KDU FOCSS
Faculty of Computing Student Symposium

FACULTY OF COMPUTING STUDENT SYMPOSIUM

17th December 2021

ABSTRACTS

General Sir John Kotelawala Defence University

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GENARAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY
RATMALANA, SRI LANKA

Published by

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

Tel: +94 71 021 9457
e-Mail: focss@kdu.ac.lk
Website: https://www.kdu.ac.lk/focsymposium

ISBN 978-624-5574-00-1

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Message from the Dean – Faculty of Computing

I am delighted that we have been able to organize the 2nd Student Symposium in Faculty of Computing (FOCSS) of General Sir John Kotelawala Defence University. FOCSS is a forum that brings the novel research ideas of our 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 2nd FOCSS.

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. FOCSS 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 FOCSS 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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-Keynote Speech I-

Impact of the Digital Technologies on Future Industries

Dr. (Eng.) Thushara Weerawardane

Department of Computer Engineering, General Sir John Kotelawala Defence University, Sri Lanka

The process of the industry revolutionised over years from mechanisation to cyber physical systems. The productivity, cost and speed changes within the production process from material to finish product in time varying physical system. Globally, many industries face numerous challenges of handling uncertainties in supply & demand variation of the supply chain & logistics for both raw material and finish products. During manufacturing processes, the reliability of equipment & plant plays key roles to minimise the downtime from the performance and efficiency perspectives.

The rapid development in technology and automation created vast improvement in manufacturing systems by providing high quality product and services to a competitive market environment during the last century. Modern technology advancements have created a cyber physical environment in the industry through the integration of automated systems by providing reliable and ubiquitous connectivity among manufacturing processes and systems. With development of industrial internet of thing (IIOT) and AI based technologies, data becomes main fuel for many digital industries. The real-time information availability over the manufacturing process and systems, creates efficient and high-quality production platforms. AI technologies provide predictive maintenance and prescriptive analytics within manufacturing industries to create cost effective reliable systems. Currently many industries are moving towards the process of digital transformation within an integrated automated cyber-physical system to be competitive in the market.

-Keynote Speech II-

Cyber Threat Intelligence

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Cyber Threat can be classified as Threats to National Security, E-crime, Data Theft, Denial of Service, Money Laundering-Organized Crime and the proliferation of weapons of mass destruction (WMD). The threat profile dates back to 1990-cyber-attack which was hit and run for fame and recognition-firewalls were used. Later for-profit making cybercriminals started attacking the system-targeted attacks. Cybercriminals have the desire, ability, patience and skills to invest their time and resources into these modern attacks to achieve financial gains. Malware is specially created based on the information gathered in the reconnaissance phase. Social engineering and phishing allow them to enter the organizations database easily. Cyber criminals even sell their tools to perform targeted attack as Software-as-service SAS in the dark web. Hackers for Hire-groups consist of professional and elite hackers, most of whom are very intelligent, calculated and, for lack of a better term, "best of breed."

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Information Technology

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Image Processing Based Proposed Drone Application for Detecting and Analysing Enemy Targets

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Abstract. Drone technology is used for many sections such as agriculture, aerial photography, surveillance, and military, etc. Surveillance is the process of keeping a constant eye on a situation, an area, or a person. This usually happens in a military environment where there is a lot of surveillance going on. For the military, conflict zones and enemy territory are critical. The safety of the country Surveillance of humans is performed by transporting workers in close proximity to vulnerable regions on a regular basis Keep an eye out for any changes. We propose in this paper to create a drone that uses a sophisticated thermal camera to detect people. With the help of neural networks, we can create an imaging surveillance system. The dual-spectrum camera for thermal imaging put on the drone can work under cover of darkness. In the dark and when there is condensation from fog or rain with no external illumination. The drone is capable of differentiating native military men from intruders by implementing RFID technologies. this paper is going to use image processing techniques and GPS technologies to identify enemy targets and to analyse their geo-location. Operations of proposed application controlled with three processing units, 1st process is used thermal camera images and digital images to identify human character(enemy) in the area and in 2nd process used RFID tags to different enemies form friendly forces and as 3rd step used GPS technology to get the geolocation of the enemy to identify their location to capture them to attack. And in addition to identifying the enemy used shape algorithms to identify the enemy.

Keywords: *GPS- Global positioning system, RFID- Radio Frequency Identification Device. UAV- Unman Aerial Vehicle*

An Analysis of the Effectiveness of Using Face Recognition Algorithms to Enhance the Performance of Online Attendence Marking System

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Abstract. The COVID-19 pandemic has changed the educational pattern of the Sri Lanka. Students and teachers must adopt this online learning as there is no other excuse in this pandemic situation. Main problem is students are continuing some bad habits during the online attendance marking as the teachers haven't ability of guide their students as conducting the classes in physically. Therefore, the main aim of the research was to find out the challenges faced by the students and teachers in current online attendance marking and giving them a solution by applying the face recognition techniques after identifying and analysing the effectiveness of using face recognition algorithms for online attendance marking. Research objectives were, Analysing the challenges faced by users during the current online attendance marking, Analysing the users' opinions to enhance the performance of the current online attendance marking systems and analysing the performance of the face recognition algorithms which can be applied to enhance the effectiveness of the online attendance marking system. To take clear evidence of the current situation of the online learning, researcher collect data through qualitative and quantitative methodologies. Sri Lankan undergraduates, school students, teachers and lecturers got involved for data collection. After analysing those findings, researcher understand the effectiveness of using the face recognition algorithms for this system and discussed about the face recognition algorithms which are suitable for implementing the online attendance marking system. Out of numerous face recognition algorithms, here researcher discussed on the four types of deep learning face recognition models such as VGG, Google FaceNet, Facebook DeepFace and the Dlib algorithms. Labeled Faces in the Wild (LWF) used as the data set for the comparison of above deep learning models. Principal Component Analysis (PCA), Artificial Neural Network and Eigen Faces Method are the main face recognition algorithms which were used for existing online attendance marking systems. Researchers examine those algorithms by comparing the features, advantages, disadvantages, accuracy rate, time for the verification and the error rate of these models. After analysing the performance of those algorithms researcher proposing Dilib face recognition for implementing the proposed system.

Keywords: *Online Attendance Marking System, Deep Learning Face Recognition Models, Convolutional Neural Networks (CNNs), Labeled Faces in the Wild (LWF)*

An Analysis of Successfulness of the Features of Software Applications in Travel and Tourism Industry in Sri Lanka

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Abstract. As the industrial society of the twentieth century gives way to the information society of the twenty-first century, the modern world is undergoing a major transition. This dynamic process has the potential to fundamentally alter all parts of our life, including knowledge distribution, social interaction, business practises, political activity, media, education, health, leisure, and entertainment. Travel industry software applications play a more and more important role in the tourism and travel industry by contributing to a large volume of transactions and revenue. Many studies have evaluated tourism websites through different research methods. Website usability, in general, has improved dramatically but problems remain. Very few studies focus on the use of software applications and features of need to develop in the Sri Lankan context. This research uses a mixed-methods approach and collects the data from Sri Lanka current existing travel apps used tourist people and Sri Lankan app developers. The survey results show that tourism and travel industry software applications search is regularly utilitarian in nature; the complex interface and not have one platform including more features either obscure or were ignored by most tourists while decreasing the satisfaction of that travel industry software applications and what features are needed for further development. This research paper discusses what are the existing systems, existing features and what features are need more development and satisfaction of these tourism and travel industry software applications. In this paper, I discuss the advantages of developing that type of travelling software applications using new technologies.

Keywords: *Tourism and travel industry, modern technology, software application, features, satisfaction, Sri Lanka*

Design and Development of Low-Cost IoT Based Early Elephant Detection System

KU Munasinghe, MWP Maduranga

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Abstract. Day by Day to satisfy the need of humans, we seek to gather land from the nearby forest. Thus, the rate of deforestation has been increased. With limited resources to live, the wild elephant community must seek outside of the forest cover to compete for the resources with humans. This tends to start human-elephant conflicts. The common method of elephant breaching prevention technique is to establish elephant fences. But this method is insufficient to mitigate human-elephant conflicts because it is not a reliable option to stop and notify if a breach happens early. And when a breach of the elephant fence happened, it is too late to stop the breach. Therefore, to solve this problem, we suggest a low-cost IoT system to detect elephant movement in advance and notify the relevant authorities. This system consists of an ESP8266 microcontroller, ADXL355 3-axis accelerometer, NEO-6M GPS receiver, and a self-sustainable power source. This system listens and detects ground vibration caused by elephants' movement and sends warning messages with location data of the elephants to relevant parties. This system acts as a virtual barrier, and it won't interfere with elephants physically. As the result of this research, elephants can be detected without causing physical interference with wildlife and save the valuable lives of both humans and elephants by mitigating conflicts caused by unknown breaches.

Keywords: *IoT for Wildlife Monitoring, Smart Sensors, Electronic Product Development*

Artificial Intelligence in Healthcare Industry

LR Mohammed, BMTN Rathnayaka

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Abstract. AI changes the human intelligence into the form of digital intelligence in healthcare industry. Because it can perform many difficult tasks in less time and in more accurate manner. The implication of AI in the healthcare industry was for a long time a controversial topic due to human not trusting a machine on their body. This research paper fully analyses the impact of AI on the healthcare industry. the review includes the ongoing flow status of medical services for AI application. this research paper is conducted a survey with the list of 6 questions send to professionals in medical sector to find out the impact of AI in healthcare industry. researcher have identified that approximately 81.1% of the respondents of health professionals believe that AI can provide more accurate, fast diagnosis and reduce the healthcare workers workload. healthcare organizations are in an urgent need for decision making technologies to handle many complicated diseases, such as cancer, brain tumours, heart arrhythmias and diabetes. Particularly during a crisis like covid 19 outbreak, healthcare professionals are dealing with higher rates of workload and burnout. By using AI will reduce the workload of healthcare professionals. Furthermore, according to the survey conducted in this research paper, 73% of the respondents have a welcoming attitude for the impact of AI based treatment in the healthcare industry. Additionally, 47% of the professionals in medical sector in the Sri Lanka believe that they are currently working with AI at their workplace. AI is an expansive concept that encloses a series of advances that are expected to use human-like insight to handle the problems. A few advanced investigations of AI applications in medical services that provide a glimpse into a future where social insurance conveyance increasingly brings human interactions together.

Keywords: *Artificial Intelligence (AI), Health Care, Patient Care, Treatment*

Emotional Artificial Intelligence Approach to detect and manage Academic Stress

KCM de Alwis, KBA Madushi

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Abstract. Stress is a prevalent issue that affects all of us at some point in our lives. The most common sort of stress that University students suffer is academic stress. This has a huge possibility of harming a University Student's academic performance. Academic stress has become a part of University Students' lives at times, it encourages them to improve themselves and work hard; at other times, it has become a burden when they are unable to manage it. There are numerous factors for academic stress. In general, it is mainly caused due to a variety of factors including Assignments on-time submission, GPA Values, Modular Grades, Loss of Hope, and Ambition. The personal coping mechanisms used by university students to manage academic stress are listening to music, watching videos, being motivated, and working hard, and wishful positive thinking. Moreover, it shows that there is a significant relationship between the ability to manage stress levels and the factors like gender, academic year, or university type of Undergraduate students. So, therefore, this research paper is concerned with examining the stress factors of University Students and finding out the personal coping mechanisms used. The main objective of this research paper is to propose a system to detect stress levels and manage academic stress of University Students through stress releasing mechanisms that will assist University Students in reducing stress levels caused due to many factors using various strategies. This proposed system uses the Emotional Artificial Intelligence approach to detect students' emotions and it identifies stress levels using three emotional artificial intelligence detection technologies as Face recognition, Voice Recognition, and Text Analysis. Further, the system assists University Students with various stress reduction techniques after stress detection.

