KDU FOCSS
Faculty of Computing Student Symposium

FACULTY OF COMPUTING STUDENT SYMPOSIUM

17th December 2020

ABSTRACTS

General Sir John Kotelawala Defence University

FOC STUDENT SYMPOSIUM 2020

ABSTRACTS

GENARAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY
RATMALANA, SRI LANKA

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Message from the Dean – Faculty of Computing

The first-ever Student Research Symposium of the Faculty of Computing of General Sir John Kotelawala Defence University marks a milestone in the history of the faculty as it opens up a multitude of opportunities for the Computer Science, Software Engineering, Computer Engineering, Information Technology, and Information Systems undergraduates of the faculty. The large number of submissions received for this symposium is a clear indicator of the enthusiasm of the students. By creating a platform that facilitates them to present their undergraduate research in front of an elite audience, the symposium will help the students to create a knowledge hub to exchange each other's explorations in the world of computing.

The Faculty of Computing from the very beginning of its formation has produced quality graduates who are presently playing key roles in leading organizations in the country's IT industry. I believe that this student symposium will lay the foundation for producing potential researchers of the future who will undoubtedly contribute to the development of the country in the computing arena.

I take this opportunity to extend my sincere gratitude to Dr. Budditha Hettige for coming up with the idea of a student research symposium and organizing it amidst many challenges in these unprecedented times. While congratulating the students whose papers have been selected for oral presentations at the symposium, I would also like to encourage the others to carry on their efforts and present their work at the next year's symposium with the same enthusiasm as they have shown this time. I wish all the presenters the very best in their future endeavors and the organizers the courage to continue with the symposium for many years to come.

Commodore Janaka Ushan Gunaseela USP, psc

Dean / Faculty of Computing

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-Keynote Speech I-

Senior Professor Asoka S Karunananda

How to do a Computing Research

Abstract: Any person embarks on research by developing an interest in a particular area. This area may be identified through the guidance of a lecturer, a supervisor, a colleague, or an expert. Having identified a research area, a researcher starts reading the published research papers in journals, and conference proceedings. This reading process should be managed by collecting papers, systematically reading the papers, keeping track of references, and maintaining shorts notes on findings. There are tools for managing the reading and writing process in the research process. As the key output of reading, a researcher will be able to define an unsolved but appreciated problem or a concern by the research community. This problem/concern can be selected as the research problem to be solved by the researcher. The next challenge in the research process is developing a solution/theory/algorithm to address the research problem. Developing a solution/theory/algorithm is the hardest part of the research process. The secret of getting insight to generate a solution/theory/algorithm can be obtained by the careful study of theory/algorithms /methods used to solve similar research problems in the literature. Therefore, a careful reading of the research papers gives the opportunity not only to define a research problem, but also to devise a solution/theory/algorithm for the research problem by covering the complete research process involving approach, design, implementation, evaluation, and conclusion.

-Keynote Speech II-

Professor Saman Muthukumarana

Bayesian Networks Learning for Complex Data

Abstract: We are in the era of data science and big data where an enormous amount of data arises in every discipline with various complexities due to the usage and advancement of technology in every day-to-day activity. These complexities may arise from high dimensionality, complex structured and unstructured aspects, and imbalance problems. In this talk, I will discuss and assess several over-sampling methods and under-sampling methods combined with several classification methods to improve the prediction ability and model performance for imbalanced high dimensional data. A Bayesian network approach is then developed to model the conditional dependencies and Structural Hamming Distances (SHD) is used for assessing similar Bayesian network structures learned using Data. The methods are highlighted using two applications on mobile apps user behavior and, spread and community structure detection of COVID-19 across the world.

Information Technology

Information Technology

Technical Session Chairs

Technical Session I, Parallel Session A   *Dr EATA Edirisuriya*

Technical Session I, Parallel Session B   *Mrs DU Vidanagama*

Technical Session II, Parallel Session A   *Dr (Mrs) MKA*

Ariyarathne

Technical Session II, Parallel Session B   *Dr TMK Jinasena*

A Comprehensive Study on Functionalities and User Interface Design Aspects for Proposed Stock Market Portfolio Analyzer and Management System with Prediction Capabilities to Colombo Stock Exchange of Sri Lanka

S Nanayakkara, WAAN Wanniarachchi, N Wedasinghe

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Abstract. Over the past few years, various studies have been conducted to develop an optimum stock market-related portfolio management platform that will assist investors to actively engage in the portfolio management process. Risk and level of investor participation are considered to be one of the challenging aspects identified for optimum portfolio management. Paper critically evaluates the contradictive nature between risk and level of returns from the investment due to different behaviors of investor participation. Along with portfolio management, stock price prediction is one of the key contributing factors that helps an investor to perform wise investment decisions. Various deep learning concepts are evaluated to determine the most accurate algorithm to implement in a stock price-based prediction system. Currently, the Colombo Stock Exchange has identified a desperate requirement of a portfolio management system with prediction capabilities to support the investors to actively engage in stock market activities at high volumes. A critical study has been conducted using supportive research papers, similar applications developed and using various requirement elicitation techniques to determine the functional requirements, non-functional requirements, user requirements, etc. Major considerations on visual design factors such as user interface design, user experience features, and accessibility factors are critically justified through the paper. Finally, the paper further proposes more suitable portfolio management and prediction system with deep justifications on major functional requirements, non-functional requirements, and supportive technologies used in the development process.

Keywords: *Stock, Portfolio, Prediction*

Vehicle Movement Based Automatic Street Light Control System

DS Dissanayake, N Wedasinghe

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Abstract. Lighting and the energy consumed by the streets these days create a huge energy demand. At night, all street lamps operate on a traditional street lighting system. To avoid this problem a proper energy-saving system and lighting control should be implemented. The proposed task is to switch on the lights when there are no vehicles on the streets and to activate them automatically when vehicles arrive. The proposed method can reduce the total energy required per day for lighting. Automated and intelligent control schemes are needed to control the complex lighting system due to the growth and living conditions of the cities. The project aims. to provide automated control and monitoring of street lighting. The project provides for the design of a lighting system that aims. to save energy and operate independently on the streets at low cost and on-site treatment on complaints. The energy consumption of the street light in a target area can be recorded and incorporated into the energy-saving lighting system with the included sensors and controllers. Besides, errors caused by guided activism can be eliminated. The street lamp can be turned ON / OFF from the primary handling point, or the light sensors included in the software's street light polar circuit can be used automatically. With those centers, you can increase the overall functionality and lifestyle of the lamps. The software is primarily based entirely on the customer client model.

