhancing UX, reducing cognitive load, facilitating operational ease, and elevating success rates and user satisfaction. Strategic guidelines for the implementation of functional minimalism are outlined, including the identification of essential elements, prioritization of usability testing, cultural adaptation, brand preservation, and ongoing evaluations. Recognizing the pivotal role of functional minimalism in e-commerce, this research underscores its contribution to a personalized user experience and ultimate business success in the ever-evolving digital landscape.

**Keywords:** *Functional minimalism, E-commerce web design, User experience, Conversion rates, Brand perception*

## Impact of Generative Artificial Intelligence in Graphic Arts: A Review

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### Abstract

Generative technologies are set to transform graphic design workflows through automated content generation, personalized outputs at scale, and rapid iteration capabilities. While early research identifies opportunities to streamline processes and expand the creative scope, questions remain on optimally weaving computational abilities with human skills. Comparative studies have highlighted limitations in AI reproducing nuanced human outputs emphasizing the importance of expert guidance. As roles evolve with shifting skill demands, risks to livelihoods and craft knowledge are observed posing the need for addressed change. A comprehensive review identifies means to maximize benefits through strategic human-AI partnerships positioning design principles and decision making at the forefront while leveraging algorithmic potentials. Collaborative mixed-method approaches focusing on interdisciplinary issues provide direction balancing strengths yet preserving innate human creativity indispensable to visual communications. With knowledge-based practices sensitively aiding technological progress, responsible AI integration challenges can be surmounted.

**Keywords:** *Graphic design, Artificial intelligence, Computational creativity, Automation, Human-computer collaboration*

## **An Evaluation of Web-Based Project Management Systems for Sri Lankan Online Microentrepreneurs: A Comparative Analysis of Technologies, Features, and Future Development Recommendations**

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### **Abstract**

This study conducts a systematic review and evaluation of web-based project management systems to identify their features, strengths, and weaknesses in order to assess their suitability for Sri Lankan Online Micro-entrepreneurs. Therefore, this acts as a guide for Sri Lankan micro-entrepreneurs when choosing the most suitable project management system for their enterprises. Moreover, this study produces recommendations for future developments that can address the needs in the Sri Lankan micro-entrepreneurial arena. When considering academic literature focused on the use of project management tools and techniques in the performance of organizations, there exists a considerable research gap, because most of them are conducted regarding large firms, leaving a larger gap to explore this aspect in the context of Small and mid-sized enterprises. So, this study intends to address that gap. By reviewing the existing academic literature and conducting surveys using Sri Lankan online micro-entrepreneurs, this study assesses the suitability of five selected web-based project management systems for the Sri Lankan online micro-entrepreneurial context. As this study implies, Sri Lankan online micro-entrepreneurs face some challenges when adopting project management systems to their operations. Implementing Project Management Systems that are incompatible with the organization can lead to adverse consequences for the organization. As various web-based project management systems possess diverse characteristics, it is possible to evaluate the systems and choose the best fitting web-based project management system for micro-entrepreneurial digital ventures, and this study provides a contribution to that evaluation process.

**Keywords:** *Project management, Micro-entrepreneurs, Sri lankan, Project management systems, Online entrepreneurs*

## Optimizing Sri Lankan Ayurvedic Healthcare Ecosystem: Integrating Modern Technologies for Enhanced Patient Care and Management

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### Abstract

Ayurvedic medicine, which originated in ancient Indian traditions, has acquired international recognition as a holistic and natural healing approach that emphasizes the balance of mind, body, and spirit via tailored treatments, herbal cures, and lifestyle practices. This study digs at the integration of modern technologies into Sri Lanka's traditional Ayurvedic healthcare system, with the goal of optimizing patient care and management. The purpose of this research is to direct the thoughtful integration of contemporary instruments, promoting a medical environment that skilfully combines traditional healing methods with state-of-the-art discoveries for the benefit of patients in Sri Lanka and elsewhere. Ayurveda, which is based on ancient practices, plays an important part in the nation's healthcare, but the changing landscape needs a collaborative approach. To provide consideration at how modern technology like wearables, telemedicine, digital health records, and artificial intelligence interact with traditional Ayurveda. With a focus on Sri Lanka's distinct cultural background, the review moves between successful case studies and new developments in the field to offer insights into how technology is revolutionizing the Ayurvedic paradigm of customized, all-encompassing patient care. The study has broader implications since it adds to the conversation about the cohabitation of traditional and modern medical systems, with the potential to provide insights applicable not only to Sri Lanka but also as a model for global healthcare optimization.