Keywords: *Academic Stress, Stress Detection, Emotional Artificial Intelligence*

Technology Involvement And Effectiveness For Online Learning During Covid-19 Pandemic

GHAS Navodya, N Wedasinghe

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Abstract. Every aspect of life has changed as a result of the ongoing COVID-19 pandemic. Schools and universities have been forced to conduct courses in online learning environments due to the COVID 19 epidemic. Online learning is a type of education in which students learn in a completely virtual setting. Due to the global breakout of the Covid-19 pandemic, distant learning is playing a key role in the education sector. The major goal of distance learning techniques is to improve the quality of learning and teaching in the educational system. This survey involved both school and university students in Sri Lanka. The quantitative study was conducted by using Google Form as the online questionnaires for collecting data. The number of responses after the survey was 83. The survey helped to identify the technology involvement and effectiveness for online learning during Covid-19 pandemic in Sri Lanka. The results found that there is a powerful relationship and influence between online learning technology and learning effectiveness. Technology can be used to enhance learning in a variety of ways, including electronic grade books, digital portfolios, learning games, and real-time feedback on teacher and student performance. Furthermore, in rural areas, a lack of basic informational technical skills has a significant impact on online education. According to the research articles and survey clearly identified online learning effective for this pandemic situation and Covid-19 has impacted on education. Furthermore, this paper supports to identify online learning advantages for both school and university students and some of the most common issues students are having with online learning right now.

Keywords: *Benefits, Covid-19 pandemic, Effectiveness, Impact, Online learning, Technology*

AI-Based Facial Emotion Recognition Video Conferencing Feature Enabled Smart Learning Management System to Measure Degree of Comprehension

SP Muthukuda Arachchi, BMTN Rathnayake, RN Samarawickrama

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Abstract. The fecundity of learning environments is hanging on the collaborative teaching methods and monitoring methods that use to discipline the students. Moving from the physical classroom to the virtual classroom decreased the validity of the above-mentioned constituents. Therefore, as a tradition students browse the web, fall snooze, and leave their study areas without listening. They know there is no one to discipline and punish them during online lectures. Weak network, Physical appearance, the background of the study area drops the number of students who switch on their camera during online learning. The purpose of this research is to enhance the proficiency of the instructors during the online lectures by using an AI-based understanding level measuring feature which sorts participants who comprehended during the session and who were not comprehended. This also provides a mechanism to detect disobey students who left the study area during the online lectures. Using distributed google forms among the 51-sample size of students and lecturers in General Sir Jhon Kotelawala Defence University- Southern Campus, in Sri Lanka, this study analysed the necessity of this research area and pointed out the use of (Facial Emotion Recognition) 2013 data set to train the facial emotion recognition model. This study results that the use of this inventing feature can reduce the monotonous online teaching process and students can realize it as same as they were in a physical classroom. Rather than developing a new architecture to detect face emotions, it can reduce implementation time by modifying the weights uses in existing architectures and resampling the FER 2013 dataset using bi-linear interpretation up sample technique can increase the amount of the dataset as same as existing architectures. This study provides a proficient way to enhance the collaborative learning environment and technology aspects which can use in facial emotion detection.

Keywords: *emotion detection, facial emotion detection algorithms, (Facial Emotion Recognition) 2013 data set, Leading light locations*

Music Therapy: Digital therapy Application for Depression & Anxiety

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Abstract. Depression and anxiety are very common mood disorders. Resulting in a loss of social functions reduces the quality of life and increases mortality. There are more than 7000 languages spoken across the world. Among those languages, music become a universal language. Music is a universal sound, and it has a vast influence over the nations on this planet. Listening to music can reduce stress levels. With the hard-working lifestyle, people are becoming robots. Nowadays conflicts, negative revolution, suicide, and other crimes become a more common thing in the world. With lots of research, doctors, and professors were able to find that music therapy can improve the symptoms of depression and anxiety. According to the WHO (world health organization), 280 million people are suffering from depression and 275 million people suffer from anxiety disorders. This research is to study the development of mobile music therapy applications for people who are suffering from depression or anxiety. Using an analysis of 50 respondents, Also, it was identified that there were common mood disorders that they follow when victims suffer from depression. In this research, few questions were formed for the users using that, depression levels of all users were cleared identified. In addition to that using the analysis part, it was clearly recognized that music therapy is more effective than other medications.

Keywords: *Music, Music therapy, Mobile application, Depression, Stress, Mood, Anxiety, Medications, Mood disorders,*

A Systematic Review and Comparative Study of Cryptojacking Detection via Machine Learning

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Abstract. Cryptocurrency mining has grown in importance on the Internet in recent years, and it now has a significant impact on the worldwide economy. As a result, a new dangerous malware known as Cryptojacking has emerged, which involves infecting other machines connected to the Internet and using their resources to mine cryptocurrency. Cryptojacking is a type of mobile malware that is very common, and it is a sort of cybercrime in which cybercriminals utilize people's digital devices to mine cryptocurrency without their permission. Cryptojacking can affect any device, including mobile phones, laptops, and other computers. This is due to its open-source nature and the global rise of artificial intelligence (AI). In this regard, crypto miners are particularly interested in the identification of Cryptojacking in devices, which may now be done via traditional methods. All these measures, however, are still unsuccessful in detecting Cryptojacking. Using prior research articles, this work gives the best machine learning-based algorithms or models for detecting Cryptojacking. The most utilized machine learning algorithms or models for Cryptojacking identification were investigated in this study. The most widely utilized machine learning approach in the content analysis of these articles for detecting Cryptojacking is the Support Vector Machine (SVM) and Random Forest, Decision Tree, and KNN are high accuracy machine learning algorithms that can be used to detect Cryptojacking. SVM is used in most research and its accuracy rate is more than 95% of all research papers cited. This study will help researchers gain an in-depth understanding of the Cryptojacking sector in the future, as well as identify prospective research and development directions.

Keywords: *Cryptojacking detection, cryptocurrency mining, machine learning*

Proposing Mobile voting application for Sri Lankan elections in the covid-19 pandemic situation

LDS Tharaka, RMM Pradeep

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Abstract. This system is designed to avoid significant flaws in the current situation and to avoid the consequences of voting in the covid-19 pandemic. In this epidemic situation, going to the polls can be described as a gathering of people because that Voters are at a risk. Nevertheless, there are some issues in the current traditional voting system. The traditional ballot paper system comes at a huge cost, the huge amount of time to carry ballot boxes and count them and calculate. The proposed system will be able to give a solution for those issues. The proposed method is a mobile voting application that voters to vote via the mobile application to their respective candidates. As the methodology, analysed literature and used a questionnaire to measure user readiness. According to the questioner many people prefer to vote with a Mobile application. Moreover, in this research paper, the researcher has discussed some solutions for the people who cannot use smartphones and who do not have the technical knowledge to use smartphones and modern technologies. As future works this application can develop furthermore using open CV, machine learning to take this application easier to manage and use.

Keywords: *Mobile voting, electronic voting(e-voting), Digital voting*

Methods Using Land Valuation for Sri Lanka

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Abstract. The practice of evaluating the components of a specific piece of land is known as land valuation. Land valuators, overall, use varied approaches for their values, which is a manual procedure and long-term project. The practice of evaluating the components of a specific piece of land is known as land valuation. Land valuators, overall, use varied approaches for their values, which is a manual procedure and long-term project. In the land valuation process, land valuators must achieve lots of tasks such as considering characteristics, gathering factors, identifying methods, and calculating land value. for achieving this procedure made special tools. but Sri Lankan land valuators do not use them because models and applications not working as really, they want. This research was conducted by quantitative and qualitative research approaches target population is Sri Lankan land valuation officers. For the survey and interview, 21 land valuation officers have participated. During this survey and interview, valuation officers were sharing their lots of best practices and their own ideas for land valuations and problems such as finding land valuation factors, land valuation methods, land valuation Techniques, land valuators Challenges, and implemented Tools for land valuations. 19 articles are used to gather data and widely describe land valuation methods using Sri Lanka such as Comparative Method, Contractor's basis Method, Residual Method, Investment Method, Profits Accounts Method, and the researcher found the best practices of land valuators and widely describes problems during the land valuation process. Finally got a decision to solve land valuations problems analysed using the land valuator's ideas and founded information.

Keywords: *Land Valuation Process, Valuation Methods, Valuation Tools, Land Valuators, Land Characteristics, Land Factors*

Features Identification of Smart Ticketing and Seat Reservation System for Sri Lankan Railway

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Abstract. This system is formulated to overcome the significant flaws in the present scenario and the consequences of traveller ticket buying and seat reservations, which frequently lead to mistakes and a lot of issues. In Sri Lankan, the Railway system mostly uses traditional methods, and in ticketing and seat reservation process are also the same. In the present world, traditional systems are converting to computerized systems for achieving convenient and efficient methods. But Sri Lankan Train passengers regularly should solve different kinds of issues for use trains for their transportation. Therefore, people focus to use their private vehicles for transportation. It mainly affects to increase road traffic. Not only that, but this also indirectly affects increased global warming, spreads respiratory diseases. By encouraging people to public transport is a better way to solve the above-mentioned troubles. But public transport should develop in a proper way for making the comfortable journey for each passenger. This is one of the purposes of this research. In the existing ticketing and seat reservation system of the Sri Lankan railway, it happens on a manual method. Therefore, passengers faced lot of issues such as waiting in long queues, no proper way to make a seat reservation by self, passengers should wait a long time for making a reservation and so other issues. These are the main issues of the existing system and there are ore issues under these issues. This research identifies those issues by using two methods. Firstly, use observations to detect issues by visiting some train stations. The second method is an online survey. The survey was got around fifty responses from real train passengers. Passengers have been attached to survey different kind of issues that they have faced. After detecting the issues, research move to the analysis part for identify the system features for reduces passengers' issues.

Keywords: *Ticketing, Railway, online surveys.*

A Comparative Study on data anonymization techniques to ensure the data privacy

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Abstract. Personal data privacy has become a common topic right now. Because modern technology generates so many public and private datasets, data security has become an unavoidable task. Initially, the priority was given to data security for organizations and businesses, but now it is also necessary to provide security for personal data. The task of processing the data and using it for analysis without compromising the anonymity of the data is critical and must be completed. Data anonymization is the practice of protecting private or secret information by removing or encoding identifiers that link individuals to the stored data. Laws and regulations such as the GDPR were created to unify this anonymity. The concepts of anonymization and data privacy will be explained in this paper. Some of the most common anonymization techniques, as well as an efficient software to support their use, have been discussed. The main goal is to figure out which techniques provide a higher level of anonymity, their strengths and weaknesses, and the benefits of using them. Using existing research papers data has been analysed. Analysing most used data anonymizations algorithms decisions have been made. Suppression, Noise addition, L-Diversity, K-Anonymity, Shuffling have been identified as main anonymization techniques. There is anonymization software that can be used to apply the techniques described systematically. ARX, μ-Argus, SDCMicro, and Privacy Analytics Eclips were discussed. K-Anonymity is identified as a commonly used Anonymization technique. In many real-world applications, more than one technique has been used. As a result, when properly implemented, anonymization techniques ensure data privacy. It may be advantageous to use a combination of techniques in certain circumstances. In many cases, after using anonymization techniques on a dataset, it may be possible to infer information about an individual in some way, even if the inference is not very accurate.