Keywords: Sensors, GSM module, Microcontroller, Street light Controlling, Fault Detective

An Ontology-Based Approach for an Improved Job Recommendation System

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Abstract. Finding the perfect job is the main purpose of higher education for most young individuals. That nowadays there are lots of job portals in Sri Lanka where job seekers discover work opportunities and vacancies according to their preferred job titles. But for that, the seeker has to have a clear idea about at least several job titles or roles in a company. Not every person who uses these portals knows jobs and job positions. Most of them might know only a few job positions and most of them might have never heard of other roles. Many researchers have already proposed semantic matching approaches by developing ontologies as a reference to mediate matching accuracy approximately, but these approaches don't prove how closely matched applicants are related to their core skills. This research paper proposes a technique that uses an ontology-based approach for improved keyword searching by influencing the comparability between concepts in the judgment, which represents the core skills and qualifications needed for a job to decide how closely matched an applicant during the job searching process.

Keywords: *Job Portal, Job Search Engine, Ontology, Online Jobs, Job Recommendation*

An Introduction to the Planning of an Online Bookstore

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Abstract. The online bookstore is a virtual shop on the internet, and it is a form of E-Commerce. This study is comparing the methods of book shopping: online book shopping method and physical book shopping method. Online book shopping method provides an effective experience for the consumers with the ability to search books of their interest, add books to cart, purchase books, online payment methods, review/ rate books, get recommendations, easily find out new arrivals, etc. using the website. The main objective of this study is to give an introduction to planning an online bookstore with a recommendation system that enables users to search and buy books online based on the title, writer, and topic. Consumers will get a valuable opportunity to easily find the books they wish to buy and increase their interest in reading by recommending books on topics they like by this system. The proposed system provides the customer with plenty of services to store the book information and systematically provide information in a short time. Data is processed fast within a short period. The user is provided with all the details about book changes and the reports are also created according to the user's requirements. Instead of going out to a bookstore and wasting time, the client can buy a book online using this website.

Keywords: Online Bookstore, Internet Book Shop, Recommendation System for an Online Bookstore

Real-Time Train Tracking System in Sri Lanka

RUV Jayasinghe, RMM Predeep

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Abstract. The paper suggests a solution to provide Sri Lanka with a smart real-time train tracking device to improve the existing system of Rail transport. A multipurpose combination of mobile computing, the Global Mobile Communication System (GSM), the Global Positioning System (GPS), the Arduino microcontroller, network services, and applications is the basis of the solution. The in-built GPS module identifies the highest accuracy of the train position and passes the information via GSM to the central system. The availability of this data helps the Train Dispatcher to make accurate choices in the direction of the train. Location data can be further analyzed to include visual positioning using maps that provide a healthy picture of the location of the train. Positioning data combined with train speed enables the administration to recognize and respond rapidly to possible safety issues using contact.

Keywords: GSM, GSP, Arduino

A Survey on Web-based Meeting Scheduling Application

ST Thalawattha, DU Vidanagama

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Abstract. The meeting is an important part of daily life to discuss and share information. There is a different kind of methods, approaches, and techniques that have been used to hold meetings. But scheduling a meeting is not as easy as having a meeting. So, various types of scheduling applications consisting of different functionalities can be seen. Although there are many meeting scheduling applications, the traditional method is the most commonly used due to its shortcomings. In this paper, the research methodology consists of a survey done with the participation of 82 responders. The descriptive statistic method was used for data analysis. According to results, issues in informing about the meeting, sending agenda and minute properly, issues in selecting the best time for most participants can and waste of time and papers are indicated as major issues. In the proposed system, when the initiator selects participants, the system looks at their schedules and gives a convenient time most can. After inviting the initiator to the participants, they can respond by looking at the agenda. Therefore, the web-based meeting scheduling application provides a huge advantage for all who hold meetings.

Keywords: Web Application, Meeting, Scheduling

Challengers of Manual Bug Management in Software Development Industry: A Comprehensive Survey

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Abstract. Software Systems are always released with bugs. In software development, the life cycle bug resolving process plays a vital role in the development and evaluation steps. Because developers can encounter a considerable amount of user and tester errors daily while during the testing process. The bug management process is an important part of software maintenances and development. In particular, incorrect action or activity is done by the developer or development team. Always this process may handle sensitive data. Handling cross-functional bug management using these sensitivity data, it should be a huge financial loss of software development project. So, this survey-based research's main objective is to identify the challenges of Manual bug management in the Software Development Industry. With Investigation of researches Duplicate bugs Assign is an anomaly in every organization in the world that manage bugs manually, this research observes the result Using questionnaire for developers and also research analysis using qualitative data collection. This paper is based on research work carried out with the objective of Challengers of manual Bugs management found with time consumption, budgeting, Duplicate bugs assign, and customer satisfaction.

Keywords: Bugs, Relative Similarity, Duplicate Bug Assign

An Overview of a Way to Deliver Online Music Streaming Services by Identifying the Neediness of Users' Music Listening

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Abstract. Over the last few years, Online Music Streaming Service Applications have become increasingly important and rapidly evolving technology all over the world. Thus, billions of people are listening to and enjoying the life of music via these technologies. Although many Online Music Services deliver the most effective and successful facilities for their users such as suggesting songs by analyzing users' previous behaviors and suggesting songs by recognizing their facial expressions but, a technology to address the issue of arranging a time to listen to music is not yet been addressed. Throughout this review paper, the way to deliver Online Music Streaming Services by identifying the neediness of users' music listening has been discussed and overviewed the paths that can bring out this into reality in the world has been discussed. The methodology used to conduct this research is a quantitative-based survey. The online survey circulated through Emails and the survey was completed from a sample of 80 people. All the findings with details which were collected from the survey are displayed in a very successful manner by explaining and elaborating a best and clear conclusion as, having an Online Music Streaming Service Application with three important features such as time forecasting feature, Suggesting songs automatically according to the user's previous behaviors and suggesting songs to the user by recognizing his facial expressions will be a successful solution for identification of the real neediness of users. Ultimately, the research paper highlights a conceptual idea of a way to deliver the real neediness of Online Music Streaming Services users who are in a busy life pattern in today's world by reminding them to listen to music after scheduling a time and forecast it to them.