**Keywords:** *Ayurveda, Ayurveda healthcare, Ecosystems, Patient care, Modern technologies*

## Artificial Intelligence in Healthcare Clinical Decision Making: A Review

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### Abstract

Artificial intelligence (AI) has been a rapidly growing technology which provides many utilities to bridge vast and various problems and gaps in many fields through important means. The healthcare industry is a more risk-taking, rewarding, complicated field with more challenges growing significantly with each passing moment. In this review research, the usage of artificial intelligence in healthcare clinical decision making have been researched and discussed through previous work on the field. In this review few of the existing works on using natural language processing chatbots and classification models in the field have been discussed with their contribution to the healthcare functionalities. Then the advantages and the limitations and challenges in using such AI tools in the healthcare decision making have been discussed. Reviewing further, the insights of trust and reliability in using AI enhanced applications in the healthcare industry have been also considered. Furthermore, in this review it concludes that it is better to use artificial intelligence tools in the clinical decision-making process in healthcare industry, concurrently and collaboratively with human practitioners rather than encouraging to follow a result solely based on the artificial intelligence systems.

**Keywords:** *Artificial intelligence, HealthCare, Clinical decision making, Reliability in artificial intelligence*

## A Review on How Artificial Intelligence-Assisted Surgeries Enhance the Medical Field

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### Abstract

Artificial Intelligence (AI) - assisted has now become a ground breaking technology in the medical field. AI-assisted surgeries are aimed at enhancing the surgeries, automated manual surgeries, and minimizing human errors during surgeries, etc. In the future, surgery will be, not just a skilled hand of a surgeon, but also a symphony of intelligence. Precise robotic arms, guided by the keen insights of Artificial Intelligence, will navigate the delicate world within patients' bodies. The benefits of the combination of these two will be countless. However, revolution is not just about the technology. It's about the human at the heart of it all. Also, it does not replace the surgeon's intuition, it elevates it. This review explores the advancements, benefits, and methodology that are associated with AI surgeries. It provides an in-depth analysis of AI-assisted surgeries powered by Computer Vision, image-guided procedures, and remote surgeries. Real life examples of successful AI-assisted surgeries are presented in this research paper to highlight the probability of life-saving with this technology. The methodology section discusses data collection, algorithm training, validation, and deployment. Overall, AI-assisted surgeries represent a transformative force and a key potential in the medical field. Furthermore, AI has the potential to revolutionize surgical care, leading to a safe future for patient outcomes, enhanced surgical efficiency, and equitable access to quality healthcare. Soon, Artificial Intelligence could be the backbone of surgeries, guiding a skilled hand toward a brighter and safer future for medicine.

**Keywords:** *AI-assisted surgery, Artificial intelligence, Artificial intelligence algorithms*



## Artificial Intelligence Powered Cataract Diagnosis: Enhancing Precision in Ophthalmic Healthcare

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### Abstract

World widely, the main cause of blindness is cataracts. The traditional ways that the ophthalmologists use to diagnose cataracts are subjective lens examination and visual acuity tests. Nevertheless, the diagnostic precision, reproducibility, and variability of manual diagnosis are limited. Application of artificial intelligence (AI) and machine learning (ML) techniques are used to analyse digital eye images for automated, standardized cataract classification and staging is done by recent research. This paper reviews 20 seminal studies demonstrating AI-based cataract diagnosis outperforms unaided physicians, with implications to enhance clinical decision making and improve global access to quality eye care. To achieve widespread integration, issues with data privacy protection, monitoring requirements, and physician acceptability must be resolved. However, AI has a great deal of promise to enable precision medicine and tailored treatment for cataracts.