Keywords: *data privacy, Anonymization's techniques, data anonymization tools*

A Comprehensive Review on Web Based Application for Herbal Cosmetics

R Fernando

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Abstract. The desire for cosmetics to maintain and enhance human beauty is growing, however cosmetics products may include a range of harmful products that can cause serious negative effects. Because of their safety as a product or homemade cosmetics are gaining popularity around the world. Herbs have been more popular in cosmetics in recent years due to their moderate action and lower toxicity, as well as the fact that they are more effective. Herbal cosmetics have a large market due to people's desire to appear nice and be beautiful. The desire to appear younger than one's actual age, to be beautiful, fresh, charming, and fair has raised the demand for herbal cosmetics and Cosmeceuticals in the market. As a result, the usage of herbal cosmetics and cosmeceuticals is overlooked in the evaluation. Herbs are also described as cosmetics. Which may wish to be used for skin care as well as beautification. The goal of health behaviour in relation to herbal cosmetics. To collect data from respondents, questionnaires and interviewers are used. According to our findings, most of the Sri Lankans favour herbal cosmetic sowing to their safety. Customers have preferred herbal cosmetics because they are more strong, readily available, and thought to have less adverse effects. Herbal cosmetics is the quickest growing segment of the personal care industry.

This paper is written with an aim of implementing a web-based application for the cosmetics shops regarding the herbal cosmetics. Survey illustrates that there is a need of implementing a web-based application for cosmetics. The proposed system will have user friendly features and tabs to make the buying behaviour smart and efficient. With the help of this application the favoured results from survey are satisfied with having a online platform for cosmetics shops. This system provides facility and flexibility to buy and retain the cosmetic products very simply within a few steps and can be implemented easily in Sri Lanka.

Keywords: *Web based application, Herbal Cosmetics.*

Information Systems

Information Systems

Technical Session Chairs

Technical Session I	*Dr. GACN Priyadarshani*
Technical Session II	*Dr. HRWP Gunathilake*
Technical Session III	*Dr. (Mrs.) N Wedasinghe*

Factors Affecting User Acceptance of Mobile Banking Applications in Sri Lanka

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Abstract. New technology has now taken a prominent place in many industries. The banking industry is one of the most needed industries in the world as there are many services offered through banks. The purpose of this research is to find the problems in existing m-banking applications, gather factors affecting the user acceptance of mobile banking applications, and gather suggestions from the users to create mobile banking applications. The researcher has surveyed by using google form which includes fifteen questions by asking the users about the problems of mobile-banking applications that users have faced when using mobile banking and their suggestions for building a mobile banking application. According to the responses, there are different problems that responders have mentioned when using mobile-banking applications such as annoying security process, the application is not functioning well, slow, language problems, connection problems, hard to use, complex steps to follow once the password is forgotten, application get stuck, cannot take a screenshot of the payment details, and cannot understand the interface clearly. When building a mobile banking application, the banks should consider these problems. Responders have also suggested that when building mobile-banking application there should be some features such as, an understandable interface, voice explanation, language options, personalization, simple process, voice command, enabling transaction facility via other banking accounts, using simple words in the application, notification facility, enabling online fund transfers, user-friendliness, simplicity, need a more simple interface, enabling a way that explains the features of the banking application and enabling good security. Therefore, when creating a mobile- banking application the banks should consider these factors, as they can give a good service to their customers and customers can do their work efficiently and in an effective way.

Keywords: *Mobile Banking, Technology, Bank*

Automated Disaster Management Assistant System to Improve the Performance of Divisional Secretariats in Sri Lanka

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Abstract. Disasters are happening in this world every day. Managing Disaster Information and providing an efficient service to the public is a very important and vital task. In Sri Lanka, the majority of people have to face disasters. Managing disaster details and damages are the tasks of the Disaster Management Officer. They handle the manual paper-based system to manage disasters relief services. However, there are still several major issues in disaster management for which no effective solution has been found. The existing manual system's big problem is very complex to handle. Other problems are it takes huge time to process complaints, having the risk of missing files, and inability to update data on time. As well as there are many problems on the Disaster Management Officer side and User side. As a result, this research paper mainly provides an effective solution to the issues highlighted and to improve the efficiency of Disaster Management systems. This proposed system will provide a huge service to Disaster Management Officer to fulfil the duty without any delay and user able to connect with disaster details and searching safety locations with systems google map and warning alerts. This research is based on the automated Disaster management system for Divisional Secretariat Office, and it has been updated to a computerized automated system. The Disaster management system for Disaster management officers will allow for the efficient creation and management of disaster details, as well as the auto fund allocation for the disaster damages relevant families and this system achieves usability enabling easy input of damage information, even by local government staff with no expertise, by using a digital pen and tabletop user interface.

Keywords: *Information management, Manual, Automated Disaster Management System*

Problems faced by schoolteachers during the Covid-19 pandemic in Sri Lanka and their solutions from an IT perspective

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Abstract. With the covid-19 pandemic, the world is facing a challenging situation today. The World Health Organization has also announced this situation as an epidemic. There are various problems in the field of education. Like other countries in the world, Sri Lanka is now locked up. Due to that, these institutions turned to online education in a background where educational institutions such as schools and universities were completely locked down. Students and teachers seem to be facing a lot of problems due to this focus on online education. This study confirms that schoolteachers have many problems during the epidemic and that teacher's awareness of online education is inadequate. The study collected responses by using a Google Form from schoolteachers. This study also shows that teachers have various problems with online teaching and that schoolteachers' knowledge of online education is inadequate. This study discusses 11 factors that contribute to this problem. These problems of teachers are mainly due to the problem of knowledge of English and lack of proper training. This study also found that teachers did not pay attention to the teaching method before the spread of COVID-19. In this study, the teachers accepted every problem collected by the surveyor as a problem they were facing in the online study. Teachers also noted that satisfaction with teachers' online teaching was very low. It was agreed that an answer to this situation should be found as soon as possible. Therefore, when the researcher came up with two short-term and long-term solutions (two software's) that could provide an IT perspective to solve these problems, it was also confirmed by the teachers who participated in the survey. The researcher hopes to describe the qualities and capabilities that two software should have in this study. This study discusses the problems that teachers face in engaging in online teaching with the spread of COVID19 and how to solve those problems from an IT perspective.

Keywords: *Covid-19, IT perspective, Online teaching, Problems, School teachers*

Implementing A Web-Based School Management System for Sri Lankan Schools

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Abstract. In the 21st -century technology plays a major role in every nation. Today due to the rapid growth of technology and globalization the world has converted into a global village. Due to globalization the information can be shared among the world very easily and hence it helps the rapid development of the nation, and it is solving social problems. To the development of open-minded young generation, education plays the backbone of every nation. In the process of developing open-minded young generation school education plays a primary and major role. Education is one of the most powerful instruments for sustainable economic growth of a nation as well as to reduce inequality and poverty in society. Admissions, data processing, and report preparation are all part of the school's processes and procedures, which are similar to those in business and industry. In the Sri Lankan context still, many schools have paper-based School Management Systems and only a few schools are integrating with automated School Management Systems. Most of the automated School Management Systems don't have an-up-to date active system and active School Management Systems have problems while integrating with the system. The absence of a computer system and the complexity of school transactions, which causes personnel to be overburdened with paperwork in storing and maintaining student records and information, are the driving forces behind the creation of the School Management Information System for Sri Lankan schools. The main aim of this research paper is to discuss the main modules and functionalities of the system and to eliminate the principal perceptions about implemented automated school management system. The design science approach is used as a methodology process model. ISO 25010, a quality model for product/software quality evaluation systems, was utilized to assess the project. This automated school management system was found to be Functional, Usable, and Reliable, with an average score of 4.04 for each category, indicating very good performance based on a Likert scale descriptive interpretation. After carefully identified features that should be included in the system the automated school management system was developed and implemented and released to the end-user. For the development process, agile AWE model was used, and this system was implemented in a school that uses the manual paper-based system for the mange of daily tasks. In terms of functionality, usability, and dependability, the system's overall quality and performance were excellent. This system will be helpful for the schools that are still functioning using a manual paper-based system as well as using automated school management systems because these new features are not available in prevailing automated school management systems.

Keywords: *Education, Automated School management system (ASMS) , School*

A review of security aspects of ATM transaction in banking sector

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Abstract. An Automated Teller Machine (ATM) is an electronic banking transaction point that allows customers to complete basic financial transactions in a public space without the assistance of a branch representative or teller. The current banking system is very popular with the feature of offering high quality 24 hours service to the customers, but there is a low-level security for the ATM transaction. At present ATMs are so advanced which can communicate with each other even if different banks, so it can be introduced as shared ATMs. There are different transaction methods used in shared ATMs with regards to the encipherment of PIN, biometrics methods, OTP methods, SMS methods and mobile banking methods with QR code. The existing method of Personal Identification Number (PIN) at the ATM has stood the test of time, mainly due to its speed and storage, but there is a greater risk to customers and the bank. Identifying the best transaction method and propose an enhanced feature for further enhancement or the development is the main aim of this review paper, and this study investigates more about ATM system in advance. This review is intended to carry out a detailed analysis on how to enhance security of transactions in ATM system and introducing mobile banking transaction method with QR code feature to improve the service of ATM transaction in less time with more level of security. The review is conducted with the objective of proposing an enhanced feature to improve the service of ATM transaction in more level of security, compare security level of existing and proposed ATM system and identifying main security issues of existing ATM system.

Keywords: *ATM, ATM transaction, PIN, security, banking sector, ATM fraud, Biometrics, QR code*

Effective Utilization for the Online Learning Platform

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Abstract. Online learning is the newest and most popular method used to conduct distance learning and teaching. Because of these new technologies e-learning has done a huge impact on the education system. The online classroom emphasizes an intuitively learning environment, outlined to stimulate exchange between teachers and understudies and among understudies themselves. The online process requires both educators and understudies to require dynamic parts. But a serious and growing problem was identified many educational systems as of how to effectively use online learning platforms in this pandemic situation and after how we develop the online learning method as effectively. Online learning makes a huge impact in the education sector with came of technological advancement so this paper going to review how to take the effective outcome to the education sector by using these online learning technologies and tools. Therefore, as a solution to all these problems, current educational trends have influenced education to enhance the learning process more technologically. Therefore, considering the purpose of this research paper the main objective was oriented towards studying how to effectively utilize online learning platforms. Moreover, how to support the online learning platforms within education sector of the country through understanding the basic functions of e-Learning. Furthermore, this research introduces what software and web portals can be used to conduct online learning, apply knowledge learned in the training session and get hands-on exposure. Fulfilling the main objective of this research data were collected through survey, interviews, and observations, past studies and through web-based secondary data. This research has identified major problems occurring to the people while conducting online learning as, connection problems, technical issues, student self-motivation, less computer literacy etc. Further proposed relevant recommendations to overcome each of the identified problems as recommend that if the government provides free Wi-Fi facilities for online learning, giving attractive assignments will motivate the students towards learning, implementing awareness programs and workshops, etc

Keywords: *Online Learning Platforms, e-learning, Educational Sector, Pandemic Situation*

Covid-19's Impact on Online Banking and E-Payment Usage

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Abstract. With the development of technology, people are used take help from machines such as computers mobile phones, etc. when it comes to the banking sector sometimes people had to wait to take money until they count. For that reason, in 1969 ATM was founded. When time passes it developed as the user can do anything like pay bills, deposit money, and also withdraw money. In that situation, people need to wait till other one's requirements are satisfied. So, banks introduced mobile banking and E-payment. But at the very first it was not a very popular one.

With the pandemic, people need to quarantine at their houses. At such time people have to use mobile banking to fulfil their banking requirements. This research mainly focused on the growth of online banking and e payment during the pandemic situation and find how the users use it efficiently manner.