Keywords: *Online Music Streaming, Neediness, Time Forecasting, Automatic Playlists, Facial Expressions*

Study Pal (Self Study Supporter) Mobile Application

A Ranasignhe, RPS Kathriarachchi, WAAN Wanniarachchi

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Abstract. Self-studying is a common task that is done by a learner to improve himself. It plays a major role in one's life to improve their knowledge and to achieve higher grades. But the students seem to be distracted and not interested in their academics sometimes. This research has involved school students and university undergraduates in Sri Lanka. The survey on this area was tested on 300 individuals and it carried 271 responses within a few days. The data were gathered and analyzed for the most requested features requested by the users which are to be added to the application. The survey helped to identify the shortcomings of the current system and paved the path to success with new features to be added to overcome the prevailing challenges. This research allows us to identify the above-mentioned problems., clarify, analyze for better results, and identify the current user requirements and overcome them to develop a more successful mobile application for individual self-study support.

Keywords: *Mobile Learning, Self-Educational Application, Smartphone App*

Advanced Lecturing Assistance and Student Guidance System

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Abstract. Learning Management System (LMS.) is a common platform used in universities for distance learning activities. Most of the universities use free and open-source platforms. like Moodle and Learn Press in their Systems Those are common solutions for worldwide usage, but they are lacking some important features such as adaptive learning, auto-answer marking, identification of weak students, etc. This survey involved the undergraduates and lecturers of different study areas in Sri Lanka to analyze the effectiveness of the existing system and provides recommendation for a new enhanced, smarter, more user friendly, and more useful functions to increase the usability and effectiveness of the system. This survey was helped to identify the drawbacks of an existing system, and identification of most necessary features, and difficulties in the current system, and implement the new functions according to the requirement of users. This research looks towards the future requirement to suggest developing a new advanced learning management system for the betterment of learning.

Keywords: *Natural Language Processing, Adaptive Learning, Data Science*

Impact of Crime Reporting System to Enhance the Effectiveness of Police Service

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Abstract. Crime reporting is a service that the police provide. By the time number of reported crime cases get an increase. But law enforcement finds out there is a gap between reported crimes and not reported crimes. Numerous reasons may involve for this gap. It is not a good thing to giving a chance for criminals to stay safely in the community as innocents and that motivates criminals to do more crimes. Because of that, the community at high risk of being a victim. And as law enforcement, they are unable to do their jobs because many crimes are not getting reported. Sometimes that affects the ongoing investigations too. To fill this crime report gap, some law enforcement launched online crime reporting Systems for the public to report crimes. So, this paper discusses how crime reporting Systems going to help law enforcement and ongoing investigations. And the involvement of the public in these Systems The effectiveness of the system to the police is also discussed in this paper. This paper has included previous studies to show the impact of crime reporting systems in modern-day policing

Keywords: Crime Reporting, Police, Privacy and Security, Crime Reporting Systems, Applications, Victim, Law enforcement

Causing Factors for Less Student-Teacher Interaction in Virtual Classrooms. & Video Conferencing in Distance Learning: A Review

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Abstract. As the Covid-19 epidemic forced people to stay in their homes, the field of education faced a major problem of conducting classes according to the same educational style. Although distance learning provided the first solution, it could not replace physical education methods. Synchronous distance learning is the most used and effective method, with video conferencing and virtual classes taking precedence. A survey was conducted to identify issues of effective interaction between students and lecturers with the participation of 243 individuals, including lecturers and students. Feedback reveals how lecturers and students experience Systems and how satisfied they are. Both parties have a positive feedback average on the use of such Systems. Various problems. arise because the active interaction between students and lecturers is very low. During online lectures, they could not see each other properly, and often they attend lectures without turning on the cameras and microphones. It mainly leads to a decrease in student-lecturer interaction between online lectures. The research is concluded by proposing to develop additional features in current online learning platforms.

Keywords: *Synchronous Distance Learning, Distance Learning Systems, Student-Lecturer Interaction, Video Conferencing, Virtual Classrooms.*

Video Games and Decision-Making Ability Improvements.

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Abstract. Most people believing video games are harmful to children and all other players. But when considering decision-making ability, Visio motor ability, and Visio moto ability. Video games are doing a great job to the players who playing video games without any addiction. The players who addict to the games are not improving their abilities that much. There are so many categories in video games. And they affect in different ways to improve their decision-making ability. The research is about video games' effect to improve the decision-making ability of the players. Action games and simulation games are the most valuable categories of video games to improve decision-making ability. Some puzzle games also help players to improve the ability to make better decisions. Action games help to make quick decisions. Action game players have sharp eyes and visual memory. So, they can make a decision faster than non-video game players. And the simulation games help to improve the experience and train the player to make decisions. Simulation games are similar to real-world experience. So, it helps a player to face when they are going to do things in real life. When analyzing the previous research experiments, video gaming can improve the decision-making ability of the player than non-video gaming players. Video gaming can boost thinking speed and train to make the best decision according to the situation.

Keywords: *Video Games, Decision Making*

Challenges of Manual Attendance System Towards Student Motivation

TS Dassanayake, WAAN Wanniarachchi

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Abstract. Students must attend lectures to get their primary source of knowledge to their study materials. They motivate students towards attending lectures can be achieved by student attendance. This article shows that many research papers prove attendance is important and attending lectures can be motivated. In the current attendance system, the process is fully manual from taking attendance to processing it to see whether the student has reached the required attendance percentage. Also, the current system shows students their monthly attendance, but it isn't sufficient to motivate students. The current Systems data can be manipulated by students and students can use those methods to mark attendance while not attending lectures which decrease the motivation of students towards attendance. According to the survey data, there is a requirement for an automated system for attendance. The system should be included with a method to motivate students to reach their required attendance percentage for a semester. The method includes a smartphone application that reminds students about their daily attendance. Also, there should be a method in the system where students with lower attendance are noticed and guided to reach their required attendance. A fingerprint is a proper method to verify a student's identity in a lecture according to the survey. Since there are more Android smartphone users the mobile application should focus on them. From this method, students can be motivated to achieve their required attendance percentage and also reduces attendance frauds.

Keywords: *Attendance Management System, Manual Attendance, Challenges, Student Motivation, Attendance Verification Method*

The Impact of IoT Concept on Smart Petcare Applications

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Abstract. Pets require extra care and special attention. This job is not as easy as it used to be, owing to today's busy lifestyle. The interaction between human and physical machines and machinery in the real world is drawing further attention, with the use of a normal and logical approach. According to this concept, life, and living well, has become a rising demand. Thus, how to raise pets easily has been the main challenge lately. The question that led to this research was "How does the IoT concept impact smart Petcare applications?" The purpose of this research paper was to examine the IoT concept characteristics and innovations of the latest smart Petcare applications. Implementing smart pet homes would ensure greater comfort and peace of mind for pet owners, especially when pets are unattended. Before implementing this smart pet home concept, one should study the existing features and facilities. This Research explores the impact of the IoT concept on smart Petcare applications potential of the machine, connectivity, and control systems across the Internet of Things, technology to facilitate human contact with pets.