**Keywords:** *Cataract diagnosis, Artificial intelligence, Machine learning, Computer-aided detection, Digital imaging, Ophthalmology, Precision medicine*

## Emerging Frontiers: Recent Advances in Geographic Information Systems for Military Applications

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### Abstract

This paper explores the significance of automated military passability map generation systems in contemporary military operations, emphasizing the importance of passability maps in military decision-making and their role in enhancing operational efficiency, safety, and tactical precision. The study examines the limitations of traditional manual mapping techniques and the need for sophisticated automated systems to improve operational efficiency and safety. The research focuses on the use of geographic information systems (GIS) in geospatial analysis, intelligence, logistics, supply chain management, environmental and disaster management, highlighting the revolutionary impact of GIS in modern warfare. The comprehensive nature of the research paper "Emerging Frontiers: Recent Advances in Geographic Information Systems for Military Applications" provides a detailed exploration of the significance of automated military passability map generation systems and their far-reaching implications for modern military operations. The paper concludes with a discussion on the substantial influence of these developments on contemporary warfare and the importance of automated military passability map generation systems in enhancing operational safety and effectiveness.

**Keywords:** *Automated military passability map, Geographic information system, Military applications*

## Machine Learning for Demand Forecasting in the Retail Industry: Applications and Future Research Directions

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### Abstract

Accurate demand forecasting is critical for retail inventory planning, supply chain management, and sustaining profitability. However, complex real-world retail demand patterns with promotions, trends, pricing variations and evolving consumer preferences pose modelling challenges. Recent advances in Machine Learning (ML) offer new data driven capabilities for uncovering hidden non-linear patterns toward improved demand sensing. This paper reviews Machine Learning applications in retail demand forecasting and synthesizes key findings on techniques, comparative accuracies of selected models and benefits of implementation. Popular methods examined include Autoregressive Integrated Moving Average (ARIMA) model, Support Vector Machines (SVMs) as well as Neural Networks. Key challenges such as computational complexity, model interpretability, and data limitation and integration are analysed and future research directions proposed related to creation of transfer learning models, lightweight deep learning models and customized demand forecasting models. The review suggests that while current machine learning implementations demonstrate forecast accuracy gains, considerable research is still needed to yield tangible business value, upon practical implementation of these models.

**Keywords:** *Autoregressive Integrated Moving Average, Neural Networks, Support Vector Machines*

## Impact of Online Learning in Education: A Comprehensive Review

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### Abstract

The field of education is evolving that the field of education is ever evolving, and then visualize online learning as this revolutionary force that is upending established teaching methods and ushering in a completely new age. This comprehensive analysis delves deeply into the ways that online learning is transforming education, compiling a wealth of evidence to help us better comprehend this changing environment. As a author conducted extensive research, going through a ton of data to identify the recurrent themes and common threads. As a author looked at the origins and future directions of online education as we took a historical tour. As a author also examined the effects of online learning on students' life, identifying benefits such as flexibility as well as drawbacks such as the loss of in-person relationships. By contrasting virtual learning, As a author identified what is effective and what need minor adjustments using the tried-and-true techniques. To sum up, rather than only discussing it, we are saying, "Let's do something about it!" To guarantee that everyone can take advantage of a strong, amiable, and technologically proficient education in the future, our recommendations include astute planning, bringing everyone up to speed with technology, and being flexible with the laws.

**Keywords:** *Online learning, Education, Student, Virtual learning*

## Enriching Resilience in Smart Manufacturing: The Role Industry 4.0 on Sustainable Production Process

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### Abstract

The world began to develop gradually since actual birth of technology happened in late 1760's which was named as Industrial Revolution. The study paper aims at evaluating, how well the Industry 4.0 can be applied in smart manufacturing in order to maximize productivity parallel to resilience and sustainability. The paper employs thorough review of existing literatures to gain insights on how Industry 4.0 can increase the productivity of a firm where smart manufacturing concepts are undertaken. In order to derive an innovative solution, the theme itself drives to establish couple of questions as, How the seamless integration of Industry 4.0 enrich the productivity in the context of smart manufacturing and will the integration of Industry 4.0 in the production process can enhance resilience in smart manufacturing. A broad literature review has been carried out to identify key theories and concepts to find information about the existing practical and theoretical implications of Industry 4.0. And using a simple questionnaire data has been gathered and analysed using an extensive as well as a comparative method. Collectively, Industry 4.0 not only creates efficient and effective production processes but also enables the activities such as maintenance and upgrades which will results in lower capital expenditure.