This paper primarily focuses on what online banking and E-payments are, what benefits online banking can provide, and what outcomes can be expected while using online banking. I have covered my research about the usage of online banking and E-payment usage in Sri Lanka. In Sri Lanka, most people are using this online banking and E-payment because of the pandemic situation. It's around 80% percent of all in the country. So, while conducting this research can observe main four issues like system lagging and downtime for maintenance, security issues, user interface issues, and self-registration issues. To avoid this type of issue, have to have a proper user interface, must be continued without lagging, concerned about more security, and must have a self-registration system with the banking applications. So, for that, I have given the recommendations in this paper to avoid the issues which are mostly highlighted during the research.

Keywords: *Online banking and E-payments, E-payment, Usage, Applications, Transaction, Lagging, Platform.*

Proposing Mobile App Design for the Online Teaching-Learning in Sri Lankan Schools

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Abstract. Distance learning is something familiar nowadays. In the past few years with the COVID-19 pandemic, every industry faced the risk of being unable to continue their usual processes. The education industry needed an alternative solution to keep moving without failure. Hence, distance learning was proposed to be the best solution but as it's relatively new in Sri Lankan schools the main issue with normal distance learning is the students' interactivity with lessons. To improve students' interactivity through technological advancements, Sri Lankan schools need to deploy innovative teaching-learning methods including games, video conferencing, chatting, sharing multimedia aids for teaching-learning with an activity-based platform. Fulfilling the main objective of this research the importance and issues with using existing applications or virtual platforms for Sri Lankan schools were analysed and proposes an alternative solution with an effective mobile app. This research focused on collecting data to analyse users' awareness of using existing virtual platforms, issues of the existing applications, requirements and suggestions of the students and teachers to design a new mobile app design for Sri Lankan schools through conduction of questionnaire surveys and conducting online interviews with both the teachers and students. This research paper further reveals several key negative aspects of the existing online teaching-learning process in Sri Lankan schools and also proposes a new mobile app design with some attractive, unique, changeable, and active techniques that can effectively be utilized in Sri Lankan schools. The main two Distance Learning methods: Online Video Conferencing and Sharing Learning Material was considered in this survey. The results reveal that the online teaching-learning techniques do not yield the same results as traditional teaching-learning methods, using more activities and online games to get the active participation of the students is the best suggestion to effectively enhance the online teaching-learning process. Highlighting that still the, online teaching-learning methods in Sri Lankan schools are not as effective as Traditional teaching and learning. So this research paper reveals that there should be an alternative solution so proposes an activity-based mobile app design with many more features that effectively benefit the education system in Sri Lanka.

Keywords: *Distance Learning, Sri Lankan Schools, Activity-Based Platform, Mobile App Design*

The Impact of E. Marketing to Business and Customer Satisfaction

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Abstract. This study examined how E-Marketing impact on organizations and what kind of effect it does to customer satisfaction. To study this research data were collected by using two types of questionnaires among buyers and sellers. It helps to identify effect to both parties and same data were collected by previous research studies. This result showed that E-Marketing is meaningfully impacts on increase the organization revenue, advertising and what kind of effect E-Marketing does to customer's behaviour and satisfaction.

Keywords: *E. Marketing, Business, advertising.*

Effects Of E-Commerce in the current scenario of Marketing

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Abstract. The growth of information technology, as well as other growing technical features, has resulted in the emergence and expansion of global e-commerce, which allows humans to meet their needs for certain items while also obtaining financial resources for their living through such endeavours. The data analysis is intended to determine whether significant differences exist in traditional marketing and e-commerce sites. This research found significant evidence the e-commerce sites are essential especially in a pandemic situation like Covid-19, which we are experiencing in the present. Not only that but also nowadays traditional commerce has vanished its demand up to a certain extent and the usage also getting lessened with the commencement of e-commerce. On the contrary, e-commerce is a time and money-saving method. The traveling cost, as well as the duration that consumers take to choose the goods, is also saved. The payments can be made using digital modes such as net banking, credit cards, debit cards, and so on. Moreover, e-commerce sites allow us to use and to buy round the clock without any time restrictions within our easy and leisure time. In addition, it can reach more customers than the traditional market. Overall, we conclude that E-commerce is the most trending form of marketing which has been embraced by many consumers and it is a safe method of a business transaction during a period when we have to stay indoors. Thus, this research proves that e-commerce is the best outcome of the revolution of information technology compared with traditional marketing.

***Keywords**: E-Commerce, Covid-19, Consumers*

How Information Technology Has Made Advertising More Appealing and Authentic To The Consumer

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Abstract. In today's world of business with a wide range of products and services, advertising has become an essential tool for providing information and attracting both current and future customers. Marketing relies primarily on enforcing that manufacturer make their products better and more efficient than their competitors' products. Advertising is growing based on business needs. Economics, sociology, psychology, and aesthetics are intertwined in the concept of advertising. For this reason, each person perceives information in a form that is unique to himself. the interpretation of advertisements has become a problem. Advertisers' misleading advertising, which influences consumer decisions, seems to be trying to force consumers to trust the advertisers' opinions. The field of advertising uses a variety of media such as Television advertising, radio advertising, printed advertising, which are traditional advertising mediums. Nowadays, media like web banner advertising, social media advertising, online & digital advertising are widely used. Through these ads the customer is not able to check on the quality and reality of the product. Consumer feedback is the only way for a customer to get some idea of a product or service. It turns out that consumers are often misled. Based on the findings, it has become a major problem that consumers are often deceived and misled because the quality of the advertising is often higher than the quality of the actual product. This is due to the lack of a proper measurement to measure the quality of advertising compared to a real product. As a result, consumer confidence in the advertising industry is declining. It is essential that consumers have the right to know the truth about what they are buying. This research discusses how information technology can be used to protect consumers from advertising misleads. The purpose of this study is to limit the misleading effects of advertising on consumers using information technology and to ensure customer credibility. The study was conducted through an online survey and based on findings from research, journals, and articles.

Keywords: *Advertising, Appealing, Authentic, consumer protection, evaluating system, misleading*

Music Artist Recommendation System for Select Human Resources For Music Production

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Abstract. The primary purpose of this study is to provide specifics for the development of a Music artist recommendation system to pick human resources for music creation. Following that, the study will present a summary of the primary elements that artists evaluate when selecting human resources for music creation. Then provide an idea of what factors can be used on the automatic Music artist recommendation system. It can be used as a module to create a music artist recommendation system.

Keywords: *Music, recommendation system, human resources.*

Review on Existing Digital Banking Applications and Customer Satisfaction

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Abstract. In this technological era for almost everything online applications are used. Information and Communication technology has become a part of our daily lives. When it's come to banking sector there is no difference. Banking sector has introduced digital banking applications in order to make their clients more satisfied with their services. The facility of digital banking is provided by almost all the banks in Sri Lanka to their customers to make them satisfied. BOC mobile banking, Sampath Wishwa Online, Combank Digital and HNB Digital Banking are some of the best examples. Even though, many applications are in use, specific issues and limitations can be noticed. Therefore, aim of this research is to identify specific issues and limitations to find solutions and satisfy customers to a great extent. Another goal is to observe how satisfied customers are with these applications. Different data collecting methods were used including primary and secondary. Primary data were collected reading journal articles, websites, and books. As a secondary data collecting method a survey questionnaire was conducted and collected data by observing existing digital banking applications and their features. Through these data collecting methods, issues and benefits of existing digital banking applications were identified. There are advantages such as convenience, efficiency and interactivity which have a positive impact on customer satisfaction. However, difficulties are there in addition to benefits in these digital banking applications. Among those, Privacy and technical issues are best examples.

Keywords: *Digital Banking Applications, Customer satisfaction, Information, and communication technology*

A case study on Contemporary Issues in Sri Lankan Startup Ecosystem: Technological Toolbox as pillars of Support

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Abstract. Technology-driven start-ups in Sri Lanka have surged, as a result of technological development, environmental dynamics, and growing consumer markets that accelerate economic growth and job opportunities. However, most existing, and initial stage start-ups face significant contemporary challenges. The purpose of this study is to identify the potential challenges and issues that face by start-ups. Additionally, to provide a technological toolbox as a cope-up strategy. This study is conducted under the interpretivism philosophy and small start-ups based on social media platforms from different industries in Sri Lanka are considered as the target population of this study. Contemporary challenges associated with social media, technological and general issues were examined through interviews and survey methods. The findings of the study identified inheriting challenges with start-ups as funding issues, competition, unavailability of information, poor government support, technological issues, high cost, shortage of staff or unskilled labour, network issues, and low technological resources. Further, study findings epitomized that the founders are not familiar with the available technological solutions for start-ups in the Sri Lankan context and those who are aware are not satisfied with the services provided by these platforms. Therefore, the findings of this study explored the challenges faced by founders of the start-ups and recommend strategies that can be practically implied. Theoretical and practical implications of this research act as a background study and can be applied as a contingency plan. Future studies are needed to be concerned with developing and implementing a technological toolbox for social start-ups, as they can utilize it in the business sector to reduce the impact of these prominent challenges.

Keywords: *Technological challenges, social media challenges, general business challenges, start-up ecosystem*

The Challenges of Online Education

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Abstract. With the Covid-19 pandemic in the education system has been changed widely. Because of the severity of the pandemic teacher and student relationship was away. At the same time, online education came into the system. Web. Simply put, students and teachers learn remotely over the Internet without physically participating in an institution. Because of the corona epidemic, online class sessions have become a platform for students to continue their education. Now online education has become the buzzword for a wider audience than expected, as at all levels, whether primary, secondary or higher, students' teachers, and parents placed all their hopes in it, expecting it to be the right solution so that educational standards could be kept at least to a minimum satisfactory level. The survey was conducted to obtain information. The target population for this survey was People who learn online. The results indicated that most respondents like to learn from the traditional classrooms and from the result of the survey can identify the challenges in online education. This research does not specify different challenges in online education and focused only technological side. This research identified the problems in online education and should develop a new platform to avoid these problems.

Keywords: *Online education, Challenges, problems in online education.*

Computer Science

Computer Science

Technical Session Chairs

Technical Session I	*Dr. HL Premarathne*
Technical Session II	*Mrs WPJ Pemarathne*

Data retrieval and analysis from Facebook to identify suspicious profiles using machine learning: A Literature Review

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Abstract. Social media is very popular among everyone in the modern world. It has done a massive impact to the global society. Some of the popular social media platforms among the people are, Facebook, Instagram, Twitter, YouTube, WhatsApp, Telegram, etc. Among them Facebook is the main social media platform that has billions of active users around the world. Many people share their opinions in Facebook through posts and comments on posts. And those posts and comments reach to thousands of millions of users worldwide in no time. When a person or a group of people spread harmful opinions on Facebook like hostile propaganda, fake news, terrorist activities, unethical religious activities, illicit drug distributions etc. it will pose a great threat for the national security of a country or any community as this can raise small terrorist groups, religious extremists, racists, thugs, murderers, and drug traffickers etc. Some of them could be a cause of a serious threat to the community. In Sri Lanka, these kinds of cases are normally happening on Facebook. But there isn't any proper system to monitor those activities and identify responsible people. The misuse of Social Networking Sites (SNS) especially Facebook by groups of people to spread their harmful ideas among people has grown vastly. In this work I try to monitor those people individually by retrieving data from Facebook pages and groups to perform a sentimental analysis on harmful contents in the posts and comments of the pages and groups. Here, the contents which would be threatful for Sri Lankan community are focused.