Keywords: *Petcare, Internet of Things, Smart Petcare System, Monitoring Systems*

Factors Affecting Undergraduate Students' Intention towards Digital Piracy of Software in Sri Lanka: With Special Reference to Undergraduates in Kotelawala Defense University

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Abstract. The development of easy and affordable internet access has led to the growth of the Digital Piracy of Software (DPS). DPS has resulted in losses to the Software industry and convictions for some of the people who practice DPS. Therefore, the author identified that it is important to find the factors that affect DPS from a digital consumer's viewpoint. The purpose of this study was to identify the factors that affect the intention of undergraduate students of Sri Lanka towards DPS. The theory that was used for this study is the theory of planned behavior. To reach the purpose of this study, a model was developed which included 4 independent variables: Attitude, social influence (SI), perceived behavioral control (PBC), moral obligation (MO), and one dependent variable (DV): Intention towards DPS. The population of the study comprised of undergraduates in Sri Lanka and a non-probability sampling technique was used for selecting the sample for the study. Data collection for the analysis was done using a web-based questionnaire survey which resulted in a sample size of 165 responses. The collected data were analyzed using quantitative analysis techniques with the help of IBM SPSS software. In the analysis process, the reliability and significance of the data were checked first, and then the impact of independent variables on the DV was measured. The results showed that only the MO factor had an impact on the IDPS of undergraduates of Sri Lanka from the four factors proposed by the author.

Keywords: Digital Piracy, Software Piracy, Intention, Digital Pirate

Analysis of the Use of Menstruation and Fertility Period Tracker Mobile Applications

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Abstract. At present, many mobile applications are using in every operation in day-to-day life to ease the works of people. Among these apps, mobile health apps are doing huge service to the people who use these applications. When focusing on women's health, there is a need for the mobile application to monitor, track, and make reminders to their sexual health like mainly menstruation cycles and fertility periods. Many mobile applications have already developed, but users claim that the applications contain false information and have no knowledge of the general lifestyles. This review is making to identify and understand the issues of the current mobile applications, identify the positive factors that helped the users and also comparably identify the best features and methods that need to make like the mobile health application.

Keywords: Mobile Application, Fertility Period, Menstrual Date, Pregnancy, Tracking

Road Incidents Pre-Notifying Navigation Android Application Model Suggestion for Sri Lanka

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Abstract. Due to the increasing number of incidents that occurred on the road and the delay in notifying the relevant authorities san caused problems. This situation leads to traffic congestions, waste of time, and resources even the human lives are at stake. After identifying and road incidents like fallen power lines, trees, insecure bends/slope, sudden landslides, insecure railway crossing without proper gates and many more the proposed process is to use an android application. The use of the smartphone has become very much effective in this scenario. The road incident pre-notifying GPS navigation suggestion model, using smartphone sensors, the incident images, videos with the detailed information like exact location using GPS can be uploaded to the application server which can be shared accordingly. This can trigger the notification to appropriate authorities to act quickly to solve the problem as soon as possible. This approach can save time and the restoration become much faster which can benefit people to make their day-to-day life much safer and comfortable.

Keywords: *Road Incidents, GPS Navigation System, Android*

Evolution of the Effectiveness of Locomotive Schedule Record System in Sri Lanka

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Abstract. Sri Lanka railways are the main transport entity in Sri Lanka that operate the number of daily travels through Sri Lanka such as public transportation and freight transportation. To pull these trains locomotives should be maintained well. These locomotives are assigned to various types of schedules to maintain their performance. These maintenance records should be inserted into the locomotive schedule record system for various purposes of the management of the Sri Lanka railways such as inventory management, budget planning, and decisions on new rolling stocks. Sri Lankan railways have a traditional record system that uses a file system with manual methods of inserting, retrieving information. In the government sector of Sri Lanka, usage of Information technology has been increased for main operations of the institutes but when analyzing in the railway sectors, it has a poor impact on information technology. The research intended to analyze the effectiveness of the current locomotive schedule record system and give recommendations for more smart, secure, and convenient services to increase the effectiveness of the system. In this study, major drawbacks of the current system are analyzed to find the best solutions to adhere to these drawbacks. The methodology used to conduct this research is a qualitative and quantitative-based survey, interviews, and experiments. This research focuses to enhance the user-friendliness of a system and minimize the main drawbacks of the current system.

Keywords: Locomotives, Trains, Web Applications

Identification of Importance to Credit Card Fraud Detection Within Online Transactions from the Client Side

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Abstract. Credit card frauds are a major problem that can be seen in the present. This issue is not limited to a certain country but the whole world as a global matter. If we take these credit card fraud detection systems, there are quite a lot of relevant Systems That can be seen in the present. But most of these are used by the related banks and only they have the full authority in the process. So, if we consider this matter most of the time all consumers do not get the right and appropriate reactions from the bank to credit card frauds. So, it is important to build up a credit card fraud detection system for the customer party. So, they can themselves protect themselves from the frauds and take necessary possible actions (ethically and legally) without disturbances from the other parties. This research paper discusses the importance of consumer-centered credit card fraud detection within online transactions. This is a thematic qualitative representation of data gathered to prove the overhead declared topic. All the data to the research paper was taken from the consumers, files, and statements from the banks, bank employees, policies, and regulations restricted from the Central Bank of Sri Lanka. The credit card fraud detection system is going to be designed using c language. Because c language is very reliable to use, portable with software as well as hardware and it does not have a termination end as a language. The main technology of the fraud detection system is Artificial Intelligence (AI) in addition to Neural Network. Because using and implementing Artificial Intelligence are low cost and less complex. Artificial Intelligence can also introduce a new trend in the world.

Keywords: *Fraud Detection, Client-Centered, Credit Card.*

Designing of Online Shopping Store

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Abstract. Nowadays, the rapid growth of the Internet and its effect on everyday life have introduced a new customer profile, which is referred to as the 'online consumer.' These consumers are influenced by different factors and have different buying preferences concerning conventional consumers. The most noticeable commercial use of the World Wide Web is the business-to-consumer aspect of online shopping. The primary purpose of an online shopping site is to offer goods and services online. Online shopping is a mechanism in which customers directly purchase goods or services from a retailer in real-time, without an intermediary service, over the Internet. It is a kind of electronic commerce. Online commerce, shop, e-shop, internet shop, webshop, online store, or virtual store evokes the physical analogy of purchasing goods or services from a brick-and-mortar retailer or a shopping Centre. The method is called Business-to-Consumer (B2C) online shopping.