**Keywords:** *Smart manufacturing, Industry 4.0, Sustainability, Artificial Intelligence, Internet of Things*

## Quantum Cryptography: Enhanced Security for Better Communication

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### Abstract

This review extensively explores and compares classical cryptographic methods with a specialized emphasis on Quantum Key Distribution (QKD) techniques in quantum cryptography. It thoroughly examines their security foundations, key distribution mechanisms, vulnerabilities, and implications in modern computing. While revealing vulnerabilities within classical methods, notably in key distribution and susceptibility to evolving quantum threats, this review places a significant focus on the intricate nuances and diverse techniques within Quantum Key Distribution. It highlights QKD's theoretical invulnerability, its diverse methods for secure key exchange, and its resistance against quantum attacks, underscoring its pivotal role in quantum cryptographic frameworks. This assessment points up classical cryptography's vulnerabilities amidst advancing computing power and interception during key exchange. Conversely, it underscores the resilience of Quantum Key Distribution against quantum-based threats, presenting diverse methods for intrusion detection. By delving deeply into Quantum Key Distribution techniques, this review underlines their potential to revolutionize secure communication paradigms. Rooted in quantum principles, these techniques pave the way for enhanced security, delineating a transformative path in securing future communications.

**Keywords:** *Cyber security, Networking, Quantum computing, Quantum key distribution, Secure communication, Secure networks*

## Evaluating the Impact of Innovative Learning Management System Features on Student Engagement: A Comparative Study

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### Abstract

Learning Management System (LMS) is a highly accessible platform for individuals involved in remote learning and remote work, facilitating a seamless environment for both education and professional tasks. Most of the current LMS systems contain rudiments that motivate students toward education and encourage them to work at a veritably minimum position. Thus, most of the students use the LMS only to study their courses and upload their assessments. The aim of this research is to motivate and ameliorate students, educational situations using LMS. However, once an LMS system is in place, it should greatly contribute to the quality of students' education and their educational conditioning. This research paper examines the functions that should be included in an LMS system and the functions that should be updated in an LMS system for the sake of the educational quality and educational provocation of scholars. And using a simple questionnaire, data has been gathered and considered them in order to derive functions like, GPA tracking, Assignment alert feature, Generating a monthly attendance report and an Academic calendar. The common approach used in exploration to collect data was a questionnaire and dissect it using expansive and relative styles. Based on the research data, it appears that a high number of students prefer the idea of having a Learning Management System with new updated features.

**Keywords:** *Learning Management System, Student engagement, Remote education, Motivation in education.*

## Comparative Analysis for Machine Learning Algorithms in Email Spam Filtering: Evolution, Performance and Future Directions

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### Abstract

Email remains a cornerstone of digital communication, facilitating fast and efficient Internet communication. The growing reliance on email has led to numerous issues caused by spam. Spam infiltrates personal and professional accounts, posing threats ranging from phishing scams to malware dissemination. There is an urgent need to develop stronger dependable antispam filters is crucial to protect users from spammers evolving tactics and maintain the integrity and safety of digital communication channels. Spam emails can now be efficiently recognized and filtered thanks to recent developments in machine learning algorithms like hybrid approaches, corporate email systems, ad anti-spam software solutions. We provide an in-depth examination of several popular machine learning-based email spam filtering methods. An outline of the main concepts, approaches, efficacy, and future directions of spam filtering research is provided in our review. Machine learning-based spam filters like naive bayes, support vector machines, decision trees, neural networks, ensemble methods and their variants are our primary emphasis. We present the results of a thorough analysis that includes a survey of relevant concepts, efforts, efficacy, and recent developments. Our evaluation rigorously compares the benefits and limitations of current machine-learning techniques with the unresolved issues in spam filtering research. We conclude by discussing performance evaluation measures of machine learning-based filters and explore challenges and future directions of the latest developments.