Keywords: *Facebook, social media, data analysis, social networks, data retrieve*

A Systematic Review on Secure Data Transmission in the Cloud Using Steganographic Techniques and Cryptographic Algorithms

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Abstract. Data and information can be considered as the most precious assets in electronic communication systems, but their security has become a struggle in this competitive world. Cloud computing has emerged as the most promising technology for on-demand internet computing, and it is now used by the military, healthcare, education, financial, and a variety of other organizations to handle their large volume of information. Cloud computing has many benefits including efficiency, high performance, scalability, accessibility, backup, and recovery. Security is a major concern in cloud computing because everyone in the organization shares the same cloud platform. The most significant issue for the user is to securely save, retrieve, and transmit data through the cloud network and storage. Cloud security is a subset of cybersecurity that deals with policies, procedures, and technologies for safeguarding cloud computing systems. It protects data in the cloud and other digital assets from data breaches, distributed denial of service (DDoS), hacking, malware, and other cyber threats. Cryptography and steganography can be defined as the most popular techniques that can be used to enhance data security. Cryptography scrambles the messages into the unreadable format while steganography hides the message as it is not visible to the attacker. High-level security is given for both the sender and the receiver inside the cloud platform when cryptography is used along with steganography. This paper analyses the performance of different cryptographic and steganographic techniques. Moreover, suggests that combining of the blowfish symmetric key cryptographic algorithm and Elliptic-Curve Cryptography (ECC) asymmetric cryptographic algorithm as the hybrid cryptosystem to perform double encryption to secure the data and Discrete Cosine Transform (DCT) and Least Significant Bit (LSB) image steganographic techniques can be combined to create a multilayer steganographic algorithm to hide the encrypted file to provide extra security. This proposed system will provide availability, integrity, authenticity, confidentiality, and non-repudiation to the data and information.

Keywords: *Cryptography, Steganography, Symmetric Key Cryptography, Asymmetric Key Cryptography, Image Steganography*

A review for a system to detect and notify phishing attacks in mobile phones

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Abstract. Because of the advancement of technology, attackers have shifted their focus away from personal computers and onto smartphones, making mobile security a big concern these days. Furthermore, as technology advances, people are becoming more interested in cell phones. Smishing is a cyber security attack that uses the short message service to steal mobile users' personal information. Attackers have taken advantage of users' trust in their smart gadgets to carry out various mobile security exploits such as smishing. If there is a system or approach to identify these kinds of malicious attacks, it is very useful. This paper includes a survey conducted to get a clear idea on awareness of smishing attacks of people in society and identify the need for a system to detect smishing attacks. According to the survey, although a person with good experience with smishing attacks can detect a smishing attack by looking at the features, people who do not have proper knowledge and experience about smishing attacks may not recognize Smishing attacks properly. Moreover, the paper includes a literature survey along with summarized existing systems to detect smishing attacks. These systems have used algorithms and approaches. Some of them are machine learning algorithms, Random Forest algorithm, Feature-based technique, Optical Character Recognition, Tag & APK check, Rule-based approach, Naïve Bayes classifier, Heuristic approach, Support Vector Machine, Rank correlation algorithms, Decision tree, and Ada boost classifier. If a system or approach can work with high accuracy and efficiency that approach or system can be identified as a successful one.

Keywords: *Smishing, Algorithms, Optical Character Recognition (OCR), Machine learning, Mobile phones, Mobile security*

Real-time Sign Language Recognition System for Sign Language to Text Translation: A Review

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Abstract. American Sign Language (ASL) is a visual gestural language used by the deaf community for communication. There exists a communication gap between hearing impaired people and the normal people because most normal people do not understand the sign language. Conversations with the hearing-impaired people becomes more difficult as most of us do not know the sign language. Hand movements are one of the most powerful nonverbal communication methods which uses both non-manual and manual correspondence. ASL to text interpreting technology using hand gesture recognition could fill up this communication gap. Recently, the hand gesture recognition systems received a great attention and many researchers have been doing studies on the methods for hand gesture recognition for many different purposes. Sign Language recognition is one main purpose among those purposes. Among these the Finger Spelling method is a very interesting research problem in computer vision which has being addressed for years with different kinds of applications in various domains. In this paper a survey of existing hand gesture recognition systems and sign language recognition systems are presented for the recognition of Static Finger Spelling method in the American Sign Language. This sign language recognition can be achieved by using sensor-based or vision-based approaches. In this paper, both these approaches are reviewed along with the background of the problem and the pros and cons are also discussed algorithms.

Keywords: *Sign Language Recognition, ASL (American Sign Language), Hand Gesture Recognition, Human Computer Interaction*

Crop Disease Alert System: Literature Review

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Abstract. Crop disease steals the energy of crops, and it is responsible for huge damage to the crop field. Crops can be affected by the existing disease as well as a new disease. It is somehow okay when it is affected by an existing disease then farmers can ASAP prevent it by following the existing methods, but if a new disease affects the crops what can they do? Sometimes they fail to get any action until it damages all over the field. Think farmers may expect the products for the year but at the last few weeks some disease affected and shatter all the crops, then their all plans vanished and face to a huge loss. There are cases that farmers have suicide because of such incidents. We supposed a system that gives early alert for newly arise diseases on crops and suggestions to prevent them. This paper gives a related work review and technology behind them to implement that proposed system. Machine Learning plays a major role in this system. For classification and data processing we have to use one or more ML algorithms. By studying related works, we suggest ensemble model that consist different kinds of ML algorithms for our proposed system because it gives more accurate result than using single classifier. Support Vector Machine, Random Forest, Logistic Regression, Artificial Neural Network and K-Nearest Neighbours are the most suitable ML algorithms that can use for this ensemble model. We Can expect around 90% accuracy from that proposed system.

Keywords: *disease, ML, SVM, LR, DT, RF, ANN, CNN, KNN*

Skin Disease Detection and Classification using machine learning techniques

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Abstract. Nowadays dermatological diseases or skin diseases are popular among society due to environmental factors as well as people's ignorance. Using lasers and photonics-based technology skin disease is identified in the current diagnosis method. This is costly and takes a long period. Within this long period severity of the disease can be increased and some features of the skin disease cannot be found by human intervention. Sometimes people face difficulties such as daily activity damages, misunderstanding, constitute mental illness, depression because of skin diseases. Therefore, a fast diagnosis mechanism for skin diseases is required. Identifying skin diseases using machine learning techniques can overcome the problems in the current diagnosis method. The people in Sri Lanka also suffer from this skin diseases like Melanoma, Eczema, and Psoriasis. In this paper, we analyse more about skin diseases identification and classification techniques using machine learning. Machine learning techniques like a convolutional neural network, neural network, support vector machine, K-means clustering are used to address the problems of the skin disease diagnosis method. Before applying these machine learning-based models first image acquisition, pre-processing, and segmentation phase take place to remove the unwanted information in the image. For the feature extraction of the image colour-based models, Gray Level Co-Occurrence Matrix, YCbCr algorithms, and basic image processing techniques like edge detection, Sobel operators are used. This machine learning-based classification can produce results with 80-100% accuracy. Drawbacks can be terminated using a method that can select the most appropriate features to select the suitable feature among the extracted features to increase the overall performance of the model and by collecting data set from the most appropriate and accurate websites.

Keywords: *skin disease detection, machine learning techniques, convolution neural network, support vector machine, K-means clustering, pre-processing, segmentation, feature extraction, Gray Level Co-Occurrence Matrix*

Limitations of doing a Stock Market Analysis in Sri Lanka: A Review

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Abstract. Stock Market Analysis and prediction has been a popular research topic that has attracted many researchers and analysts. The stock market is deemed to be a random walk for novices. With the risk involved and the huge amount of money that is put into stake, everyone wants to have an idea of what returns they can get on their investment, before they get into it. Many variables and factors define the price of a stock, and some of them are challenging to factor in when making a prediction. Apart from the fundamentals of financial markets, some local elements are different from one stock market to the other, that changes the way how a stock market analysis should be done on each. According to multiple various research work done around financial markets around the world, there are multiple technologies that are identified as suitable to be used when analysing the behaviours and predicting the trends and possible outcomes in each. To complement and mitigate the limitations of statistical methods that have been used traditionally, new machine learning methods such recurrent neural networks, principal component analysis and sentiment analysis have been used. In the context of Sri Lanka, most of these modern analysing and prediction technologies can take a hit in performance and accuracy due to the volatile behaviour of some local factors that affect the stock market and the economy as whole. In this paper, it is discussed what technologies are used to build stock market analysis, the way external factors such as macroeconomic variables and news sources affect the stock market and the limitations that make it challenging to do a stock market analysis on the Colombo Stock Exchange (CSE), the only stock market established in Sri Lanka.

Keywords: *Stock Market Analysis, Limitations, machine learning.*

A Systematic Review on Digital Signature Verification and Modern Development

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Abstract. A digital signature is an authentication mechanism that enables the creator of a message to attach a code that acts as a signature. Digital signature techniques have considerably grown with the advancement of computer and network technologies, from single signature and single verification techniques to multi-signature approaches. To increase the data security and authenticity of transmitted data, further studies on digital signatures should be conducted. In this review paper, systematically analyses the common and modern algorithms for digital signature verification. Elgamal Scheme and Schnorr Scheme are used as common algorithms. Bio-Gamal Algorithm, Hyper Elliptic Curve Digital Signature Algorithm, Eigen-signature, XTR System, IDStack, ISRSAC, and Dynamic Signature Verification are used as modern algorithms. As a result, the bio-gamal system is ahead when compared to the Elgamal system. XTR system is ahead when compared with the RSA and ECC systems. When comes to offline signature verification, Eigen Signature is recommended. IDStack architecture is helpful when sharing a document like pdf. Apart from that, it was noticed chain verification signature scheme which developed by using ECC and ISRIAC algorithm which has developed to improve the security of the RSA algorithm. All these algorithms and methods can use for improving the level of security on Online data transfer, Offline signature verification and Document or file transfer by managing the tools and algorithms. A performance analysis has been carried out in this study along with the literature review. In addition, it is possible and recommended to create new algorithms and systems by using or combining the current systems for digital signature and verification. it will help reduce the disadvantages of existing algorithms.

Keywords: *digital signature, Cyber Security, Database security, digital signature verification.*

Secure data transformation in cloud using ECC and RSA - A review

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Abstract. Unlike traditional storage systems, the cloud is a very well-known and accepted data storage that provides many benefits to users with a pay-as-you-go pricing model, even providing storage solutions for massive amounts of data. Many users nowadays use different cloud services, mainly because the data can be accessed from anywhere via the internet. The cloud servers are located all over the world storing massive amounts of data. When a user uploads or downloads from the cloud server, the data is exposed to the internet. This can lead to security issues such as unauthorized disclosure of data and the privacy of users if the data is not properly protected. Many cryptographic algorithms are used to secure data transformation in the cloud. ECC (Elliptic Curve Cryptography) and RSA are asymmetric encryption algorithms that can secure data in the cloud, in which encryption and decryption are performed using different keys, one a private key and one a public key. RSA is a block cipher in which the plaintext and ciphertext are integers and it involves 3 steps as key generation, encryption, and decryption. Elliptic Curve Cryptography (ECC) is one of the public key cryptographic schemes which uses the characteristics of an elliptical curve to create Cryptographic calculations depending on the mathematical background. This paper focuses on the significance of both ECC and RSA as a review of the researches, compared with other asymmetric algorithms which have been used in the cloud to secure data transformation. It is intended to distinguish the features and functionalities to overcome drawbacks when implementing ECC and RSA for the data transformation in the cloud.