Keywords: *Online, Shopping, Web Designing*

Information Systems

Information Systems

Technical Session Chairs

Technical Session I, Parallel Session A   *Dr (Mrs) N Wedasinghe*

Technical Session I, Parallel Session B   *Maj RMP Rathnayake*

Technical Session II, Parallel Session A   *Dr ADAI Gunasekara*

Technical Session II, Parallel Session B   *Dr (Mrs) N Wedasinghe*

Tirtual Tailor Body Measuring System – Survey Study of Calculating Interest about Consumers.

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Abstract. Measuring Systems for clothes size have to be updated from time to time. Clothes should be designed to tailor well, fit the body elegantly, and hide obvious body flaws. To attain this goal, it is crucial to know the interrelationships between different body measurements. The clothing industry currently changing the manual tailoring sector to automate the tailoring sector. Complications with garment sizing and poor fit inconvenience many consumers who become dissatisfied with such provision on the high street. It is evident that human measurement and classification of the human body based on size and shape are precedent to accurate clothing fit and therefore fundamental to production and consumption. The comfort and impact performance of clothing are typically subjectively measured, and this is a multifactorial and dynamic process. This study aims. to develop the human body measurement without any direct contact using image technique to decrease the time of measurement, to increase the accuracy of measurement, and to compare between manual measurement and image technique measurement for human body measurement. With the advancement in technology, automated 3D body scanning, Avatar base body scanning, Online Store body measuring Systems designed to capture the shape and size of a human body in seconds and further produce its true-to-scale. Some Systems are standardized by international organizations. But in Sri Lanka, as a developing country people do not pay much attention to the new technologies regarding the clothing industry. This research focus to suggest the advantages and importance of having a virtual tailor body measuring system.

Keywords: *3D Body Scanning, Avatar Base Body Scanning, Online Store Body Measuring Systems*

Automated System to Improve the Performance of Vehicle Service Management in Automobile Industry

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Abstract. Now a day's vehicles are important in our day-to-day life. Our main transportation methods mainly depend on vehicles. Today the use of vehicles among the people is increasing day by day. But in this busy life, people fail to give much attention to their vehicles. This results in major technical problems. in their vehicles. People refer to live a luxurious life while minimizing physical work. So, this review intended to carry out a detailed analysis of automated vehicle service management Systems (AVSMS.) and find out the advantages & untouched areas or else the points that won't be talked about and still not yet developed up to a good level. The review is conducted to analyze the advantages of automated vehicle service management Systems over manual systems and what are the areas that need further attention in the future in the automobile service industry? With the help of published research studies and customer feedback, I came up to a conclusion that what are the features that should be developed further to look for more advancement. Identifying advantages & available spaces for further enhancement is the main aim of this review paper and this study investigates more about the automobile vehicle service management industry in advance.

Keywords: *Vehicles, Automobile, Online Booking*

Automated Real Estate Retailing Website

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Abstract. The usage of the Internet has become intertwined in all facets of day-to-day life for work and play. It serves as an essential part of our lives specifically for those in industrial and developing areas. There is a major decrease in the general workload of online retailers compared with the full- service brick-and-mortar dealers. To contest with the online limited service and discount brokers, many brick-and-mortar brokers set up Websites to reach out to new and prevailing customers. Furthermore, e-business can produce new business strategies that exploit an advanced level of interactivity between clients and suppliers while increasing opportunities for bonding business and market logics and also decreases production cost. The increasing number of potential buyers perusing listings through the Internet produces a high level of potentials and reques0st for refined search engines. Customers can adjust the search standards to return good results. In a search, customers can specify a price range, location, etc. Customers can expect to discover clear and professional photos, virtual tours, loan calculators, area maps, local institute information, relative sales data of recently sold similar households within the same neighborhood, property taxes, and if obtainable, the prior sales price. The study focuses on strategies used in building a website with enhanced capabilities by overcoming the drawbacks for property retailers

Keywords: *Digital Marketing, Land Valuation, Digital Technology*

A Comprehensive Review of Automated Railway Ticketing System

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Abstract. Travelling has become tiresome and difficult in this period. Starting from the discovery of the steam engine, until now with numerous advancements, the most picked mode of traveling for many within any country is the train. Unfortunately, the challenges faced in this mode are numerous and are getting piled up day by day. To overcome these challenges and issues, a well-organized automated ticketing system is one of the necessary means to resolve the prevailing issues in a train traveling. Looking at the history, railways issued tickets in paper with all details written by hand and issued with a money exchange requirement. With the use of computers and printers came the printed version of tickets. But still, there is a rush at the counters for tickets. This paper represents a review drawn from a survey conducted regarding a solution to be brought to the ticketing system of the Railway. This paper is written by surveying to get some feedback to thereby decide on implementing a smart and automated railway ticketing system that uses IoT devices. As expected, according to the survey, the majority of the participants bias to the side of implementing a smart ticketing system which they expect to be a smart solution for the current mess in our country. With the survey results came the need for a smart ticketing system and through the proposed system will have an RFID system and tags to make ticket purchase smart and reliable. With the help of this developed database system in our country, the floured results from the survey are satisfied with low cost which is much secured than the prevailing ticketing system. This system provides facility and flexibility to book and retain the ticket very simply following a few steps and can be implemented easily in Sri Lanka.

Keywords: *Ticketing, RFID System, Automation, Solution*

Introducing an Automated Consumer Complaint Management System to Improve the Performances of National Water Supply and Drainage Board

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Abstract. Consumers complain Management is a somewhat critical operation for every organization. good customer satisfaction reflects the organizational performance assessment. Complaints ought to be considered a pointer of organizational execution appraisal, flagging issues, or disappointments in inner forms. that require speedy recuperation in arrange to maintain a strategic distance from the relocation of productive clients. Organizations need to realize that the consequences of losing customers are both decreasing benefits and negative word of mouth. Customers become almost invariably disappointed under some situations due to numerous issues or challenges that are not necessarily under the direct control of the company. The first step recommended to managers is to allow consumers to communicate their dissatisfaction in their attempt to systematically learn about consumer negative experiences, restore loyalty, and improve business relationships. This research is conducted to introduce an automated consumer complaint management system to overcome the problems. of the current system and to highlight the methods and different mechanisms of the customer consumer management system.