**Keywords:** *Email, Spam, Antispam filters, Machine learning algorithms, Performance evaluation measures*



## A Review of Blockchain Technology for E-Governance: Applications and Challenges

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### Abstract

Information Communication Technologies are seen as a pivotal factor in improving service delivery in the realm of e-governance. Nonetheless, issues such as data privacy, confidentiality, dependability, coordination, and interoperability impede its complete potential. This study will examine the impact of blockchain in resolving these issues while lending transparency and protection to e-governance at the same time. The central inquiry of the research highlights how blockchain can aid in fortifying e-governance by upping transparency and security. Fields such as identity management, voting system safety, clear supply retailers, and electronic documents notary services are investigated as part of the research. Despite previous research recognizing its prospects, there is still a need to review its literature and empirical evidence. Fueled by an eagerness to handle the vital challenges of e-governance, this research aims to provide useful insights, research gaps, and a guide to utilizing blockchain to enhance e-governance. The systematic review approach encompasses essential elements of the blockchain to properly assess its capacity to back up e-governance. Case studies from varying backgrounds underscore the capability of blockchain in dealing with the troubles. This research greatly and practically provides possible solutions and calls for further examinations for an accountable adaptation of blockchain in e-governance. It also brings to light modern prospects of more effective and secure governance.

**Keywords:** *Blockchain, E-Governance, Transparency, Security, Service delivery*

## Systematic Review: Artificial Intelligence-Based Methods for Quality Control and Defect Analysis in the Apparel Industry

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### Abstract

Nowadays, garment manufacturing companies face increased worldwide competitiveness and unpredictable demand variations. These demands push companies to continually enhance the effectiveness of their manufacturing processes to provide the final product in the shortest possible time and at the lowest possible cost. Traditional manual approaches, on the other hand, confront limitations in terms of subjectivity, time limits, and scalability, driving the study to propose ideal AI-based methods for garment quality inspection. This systematic study looks into the integration of artificial intelligence (AI) technologies such as Convolutional Neural Networks (CNNs), Artificial Neural Networks (ANNs), and many more AI technologies for quality control and defect detection in the clothing industry's sewing segment. This focuses on innovations such as CNNs for identifying damaged stitches and the influence of ANN on the fashion supply chain. Future work recommendations include broadening AI-powered defect detection, incorporating AI into Industry 4.0, resolving ethical problems, and developing adaptive AI systems to handle dynamic changes in garment patterns. Overall, this analysis sheds light on the revolutionary potential of CNNs and ANNs in improving quality control in the clothing industry's sewing division.

**Keywords:** *Apparel industry, Artificial intelligence, Quality control, Defect analysis, Artificial intelligence*

## Efficient Hotel Stock Optimization and Food Waste Reduction System for Enhanced Customer Service and Menu Management Applying Predictive Analytics

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### Abstract

This study conducts a systematic review and evaluation of web-based project management systems to identify their features, strengths, and weaknesses in order to assess their suitability for Sri Lankan Online Micro-entrepreneurs. Therefore, this acts as a guide for Sri Lankan micro-entrepreneurs when choosing the most suitable project management system for their enterprises. Moreover, this study produces recommendations for future developments that can address the needs in the Sri Lankan micro-entrepreneurial arena. When considering academic literature focused on the use of project management tools and techniques in the performance of organizations, there exists a considerable research gap, because most of them are conducted regarding large firms, leaving a larger gap to explore this aspect in the context of Small and Mid-Sized enterprises. So, this study intends to address that gap. By reviewing the existing academic literature and conducting surveys using Sri Lankan online micro-entrepreneurs, this study assesses the suitability of five selected web-based project management systems for the Sri Lankan online micro-entrepreneurial context. As this study implies, Sri Lankan online micro-entrepreneurs face some challenges when adopting project management systems to their operations. As various web-based project management systems possess diverse characteristics, it is possible to evaluate the systems and choose the best fitting web-based project management system for micro-entrepreneurial digital ventures, and this study provides a contribution to that evaluation process.

**Keywords:** *Predictive analytics, Point of sale, Hospitality industry, Food waste*