Keywords: *RSA, ECC (Elliptic Curve Cryptography), Cloud, Asymmetric algorithms*

Enhancement in Aviation Security using Human Pose Recognition: A Review

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Abstract. Aviation security complies with the procedures and tactics used to protect passengers, crew members, aircraft, and airport property from injury, criminal activity, terrorism, and other threats. It is a system of policies, processes, personnel, and material resources aimed at preventing illegal interference with civil aviation. Terrorism, sabotage, threats to life and property, false threat communication, bombing, and other forms of unlawful interference are instances of unlawful interference. A vast number of people pass through airports every day. Because of the high number of people gathered in one place, terrorism and other forms of criminality are prospective targets. As a result, a strong security system should be in place to ensure the survival and safety of air transportation. From the point of ground handling through taking off in the plane, everything should be done in a secure environment free of illegitimate and criminal influence. Furthermore, the relevant authorities should solidify and assure every detail of the passengers and flights, as well as the behaviours of the passengers even within the airports from the point they enter the airport to the point where they leave the airport and get into the flight. So deviating from the currently existing methods this proposing system suggest a method as an advancement in the aviation security using human pose and behaviour recognition using set of RGB-D cameras fastened within the targeted, defined premises with deep learning, convolutional neural networking and 3D image capturing techniques.

Keywords: *Aviation industry, Deep learning, RGB-D image processing, CNN, Human pose recognition*

An Approach to EEG based Emotion Recognition using Machine Learning

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Abstract. Emotion is a complex experience of consciousness, bodily sensation, and behaviour that reflects the personal significance of a thing, an event, or a state of affairs [1]. There is a wide variety of human emotions, and they are very diverse things. It is changing from time to time, people to people according to their background. There are different kinds of emotional recognition methods like facial recognition and speech recognition. In the proposed system emotions are detected using Electroencephalography (EEG) signals. EEG signals are brain signals. Emotion recognition using EEG signals is more accurate than other emotion recognition techniques used. EEG signals can be measured using EEG headbands and they are divided into categories according to their frequencies: Delta, Theta, Alpha, and Beta. Emotions can be divided into different categories. In this study, emotions are categorized into three major parts: positive, negative, and neutral. In the proposed system, Microsoft Azure ML Studio has been used to build, train and visualize the system. Microsoft Azure ML studio is a workspace that is built for creating, build and training machine learning models using without code or low code. In this research, the authors have used an already predefined EEG dataset that is freely available on the internet. The author's goal in this research was to build a system that can recognize emotion using brain signals.

Keywords: *Emotion Recognition, EEG signals, Machine Learning, Azure ML Studio*

Comparison Analysis and Data Retrieval to identify the associated people of Instagram by Image Processing

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Abstract. Instagram has become a fastest growing social network in the last three years. It let the users to share their status by uploading images with a descriptive text, a location, and certain hashtags that do not necessarily represent the substance of the pictures. So now Instagram has become a most popular photo-sharing website. While it is a relatively simple service, Instagram's simplicity has contributed to its worldwide success. But unfortunately, some people misuse this website for unethical activities such as sharing false propaganda and fake news, terrorist activities, unethical religious activities, illicit drug distributions etc. Especially when concerning about Sri Lanka, day by day these kinds of illegal activities are rising. So, it is very important to develop a system to retrieve the data from Instagram accounts and analyse that data to identify the mostly associated people of a certain account. So, to develop a system to retrieve the data from Instagram accounts and analyse that data to identify the mostly associated people of a certain account, it is necessary to use many technologies such as Data retrieving, Analysing and Face recognition. Therefore, this work is to recognize the suitable technologies that can be used to retrieve and analyse image data from Instagram such as Demographic analysis, Text analysis, Image analysis, Snowball Technology and some of the face recognition technologies used in iPhone photos , face recognition technologies such as Eigenfaces technology, Neural Networks, Graph Matching, Line Edge Mapping for a system to retrieve and analyse image data from Instagram and to identify the most associated people of a certain Instagram user.

Keywords: *Instagram, Social network, Face Recognition, Neural Networks, retrieve and analyse image data, Demographic analysis*

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Mobile-Based Skin Disease Diagnosis System Using Convolutional Neural Networks (CNN)

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Abstract. Skin cancer is a serious hazard to everyone throughout the world. However, it is difficult to make an accurate skin cancer diagnosis. Deep learning algorithms have recently excelled in several different tasks. They've also been used for skin disease diagnosis jobs mainly. With around 85% accuracy, the suggested technique outperforms existing methods on the HAM10000 dataset. Its resilience in detecting the impacted region considerably faster with nearly 2x fewer computations than the standard MobileNet model results in low computing efforts. A mobile application, on the other hand, is built for quick and accurate action. By looking at an image of the afflicted area at the beginning of a skin illness, it assists patients and dermatologists in determining the kind of disease present. According to these findings, the suggested approach can assist general practitioners in quickly and accurately diagnosing skin diseases, therefore avoiding future complications and mortality.

Keywords: *CNN, Convolutional Neural Networks, Skin Disease Diagnosis, Mobile based system, Deep learning algorithms.*

Technologies and Tools for Implementing a Mobile Pharmacy: A Review

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Abstract. In society today, the use of mobile phones and the development of mobile applications have evolved vastly. Mobile application services have made the lives of people more efficient and thus they have now become a part of the daily routine of people. Yet again, people still have to visit several pharmacies to find the prescribed drugs if they are rare to find, or unavailable in some pharmacies. This has become a huge issue for old people and those who face difficulties in travelling. And especially during this pandemic situation where minimum physical interactions should be maintained; it is a risk to visit several places just to find a particular drug. It would be much efficient and effective both in time and energy-wise if there was an application to locate the nearby pharmacies where the prescribed medicines are available. A mobile pharmacy application is proposed as a solution to these problematic situations, that people face daily. The aim of this study is to identify the suitable tools and technologies to develop this proposed system. Since the proposed application contains the major functionalities of scanning the doctor's prescription to identify the drugs and locating the pharmacies in which they are available; this study is mainly carried out considering the main two features related to those functionalities: handwriting recognition, geolocation positioning and navigation. Through the comprehensive literature review that was carried out it was identified that the IAM dataset, CNN model together with the OCR technique is more suitable to implement medical handwriting recognition. On the other hand, Google Maps API was identified as suitable to be used for geolocation positioning of nearby pharmacies. These technologies would enhance the accuracy of the final output generated through the system while making it more useable for the users.

Keywords: *Geolocation Positioning, Handwriting Recognition, Technologies, Tools*

Security Vulnerabilities of E-learning Platforms: A Review

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Abstract. E-learning has now come to stay with renewed interest and popularity among the student population worldwide. The sudden outbreak of Covid-19 compelled the traditional education system shifted to online education mode. Online education is provided via e-learning platforms. These platforms provide easy access to students around the globe to learn, communicate and interact with each other. However, the concerns at hand are how secure these e-learning platforms are for the users. If the use of e-learning systems causes security and privacy issues then there is a high possibility of information being leaked out to external parties, with vested interests. Then the learners will be reluctant to be exposed to the platform. Therefore, it has become a major challenge to ensure that only the authorized parties have gained access to the system. The purpose of this study is to investigate all possible security vulnerabilities in the current e-learning platforms and provides appropriate solutions to overcome the security threats. This study has undertaken a comprehensive review to filter the literature with respect to the security elements, threats, and vulnerabilities in e-learning platforms. When analysing the existing research, it could be identified that Moodle, Blackboard and Sakai are the most used platforms. Therefore, this study is based on security threats and vulnerabilities of the aforementioned platforms. It is revealed that security vulnerabilities of the platforms, Blackboard and Sakai have not addressed as much as Moodle. Furthermore, this study reveals that confidentiality and integrity are the most important security elements that need to be considered and prioritized within the e- learning environment.

Keywords: *E-learning Platforms, Security Vulnerabilities, Security Elements, Privacy*

A Review on Existing Health Care Monitoring Chatbots

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Abstract. Conversational agents often referred to as chatbots, are computer programs that mimic human-to-human interactions. They are natural language processing systems that are used as virtual conversational agents, emulating human interactions (talk with them whenever they want and are included in AI devices from a technological standpoint). These chatbots are used in different fields like business, banking industry etc. Also, a conversational bot with a voice and/or chat interface can help overcome the existing barriers to making primary healthcare affordable, accessible, and possibly sustainable in the rising digital economy. The goal of this study is to look at the characteristics, analyse the technologies, and find the flaws in chatbots employed in health-related sectors. This paper includes a literature survey along with summarized existing systems. According to the literature survey, these systems have used different frameworks of Natural Language Processing (NLP), Natural Language Understanding (NLU) technologies, and ML models. Also, this paper includes a survey conducted using 150+ participants to get a clear idea of the awareness and experience level of the people in using these systems. Although the highest level of advancement in chatbot-related technologies, the results of the survey concluded that both awareness and experience level in using healthcare chatbots are still in their infancy, and the patients' perspectives, motivation, and capabilities have not been considered when developing and assessing the effectiveness of healthcare chatbots. Thus, most people have mixed feelings about them despite huge technological advancements. Also, the reliability and accuracy of the instructions provided by chatbots, privacy, and security of personal data used in these chatbots, and methodologies for providing dependable have not been thoroughly investigated yet.

Keywords: *Conversational Agents, Chatbots, Healthcare, Natural Language Processing,*

Privacy, Security, Reliability. Natural Language Understanding

Models, Developments, Trends, and Evaluation of Software Product Qualities: A Review

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Abstract. Program item quality models have improved their ability to capture and explain the theoretical concept of computer program quality since the 1970s. Many methods are designed to assess a particular component of program quality, rendering them unsuitable for assessing the overall quality of computer program items. Previous distributions are ignored in order to examine and identify all available models that attempt to characterize each known feature of computer program item quality. This research looks at how to distinguish entire program item quality models that have been available since 2000, as well as how to evaluate the centrality of each show using logical and industrial community pointers. Recently, certain criteria have been employed to determine (quantitatively) a software's quality grade. The findings offer a way for determining which computer program item quality demonstrate to utilize or for improving newly discovered quality characteristics that must be linked to a larger context.

Keywords: *Quality Models, Quality assessments, Quality extensions, Quantitatively*

Blockchain-based Intellectual Property Management Using Smart Contracts

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Abstract. In this paper, we present a comprehensive overview of intellectual property management applications that employ blockchain technology. An exploratory strategy with four steps (Planning Phase, Selection Phase, Exclusion and inclusion criteria, Synthesis) was used to perform this literature review. The theoretical foundation of many papers published in recent years is used as a source of theoretical and implementation research for this purpose. Later, a taxonomy is being developed to categorize these applications based on technical elements of blockchain technology, intellectual property management mechanisms such as digital rights management, encryption, fingerprinting, digital watermarking, and performance parameters. There is currently no comprehensive and systematic taxonomy for blockchain-based copyright protection systems, according to a survey of the literature. Furthermore, the number of blockchain-based content protection solutions that have been effectively established is extremely limited. To close this gap, we propose a taxonomy that incorporates both technical tools and application knowledge such as smart contracts which is a recent technology that is evolving in parallel with blockchain technology. Smart contracts, according to our literature analysis, function automatically, control, or document legally significant events and activities in accordance with the contract's requirements and can help experts construct blockchain-based multimedia copyright protection systems. The objective of this review is to analyse the applicability and feasibility of mechanisms such as smart contracts and address the fundamental aspects of blockchain that might pose security concerns in smart contracts within the field of intellectual property. Moreover, the study also explores certain technical issues and suggests future research directions.