Keywords: Consumer Complaint Management, Improve Customer Satisfaction, Organizational Performance Assessments.

Online Leave Application System for Government School Teachers

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Abstract. The main objective of this project is to create an online leave application system for government school teachers. A vacation application system is a system that operates within a selected organization or specific group/department: based on the Internet. Teachers can use this online leave application method to make leave applications efficient and automated. The leave application and its approval will automatically show the number of leave approved from time to time and will be kept on a day-to-day basis under the supervision of other teachers. The system has features such as notifications, automated leave approval, report generator, email. Applying for vacations online can reduce paperwork and keep records more efficient. Sometimes teachers suddenly face many difficulties due to applying for leave. Unlike advance notice leave, there are times when teachers are unable to apply for leave in an emergency. The main reason for this is that for some reason they do not maintain contact with the required authorities. Therefore, this proposed system will automate the existing system. This online system replaces all existing traditional methods with computerized methods and makes the vacation application process faster and easier. The main purpose of this is to record the attendance of teachers reasonably and to give assignments to the children properly. All teachers in government schools have to face certain difficulties in applying for leave. This can be used for teachers to apply for leave, for assignments to students, etc., and by submitting this leave application to the relevant authorities, they will have the students supervised by another teacher. This leave management system has all the relevant detailed reports on the leave requests of each teacher. The current procedure for applying for leave is to fill in a leave form by hand, submit it to the relevant authorities, confirm the leave application, and maintain the relevant records. This process increases the paperwork and makes it difficult to maintain proper records. Therefore, the main objective of this proposed system is to reduce paperwork and facilitate record maintenance by having a specialized centralized database system. The proposed system automates the existing system.

Keywords: *Online Leave Application System, Data Analysis, Automate*

Automated Hospital Clinic Maintaining System for Government Hospitals in Sri Lanka

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Abstract. Hospitals play a vital role in Sri Lankan healthcare services. Great healthcare service is necessary for any nation in the world. The efficient healthcare service system holds the key to the development of the country. Increased diversity and specialization are the main problems. posed in healthcare today. New medical specialties are continually being created: there are many positions in inpatient care, as well as many public and private organizations. All of these positions are involved in the treatment of a single patient in health care organizations. Hospitals are the backbone of the health service. The healthcare system is the most important factor in the development of the country. When considering healthcare hospitals contribution is priceless. So, in Sri Lanka, there are two types of hospitals. Such as government hospitals and private hospitals. Most of the people in this country use government hospitals for their treatment. Treatments to agelong diseases for the long-term are one aspect of the treatment. To treat these agelong diseases hospitals, conduct clinics. Those clinics are divides based on the majority of the disease type. This research-based on the difficulties of the existing manual hospital clinic management system and the way it upgraded to the automated computerized system. The methodology used to conduct this research is a qualitative and quantitative-based survey. The online survey circulated through Email and the survey were completed by 300 samples of people covering the western province of Sri Lanka.

***Keywords:** Manual, Automated, Clinics*

Digital Marketing as a Strategy of E-Governance in Sri Lanka: A Case Study of Sri Lankan Hospitality Industry

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Abstract. E-Governance is a perfect development strategy for under-developed nations. Now Sri Lanka creates a SMART government. India has proven this fact by implementing e-Governance at the regional level gone successfully. E-Commerce is accepted as an organizational strategy and approach that facilitates the global market with unprecedented opportunities for organizations. And, with remarkable cost savings. As far as Sri Lankan hoteliers are concerned also the how to apply, e-commerce into their business process. As a result, online Travel Agencies like such as Booking.com are offering Sri Lankan hotels. In this research always user-centric approach was adapted. For this research, the main collection method is a web survey and web content analysis. The web survey was conducted based on the data collected by hypothesis testing. And, navigation and navigation design features that prevent customers on the transaction were highlighted in the web content analysis. Internet use especially online travel agents to research and promote, sell products or services. Especially most international travellers always search the web before they decide to visit a new destination quite often. It is readily available on the web site and includes universal knowledge. Competitors will have easy access to information and other data to-the-minute prices to both customers. This has turned into the internet at the end than the price of a price cutter Equalizer.

Keywords: Electronic Commerce, Hospitality Industry, Centric Approach

Human Resource Management Practices and Job Performance among Staff Level Employees in Foundation Garment (Pvt) Ltd - Palapathwala

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Abstract. Foundation garment (Pvt) Ltd (Hela clothing) is one of the Apparel Manufacturers in Sri Lanka. So, there are a lot of branches consist of Sri Lanka as well as Kenya and Ethiopia. As the Apparel production provider, there has a large market in the environment. To achieve overall operations Human Resource has become a major role in the working area. Therefore, human resources are the main factor in achieving the objectives. Therefore, management needs to focus on the employees as they are the main assets of the organization. The population of the research was all staff level employees of the current working environment of 86 employees. The probability random sampling method was used to sample 86 staff-level employees. The data were collected by using a questionnaire and SPSS Statistics 21.0 used to analyze correlation and multiple regression analysis of the data. The finding of the research creates that there was a positive relationship between employees' job performance, Recruitment, Selection, training and there have a negative relationship between employee job performance and compensation. As a result of the Researcher finding employees' performance can be improving through improving human resources practices (Recruitment and Selection, Compensation and Training) and training is a high impact on Employees' performance.

Keywords: *Human Resource Practices, Compensation, and Training, Recruitment and Selection*

Interchange Library Material Among Schools: Integrating the Library Management System

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Abstract. This paper is titled as the Interchange Library Material Among Schools within Integrating Library Management System. This system monitors and controls all transactions in the library. This software is built by using Java language. Connect other school's libraries, add a new member to the library, update new books, borrowings and return books, calculate the borrowing period, and calculate fine are the main functions in this system. Moreover, every librarian should know about the pros and cons of using the LMS. and how the impacts the students in schools. This system is a windows application. This system is mainly helpful for the users of the library and to the maintainers of the library system. This system is very easy to use for people who are new to the system and advanced users. This system is supported to reduce the workload of the librarian and the users. This system is efficiently done with the java language. This integrated library system will be a very important part of schools because the main three school libraries are get connected to this system. This system can build communication with other connected schools, can interchange the library materials among connected schools and this system will be helpful for students

Keywords: Library Management System (LMS.), Integrated Library System (ILM), Borrowing and Returning

Planning an Automated Grade Point Average (GPA) Calculation System to Enhance Students' Academic Performance

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Abstract. Grade Point Average (GPA) is an important criterion used to measure the academic achievements of an undergraduate. GPA matters when applying for a job followed by your degree qualifications or applying for a master's or Ph.D. (Doctor of Philosophy). To achieve someone's best results or gaining a class degree it is important to be aware of GPA and how to maintain a good record of it. This paper is discussing What is GPA, the importance of GPA for an undergraduate, methods of calculating GPA, the importance of using an automated GPA calculation system, and how an automated GPA calculation system contributes to enhancing the performance of students. It is important to calculate the GPA value of a student accurately because the final GPA for a degree program will be calculated for the fourth decimal place. That means a tiny mistake in the GPA calculation will lead to a huge difference in the final result and that will affect when you are applying/ being qualified to do or not for a master's degree at some point. When this task is done manually, there is a possibility of making mistakes. This paper is recommending an automated GPA calculation system for preventing those mistakes that can happen by humans, for providing students the opportunity to view their results transparently, compare them with the results they calculate and contact the teacher when necessary. A system like that could be used to enhance student's academic performances by motivating and guiding them to be better.

Keywords: GPA, Automated Systems

A Study on the Impact of Virtual Management on Employee Performance

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Abstract. This research aims to study the impact of virtual management on employee performance given its increasing prominence in the contemporary day. Thus, this study is structured in four folds; first, an introduction to the study is given followed by a comprehensive literature review analyzing a vast range of preceding research. The literature review of the study accentuates the significance of information technology and information technology-related software for virtual management when having a positive impact on employee performance. In virtual management, employee satisfaction, engagement, and productivity can be achieved through the proper use of IT tools. Further to this, the study explores the paradigms. of video conferencing, audio conferencing, integration of information technology, and the critical need to embrace new technology in ensuring a healthy employee performance through enhanced employee satisfaction, engagement, and productivity. Moreover, the author investigates the progressive adaption of virtual management and its impact on employee performance in the context of the global pandemic; Covid-19. Moving on, the author emphasizes the research methodology embraced followed by a discussion on the analysis of the results. Finally, a conclusion to the study is given. Over the year's technology has been growing fast and Information technology (IT) depicts rapid growth creating opportunities in all spheres of life. Hence, IT continues to initiate paradigm shifts economically, socially, and culturally, having profound impacts on organizational functioning. Henceforth, IT has altered the outlook of companies in the deployment of human resources as it expands access to talent, eliminating challenges such as commuting, communication, and time constraints. Performance, goals may be constantly changing as an individual or corporate priorities shift, even more so in these unprecedented times. employers may find it more difficult to keep track of what their employees are working on. virtual management is adapted by organizations progressively as it is the ideal alternative to practice the physical distancing strategy to eliminate the pandemic while ensuring a steady workflow and sustained performance.

Keywords: *Virtual Management, Employee Performance, Information Technology, Virtual Meetings, E-Leadership, E-Mentorship.*

Impact of E-learning and E- Teaching During the Pandemic of Covid-19 in Sri Lanka

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Abstract. There is no doubt that the emergence of the Covid-19 pandemic has resulted in tragic socio-economic challenges throughout the world. To mitigate the pandemic, several governments have made restrictive measures to limit group gatherings and encourage social distances. This meant the closing of higher learning facilities and a significant change from conventional classroom teaching and learning to virtual education. Covid-19 has become a global pandemic; in this pandemic situation schools and other higher education institutions in Sri Lanka were temporarily shut down therefore e-learning and e-teaching was introduced as an alternative method to face this situation by obeying the quarantine rules. This research aims. at Sri Lankan students' and academics' attitudes towards e-learning and e-teaching on this pandemic situation, merits and demerits of online learning and teaching, and the most used application tools for their e-learning and teaching purposes. To collect data for this study an online questionnaire was conducted. Two google forms were distributed among students and academics. Through a literature survey, the merits and demerits of e-learning and e-teaching were discovered. From the findings, it reflects that e-learning and e-teaching have fruitfully impacted students' and academics' lives and it helps to continue the learning and teaching methods under the quarantine rule and also it shows that still students, teachers, and lecturers prefer for classroom-based learning and out of Microsoft teams, Google classroom platforms and Zoom all have interested to use Zoom as the preferred application for online learning and teaching. This research illustrates both merits and demerits in doing e-teaching and e-learning. E-learning and e-teaching is a successful opportunity to pursue the schooling, but it is not perfectly successful in developed countries like Sri Lanka unless the factors affecting the e-learning process are taken into consideration. Through the research findings, it will help to address the real challenges faced by teachers, lecturers, and students when running online classes and make the education system more effective.

Keywords: E-learning, E-teaching, Covid-19, Higher Education, Challenges, Impact

Online or Face-to-Face Communication? The Selection of Sri Lankan Youths

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Abstract. Information technology has caused a huge impact on the way people communicate. With the advancement of technology, the internet has become an essential part of human life today. The objective of the present study is to assess how online communication affects youths' communication patterns and social behaviors. Further, it is required to analyze what attitudes they are having on both online and offline face-to-face communication. For this purpose, it carried out an online survey and 103 Sri Lankan university students participated. When analyzing the data, it reveals that no matter how much the young generation communicates online, but face-to-face communication seems to be more reliable with a scored preference of 81.6%. Therefore, the authors suggest carrying out more in-depth studies to identify face-to-face meeting requirements to develop more reliable online communication.

Keywords: Online Communication, Youth, Face-to-Face Communication

Identify Best Online Business Solution for Handicrafts and Traditional Industries to Exploit Economic & Business Opportunities in Sri Lanka

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Abstract. Introducing and monitoring a well-organized bus transportation service has always been a challenge for the Sri Lankan transportation system. Passengers often face difficulties with purchasing tickets, reserving seats, unnoticed changes in travel schedules, and finding information of the service such as arrival and departure time, itinerary and location of the bus, etc. when it is required. The objective of this research is to investigate and address the existing issues faced by the public when utilizing the bus transportation system in Sri Lanka by making suggestions for a proposed online ticket booking system for smartphones, to overcome them. The research paper consists of two sections. The first part, discusses recent advancements, issues, solutions, and their drawbacks regarding bus transportation Systems operated in different parts of the world. Furthermore, it explains features that could be implemented in the proposed bus ticket booking system. Second section; the analysis of the questionnaire survey is presented and discussed, regarding the condition of the existing system and the way proposed features should be fine-tuned according to user preferences, highlighting the finalized features and how they should be implemented in the proposed system.