Keywords: *intellectual property, blockchain, smart contracts, digital watermarking, fingerprinting, encryption, digital rights management*

Analysing Of Fake Voice Detecting Using Deep Learning

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Abstract. There are several digital tools available now that allow for the modification of digital information like audio files and are conveniently accessible on mobile devices and personal PCs. Due to the importance of having trustworthy evidence in court, audio forgery detection has been one of the key issues in the forensics profession. These audio recordings that are used as digital evidence might be faked, and methods to determine if they have been forged are needed as new means of creating bogus information emerge. Fake audio can be used for harmful objectives, affecting human life directly or indirectly. Imitation, in which a speaker imitates another speaker using machine learning and signal processing techniques, is one way to create false material. Deep fake audios can detect by using deep learning-based techniques. This paper discusses the techniques that produced deep fake audio and techniques and tools to detect deepfake audio. It describes when analysing those tools found that most deep fake voice generators have over 85 percent of accuracy. Since everyone can access these voice generators free through the internet, criminals and frauds use those tools for illegal purposes. In that case Deep fake voice detectors were introduced. Available tools contain average of 80% percent of accuracy. Since quality of deepfakes has improved, the performance of deepfake Detectors must also improve. For achieving higher percent of accuracy researchers are conducting by varies of companies include Microsoft, Facebook, Google etc. Competition between deep fake voice creators and deep fake voice detectors like competition between rat and cat.

Keywords: *fake voice detection, deep learning*

Real Time Face Mask Monitoring And Automated Alert System To Prevent COVID-19 Spread

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Abstract. Millions of people have already died as a result of the covid-19 pandemic, which has become a major problem not only in Sri Lanka but also around the world. According to the World Health Organization, wearing protective face masks in accordance with health regulations can help to reduce the disease. The relevant authorities are under a huge strain, and they are working diligently to stop this risk and encourage people to wear proper face masks. The number of deaths is rising day by day, and some countries are being forced to go into lockdown because of the situation, which will have a significant impact on the global economy. Face-covering regulations have been adopted in several countries. It is required to detect and advise those who do not wear face masks in accordance with safety regulations. Whenever one infected person interacts with others without wearing a mask, the infection quickly spreads. However, monitoring and recognizing anyone not wearing a face mask across a large number of groups at the same time becomes a complex, challenging, and time-consuming process. If someone is not wearing a mask or is wearing one without following the health recommendations, this system will detect them and take their photo and will be able to send an alert message with the photo and location to the admin/authorized parties, allowing appropriate parties to act on their behalf. This method will be extremely useful in controlling the covid-19 pandemic for the health sector, security agencies, government, and citizens. Therefore, this real-time face mask monitoring system can be integrated into existing CCTV cameras and used in collaboration with computer vision techniques to monitor people and prevent the present pandemic using image processing and deep learning.

Keywords: *Covid-19, Face Mask Detection, Deep learning, Image Processing*

Data extraction and efficient storing of PDF in a database: A Review

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Abstract. With the broad usage of information technology in many different sectors at present, the digital world is expanding rapidly. With that, a huge amount of data is communicated around the world continuously. In there, unstructured data types are widely used than structured data types. Unstructured data doesn't have a data model or schema that has already been defined. It's the opposite of structured data, which is commonly found in relational database management systems (RDBMS). When consider about managing unstructured data in a Relational Database System, Unstructured data cannot be driven to conform to a traditional relational database's columns and rows format. Recent researchers have given their attention to finding the best method to store and manage unstructured data in a database effectively. Throughout the process I am going to do a comparative analysis based on well-defined parameters. This will be based on some existing methods such as PDF data inside relational database environment, PDF data outside relational environment. As the first step those methods will be explained separately by stating benefits as well as side effects of each. When consider about PDF data inside Relational Database, Databases are used to store information for easy lookup and better data management. The usual types of data stored are texts and numbers. Data types such as VAR or VARCHAR will let you store characters or text, while INT and FLOAT will let you store numbers. One data type called a BLOB (binary large object) will enable you to store binary files such as a DOC file, executable files and PDF files. By creating an upload form connected to your database, you can successfully store PDF files in it. The second method is an alternative to store PDF files. In that method, PDF files are storing outside the database and a file path or URL Will be used as data in the database. This work aims to review recently improved methods for storing PDF files in a database concerning the performance of the database and tools for extracting data in PDF files.

Keywords: *database, unstructured data, PDF files, performance, PDF extraction tools*

Securing IoT Devices Using Blockchain Technology: A Review

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Abstract. Currently most IoT devices use centralized models and here we suggest highly independent and decentralized peer to peer business model. In blockchain it can store records, fact can be verified by anyone, and security can be guaranteed the no one can deliberate the system by editing records because everyone in system watching. Blockchain store information cross the network of personal computers making them not just the decentralized but distributed. In here we use second generation blockchains has been development of, what are called smart contracts, smart contracts are a computer code that is stored inside of the blockchain which encode contractual agreements. Smart contract is self-executing with the terms of agreement or operation directly written code stored and executed on the blockchain devices and the main contribution of this research review document paper is to suggest public blockchain based architecture for IoT that delivers lightweight and decentralized security and privacy. The architecture retains the benefits of blockchain while overcoming the aforementioned challenges in integrating blockchain. A cloud-enabled IoT framework possess a few significant disadvantages, such as high cloud server maintenance costs, weakness for supporting time-critical IoT applications, security, and trust issues. Therefore, it is essential to solve these problems associated with the cloud enabled IoT frameworks and to develop new methods for IoT decentralization. Recently, blockchain is perceived as a promising technique to solve the aforementioned problems and to design new decentralization frameworks. Ethereum is a blockchain based decentralized network primarily used for securely conducting and verifying (settling) transactions according to a given smart contract. This research mainly focusses on building a platform for IoT devices using Ethereum smart contracts, which is trustworthy and secure enough to prevent cyber-attacks such as DDoS.

Keywords: *Blockchain, IOT, Device Security, cloud enabled IoT.*

Local Host Web Application for Pre Anesthesia Record System

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Abstract. There are uncountable number of patients face to the anaesthetic situations in the world. Anaesthesia means basically out of sensation. It means anaesthesia is a state of controlled, temporary of sensation or awareness that is induced for medical purposes. It may include some or all of analgesia (relief from prevention or pain), paralysis (muscle relaxation), amnesia (loss of memory), and unconsciousness and so on. Patients do anaesthesia when they are going to face for surgeries. There are 4 types of anaesthesia as ASA 1, ASA 2, ASA 3, ASA 4 also called as ASA statuses. The anaesthesiologists, who are specified in anaesthetic field and nurses have to clarify the ASA status of the patient according to their medical situations. Current process in here is, doctors and nurses gather the information of medical problems of patient to a record sheet and manually categorize the ASA level of the patient. The main problems in this process are such as time can be wasted for critical patients, record book can be misplaced, recorded data may not be clear, data can be missed etc. So, in this study, showing the anaesthesia status of the patient automatically using web technologies, when the medical data of those patients to the system is described as a remedial measure to this problem. And also, the suggested system has the ability for setting reminders for doctors to check the patient's medical plans and system can be shown the statistics of the ASA level comparison of the world, by age and by gender. The suggested system can be used even on offline because this is a local host web-based system.

Keywords: *Anaesthesia, ASA, surgery, medication, Pre- anaesthesia, web technologies*

Stay Focus: An Android Application for Smartphone Addiction Monitoring and Preventing

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Abstract. With the advancement of science and technology, the world is changing. In the field of smartphones, there has been a tremendous progress. There is no debate that the mobile phone is an incredibly valuable tool. "Nomophobia" is a term used to describe smartphone addiction. The goal of this study is to investigate the scope of smartphone addiction, assess its impact, and come up with a better way to deal with it. This article examines existing approaches, including ways to research the scope of smartphone addiction, their limitations, and how they arrive at a final solution to meet their goals. Stay Focus is a mobile application for Android. This system has two major of aspects smartphone addiction monitoring and preventing people while improving their physical and mental health. The System is achieving its major aspects using the 20 20 20 rule for eye strains. This paper presents the design and implementation details of the Stay Focus and further improvements.

Keywords: *Smartphone Addiction, Prevention, 20 20 20 rule*

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Technical Session Chairs

Technical Session I	*Dr. TL Weerawardane*
Technical Session II	*Dr. EATA Edirisuriya*

A Review on Real-Time License Plate, Vehicle Type and Face Recognition Using Computer Vision

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Abstract. Automatic License Plate Recognition (ALPR) is an image processing system that uses various phases such as detection, pre-processing, segmentation, and recognition to identify vehicles based on their license plates. Vehicle Type Classification (VTC) is critical in transportation management systems, especially when operating in real-time environments. It's still difficult to classify and count each sort of vehicle. Face recognition is the most reliable biometric identification method and the most cutting-edge technology for security and password systems since it can detect the person with no interaction. This study aims to seek into the approaches and methods utilized in ALPR, VTC, and Face Recognition systems, with a particular focus on Deep Learning techniques. For the systems listed above, we conducted a thorough literature review and created tables with summaries of their methodology, datasets, recognition rates, and device configurations. We also examine and discuss relevant studies in order to determine the best technology for implementing these systems with more accuracy and efficiency. RCNN, Fast RCNN, Faster RCNN, SSD, and YOLO are some of the most common CNN models for recognizing vehicles and license plates. PCA, LBPH, and LDA algorithms appear to be the most well-known and successful convolutional neural network methods for face recognition. Many modern systems appear to be a hybrid or a combination of the above-mentioned algorithms, as some algorithms perform better especially when combined than when used alone. One of the more successful strategies looks to be PCA with LDA. Each of the proposed ALPR, VTC, and Face Recognition solutions has its own share of benefits and drawbacks.

Keywords: *ALPR, VTC, Face Recognition, LP, Deep Learning, Computer Vision*

An Overview of Information Technology based Vehicle Management Systems (VMSs)

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Abstract. This paper is based on Vehicle Management Systems (VMSs) related to the field of Information Technology (IT). There are a lot of existing VMSs which have different functionalities according to the specific needs of businesses or individuals. The usage of VMS for business purposes like product shipping, vehicle renting and fleet management is almost high. According to the studied materials, telematics is the backbone of a VMS which is an integration of hardware and software. Monitoring vehicles, objects and other assets by using On-Board Diagnostics (OBD) and Global Positioning System (GPS) technology to plot the asset's movements are methods carried out in telematics. The existing Fleet Management Systems (FMSs) are used specially for tracking vehicle's data like geographical location, route direction, speed, temperature, fuel level, mileage etc. The data gain from the vehicle are sent to a server through wireless communication media or stored in the device itself by using Subscriber Identity Module (SIM) or a chip card and the stored data can be used for predictions by the fleet owner who will be able to track vehicles in real time, estimate when a certain vehicle gets to the destination, evaluate the history of a vehicle, how well the vehicles are handled by the vehicle drivers and determine maintenance periods etc. According to this study, the importance of integration of IT with the automotive sector is depicted. This paper brings out the way Information Technology affects fleet management, software key modules in fleet management, on-board data acquisition and techniques used in vehicle maintenance. Literature review section analyses a sequence of research on FMS, how those have developed, used technologies, data communication methods and functions etc. Through this study, it is aimed to recognize features and functionalities to be added for VMS to give a better output by resolving some issues in existing systems.

Keywords: *vehicle management, fleet, automotive, information technology, telematics, on-board diagnostics, proactive maintenance*

Non-invasive Blood Glucose Monitoring System Using Painless Near InfraRed Based Technique and Linear Regression Analysis

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Abstract. According to the world health organization Diabetes has become one of the largest chronic diseases faced by humankind mainly in the 21st century, the disease is recorded at 8th in the most common causes of death. It is expected to be the 5th cause of death by 2030. Since there is no permanent cure or enough effective prevention, the only way to control the disease is through constant monitoring and medication. The current monitoring systems are invasive. Which needs patients to prick their finger to get a small amount of blood sample to check the glucose level of a patient using non-reusable biochemical reaction stripe. It's clear that this method is costly, bit painful and leads to allergies may be a cause for spreading diseases. Most of the patients are demotivated to test constantly, mainly due to the above reasons. These reasons lead to design a non-invasive blood glucose monitoring system, which uses painless near infrared based optical technique to detect the sugar level of a human body. The designed system includes a LED emitting signal, which is of 940 nm wavelength. Those optical rays will be sent through the fingertip or ear lobe and the reflected light ray will be caught by a phototransistor located behind the LED. Glucose concentration of the body will be determined by the intensity variations of the transmitted and reflected optical rays. The results obtained from the designed system is evaluated with a self-monitoring system. (One-Touch Ultra 2). The results show the feasibility of using NIR based non-invasive method for measuring the blood glucose concentration of a human body.

Keywords: *Blood Glucose, Non-Invasive, Near Infrared*

Emotion Recognition Techniques and Tools: A Review

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Abstract. Human Emotion plays a vital role in many intelligent systems in the modern day. Emotions can be termed as psychological states that are expressed through various facial expressions. Humans experience a variety of emotions such as happiness, anger, sadness, and fear. Every one of these emotions can be identified by its own unique facial expression. It is these varied and distinct facial expressions that act as the focal point in emotion recognition systems. Emotion recognition systems can aid in many different fields and ensure that the psychological well-being of individuals is being taken into consideration when providing certain services. These systems usually involve obtaining a facial image from the user depicting the user's facial expression. Afterward, this image is subjected to segmentation and pre-processing in order to extract the features of the facial expression. Feature Classification is then carried out to identify the emotion that corresponds to the previously extracted features. Many different emotion recognition systems are already in existence for a variety of reasons. Each of these systems use a range of different techniques and tools. Commonly found examples of such techniques and tools would be Neural Networks, Learning Algorithms, Support Vector Machine Classifications and Bezier Curves. All these different types of techniques and tools hold merit, though some may work more efficiently and more accurately than others. The objective of this paper is to review the different Emotion Recognition Techniques and Tools available in previously developed systems, and to carry out an analysis on their respective advantages and disadvantages.

Keywords: *Emotion Recognition, Artificial Intelligence, Image Processing Neural Networks, Support Vector Machine, Bezier Curve*

i-Walk – Smart Navigator System in indoor For Visually impaired people

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Abstract. The World Health Organization (WHO) reports that there are 285 million Visually Impaired People Around the World. Among them there are 39 – billion who are completely blind. There are several systems designed to help and improve visually impaired people's quality of life. Unfortunately, many of these systems are limited in their capacity. This paper presents a sensor-based mobility assistive device for visually impaired people. In this paper, we present a comparative survey of wearable and portable assistive devices for Visually Handicapped people to show the progress of assistive technology for this group of visually impaired people. There were 25 participants in the survey, and that survey directed us to understand their day today life struggles, especially those they had to face indoors. And how much the currently using devices affect their lives to make it an easy comfortable one. The contribution of this literature survey is to discuss the most important aspects in detail. Our aim is to design a compatible smart cane that ensures visually impaired people throughout their lives

Keywords: *Visually impaired, Sensors, wearable devices, portable assistive devices*

Feasibility Study on Using NB-IoT For Animal Health Monitoring

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Abstract. There are more than 161,000 dairy farms all over the country. Technological involvement in the dairy industry is not yet enough compare to other countries. Using technology, we can increase the production volume of farms. The dairy cow's health is one of the significant considerations for the daily milk production of a cow. Manually checking the health condition of each dairy cow is very time consuming and when the number of dairy cows increase it require more human resources to check manually. Also lack of knowledge about diseases breeders were not able to provide medical treatments for dairy cow on time. Diseases are the main reason of reducing dairy cow productivity. In this study, we have discussed some problems in cattle health monitoring. Further, we have mainly focused on current health monitoring systems and their related works to find the most effective and valuable solution to overcome these problems. Furthermore, we aim to develop a Narrowband Internet of Things (NB-IoT) Based Cattle Health Monitoring System. NB-IoT provides low power consumed, better scalability and quality of service when compared to other unlicensed Low Power Wide Area (LPWA) networks such as Lora/ Sigfox. In this technology a Base-station is capable of handling higher number of nodes and can be implement the system for small scale or large-scale cattle farms. The system will continuously monitor heartrate and the body temperature of the cattle. All the recorded data will be uploaded to Cloud database for easy access, individual cattle health profile management and abnormal health condition detections. Primary goal is to develop more reliable, accurate, and low-cost system that every breeder can afford.

Keywords: *Narrow Band - Internet of Things (NB-IoT), Cattle Health Monitoring, Dairy Cow.*

A Review on Vision-based Obstacle Avoidance and Assistant Systems for Visually Impaired People

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Abstract. Though the assistant and navigation technologies has been developed rapidly and make our lives easier in the past decade, still there are issues in using them for visually impaired people because almost all the modern digital devices uses vision-based modules like displays as the main interaction module so it is hard to operate by a person who don't have the vision. Even though many new technologies like voice assistants are developing day by day to reduce this disability digital divide it couldn't give satisfactory results for visually impaired people in some tasks like travelling. In the past decade, many attempts have made to address this problem of applying modern technology to the issues that visually impaired peoples face in day today travelling. Different kind of vision technologies and sensor technologies has used in the previously developed systems and in this paper, we are mainly focusing on computer vision-based navigation and assistant systems. Many types of approaches have made by the research using modern technologies like Deep Learning, Machine Learning, and Image Processing Techniques to enhance the Computer Vision modules to make accurate, reliable and portable smart wearables for visually impaired people to make their day today travelling easier. The focus of these systems is to give more efficiency and functionalities than the traditional methods like white stick and guide dogs used by visually impaired people. In this paper we try to compare those systems by understanding their technologies, used modules, algorithms, efficiency, usability, functionalities as well as their pros and cons.

Keywords: *Computer Vision, Deep Learning, Machine Learning, Image Processing, Smart Wearables*

A Review of Unstructured Data Analysis

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Abstract. Every day, computer programs generate enormous amounts of data in the form of your records, machine-generated papers, and other reports. This generated data constitutes the kingdom of the walking machine and contains a variety of data that can be used for machine monitoring and diagnostics. Because network monitoring systems generate a large amount of unstructured data, an automated method to obtain the required information is required. information, which now necessitates the use of many specialized analyst's Custom analyser development and testing can be time-consuming. Instead, the data can be mechanically processed and analysed in a computer-readable format, yielding a common version for standard or vendor-specific information and insights assessment, anomaly detection, intrusion detection, node failure, and a variety of apps. This paper examines a few modern approaches to mining and analyzing unstructured data, as well as the challenges associated with data extraction, the introduction of technological foundations, and the provision of a standard framework for computerized review. In this paper, I present the most recent methods for extracting unstructured text information. Relationship-based algorithms that use function template-based approaches and deep learning techniques, as well as data-driven approaches, are available to me. I also go over the analysis problems such as Values that are missing, not linguistic, No Metadata, Template of several types and tools that are available (Extraction, transformation, Modelling, Execution etc…). For each identified component, I describe the data analysis method and general techniques.

Keywords: *Knowledge base, Data Mining, Information Extraction, Similarity, Natural Language Processing*

Traffic Density Analysis using Image Processing: A Review

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Abstract. Due to the growing number of vehicles and the limited resources given by current infrastructures, traffic problems are becoming more prevalent. The traffic light control system is commonly used to control the flow of traffic at road junctions. To control traffic flow, most traffic signal systems currently use pre-time and count down timers. Because of the fixed time setting, the system is frequently unable to handle unusually high traffic flows, resulting in traffic jams. Delays, safety, parking, and environmental difficulties are all major concerns with today's traffic systems, which emit smoke and contribute to global warming. As a result, adaptive traffic signals are required, which can perform real-time monitoring and control traffic light signals based on traffic density. This paper presents a review of various image processing techniques used to detect traffic congestion. Regardless of traffic congestion, the traditional traffic signal system has a predetermined time cycle. A system that controls traffic lights based on the number of vehicles can be designed to reduce traffic congestion. For efficient vehicle management, a heavy flow of vehicles on one side can be given higher priority. It is required to detect real-time traffic congestion. Various image processing algorithms, such as background subtraction, edge detection, and so on, are covered in this study.

Keywords: *Traffic Congestion, Image Processing, Background Subtraction, Edge Detection*

IoT based Parking Management and Guidance System using Image Processing

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Abstract. Car Parking has become a serious problem due to the increase of amount of population. In urban areas have huge traffics because of the informal vehicle parking on both side of the road. As a solution for this problem, the Vehicle Parking areas were introduced. It may be indoor or outdoor car parks. After these are introduced, a new problem begins. In a huge car park, it can be taken 30 minutes to find a vacant spot in a rush hour, creating unnecessary fuel waste and air pollution. Image processing-based Car Park Management System is described in this paper. It detects vacant legal parking spots and safely guide to selected parking spot. Detection can be performed in indoor parking lots. The system is consisted of many cameras and Arduino board with LED display. All the devices are connected by using IoT. Using this system, a driver who need a vacant spot in the indoor parking area can be guided to the vacant spot by displaying the number of vacant spots in each level at the entrances of each level. Then the driver can read the display and can take idea about vacant spots in each level and drive through it to the vacant spot.

Keywords: *Ambient Assisted Living (AAL), Wearable Sensors, Elderly Monitoring System, Smartwatches*

Personal Intelligent Natural Language Assistant for Sinhala Language

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Abstract. Voice assistants are thought of to be a developing technology within the world that was recently introduced. The voice assistant has with success been ready to replace human assistants and build human lives easier. Voice assistants are code agents which will interpret human speech and respond via synthesized voices. Apple's Siri, Amazon' Alexa, Microsoft' Cortana, and Google' Assistant are the foremost in-vogue voice assistants and are embedded in smartphones or dedicated home speakers. However, these sort of voice assistants is built exclusively to support most country language or another world language. Not any of these voice assistants support the Sinhala language. This paper presents developing a Sinhala Voice Interface to support Sinhala commands and Sinhala speech and the thanks to responding via Sinhala-enabled synthesized voices. The interface is going to be liable for gathering Sinhala voice commands and playing actions supported by the input human speech command and generating outputs via Sinhala synthesized voices. The system is trained to support every English and Sinhala command. The system will perform terribly easy tasks that have already been accessible and performed by the opposite assistants. The paper discusses a lot of how the language process is employed within the system and the way it's been used to model the Sinhala language to supply services from the system. In step with the undergone research, there have been a lot of helpful tools that have been designed to model the Sinhala language commands. Also, the paper discusses the flow of the system and several other modules within the system. It' 85% accurate in recognizing Sinhala and English voice commands.

Keywords: *Natural Language, Computer Code Agents, Voice Assistants, Sinhala voice interface, Synthesized voice*

Smart Receptionist with Smart Lock System – Review

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Abstract. Security and safety are popular, and their popularity is growing by the day, thanks to advancements made in the last decade and technologies designed to make our lives easier. In today's world, technology has become an integral component of society, so the security of one's house, office, or organization must be given first importance. As a result, the Smart Receptionist with a smart lock system is primarily created and developed for security system purposes. When the main door of the workplace or organization is closed, this smart security system is employed to observe a guest. The goal of this setup is to use a Raspberry Pi to operate the door lock. When a person enters the office door, the camera captures an image of the person, and the smart lock system sends the image to an Android application and database. Once the image has been uploaded to the Android application, the user will have the option of unlocking or locking the door. If the individual accepts the permission to enter, the system will unlock the door; but, if the person refuses the permission to enter, the door will stay locked.

Keywords*: LoRa, LPWAN, Sigfox, Wireless Connectivity*