Keywords: *E-commerce, Handicrafts, Traditional Industries*

Improving and Perfecting Prevailing Automated School Management System in the Sri Lankan Context

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Abstract. Education is the most powerful investment for a person's life which will never be stolen throughout the journey of one's life. As a consequence, it is obvious that education plays a vital role. The children of today are the future of tomorrow. Therefore, they will need a balanced education to contribute to the economy of the nation tomorrow. In the process of being educated, school education is the primary institute that educates students immensely to the development of adolescent minds as they step into adulthood. This research is carried out to identify how to aid in updating from traditional manual Paper-Based School Management System to Automated School Management System by improving and perfecting the prevailing Automated School Management System. This will help to reduce the use of manual paper-based systems in the schools as well as to develop the features of prevailing automated School Management Systems in the schools for better performance. This research is conducted to investigate the success of prevailing School Management Systems, how the schools use new technology, and what are areas needed that require attention in the future. With the help of published research studies and through questionnaires and interviews the conclusion of what are the features that should be developed in the prevailing automated school management system for future enhancement can be identified. This research paper investigates more about how to aid in updating from traditional paper-based School Management System to automated School Management System by adding and perfecting new features of the prevailing Automated School Management System.

Keywords: *Education, Traditional Paper-Based School Management System, Automated School Management System (ASMS.), School*

Survey on Development of Internship Communicating and Monitoring Web-Based System

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Abstract. University students are required to complete successfully the industrial training period as the essential requirement of the university to complete the degree program. For that process student, there is a position called "Industrial Coordinator" who is assigned from the university to manage and monitoring activities regarding the university student industrial training program. The Industrials coordinator is responsible person to update the university about the state of all the students during and after the industrial program. And also act as a resource person to help students to find and internships by communicating job vacancies to students and lead them to achieve the real goal of the industrial program and provide guidance to solve issues relating to the internship. All of these activities are done by the manual method in the existing system. There are a lot of problems. in the manual method when cannot keep continuous communication between the university and students therefore it hard to maintain the relationship between students and the university because of a lack of communication between those two parties. As a result of the university cannot evaluate the progress and success of the industrial training program. Because of this issue at the end of the training program both the university and the student cannot express the real accurate and updated information at the viva session. It will surely lead to a misunderstanding or/ and lack of understanding. Therefore, the university cannot take necessary action and decisions to increase the efficiency of the industrial training program. Industrial tanning is the most important a six-month training period. Universities in Sri Lanka use manuals, different kinds of ways to find an internship by the student. And there is no proper way to communicate and not centralized method to maintain student's records to use as a recourse to take future decisions. After students leaving the university for the internship period, there isn't a way to monitor those students by the industrial coordinator. As a solution, this paper presented a web-based internship coordinating system to overcome the identified problems from the survey in the Faculty of Computing Kotelawala Defence University, Sri Lanka. Proposed system work as an interactive tool for the faculty and students to communicate with each other whenever and wherever they want. The industrial coordinator acts as the admin of the system. The proposed system tries to integrate all the parties of the industrial training program to archive the ultimate goal of the industrial training and help everyone to perform the particular job easier and correctly.

Keywords: Industrial Training, Web-based System

Improving a Grievances Handling Process Using an Automated System

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Abstract. Every organization is continuous in the market based on employee productivity; employee production can be important to satisfy them. Employee satisfaction can be possible by developing interesting work, job security, growth, appreciation, proper working conditions, and organizational support at need. Sometimes there are not satisfied with their grievances handling system, as the responsible of the human resource manager is to recognize all the issues of the employees and try to resolve them as quickly as possible. So that is the reason for improving these automated Systems. This paper highlights the improvement of the automated grievance handling procedure and its role in employee satisfaction, which relative for enhance the productivity of the employee.

Keywords: Grievances Handling, Automated, Manual, Employee

Development of Online Bus Ticket Purchasing and Reservation System for Smart Phones

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Abstract. Introducing and monitoring a well-organized bus transportation service has always been a challenge to the Sri Lankan transportation system. Passengers often face difficulties with purchasing tickets, reserving seats, unnoticed changes in travel schedules, and finding information about the service when it is required. The objective of this research is to investigate and address the existing issues faced by the public when utilizing the bus transportation system in Sri Lanka by making suggestions for a proposed online ticket booking system to overcome them. The research paper consists of two sections. The first part discusses recent advancements, issues, solutions, and their drawbacks regarding bus transportation Systems operated in different parts of the world. Furthermore, it explains features that could be implemented in the proposed bus ticket booking system in Sri Lanka. Second section; the analysis of the questionnaire survey is presented and discussed, regarding the condition of the existing system and the way proposed features should be fine-tuned according to user preferences, highlighting the finalized features and how they should be implemented in the proposed system.

Keywords: Online Bus Ticket Booking System, Reservation, Electronic Ticketing

Establishing Food Donation System in Sri Lanka

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Abstract. Hunger is the main problem that every country faces. As a developing country, Sri Lanka works with world food program for fifty years to end this matter. According to the 2020 Global Hunger Index, Sri Lanka ranks 64th of 107 countries with a score of 16.3. This score means that there is a moderate level of hunger in Sri Lanka. The country has improved in the matter compares to the past, but still, child undernutrition takes a high percentage. The citizens of the country are famous worldwide for their generosity and they spend a significant amount of money on community service projects and other similar donations yearly. The technology level of the country is also good, but still, there is no food donation system was implemented in the country. The main aim of this research is to implement a food donation system for Sri Lanka in which people can donate their food surplus using a trustworthy and responsible mobile application or a website. This kind of system will be new to the country. So, this research is to get an idea about current food donation Systems in other countries and identify the strengths and weaknesses of those Systems. Also, additional features like food pickup trucks, accessible community lockers, and restaurant leftover finder will discuss in this review. In the end, the main objective is to develop a suitable food donation system with fewer mistakes for Sri Lanka.

Keywords: Hunger, Food Donation System

Intrusion Detection System – A Literature Review

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Abstract. With the advancement in technology, the day-to-day life of people is mostly dependent on technology. So, it is highly required to assure the reliability of network operations. There is a dramatic increase in the number of network attacks during recent years. With this, research interest in Intrusion Detection and Intrusion Detection System (IDS) have increased consequently. Intrusions into computer Systems by unauthorized users have become a rapidly growing problem with the increase in reliance on the internet, intranet, and extranet in network computer access. Unauthorized access to computer Systems or unauthorized activity in a computer or information system is defined as an intrusion. When considering the security of the computer system, intrusion detection technologies play an extremely important role. IDS can protect both internal and external parties. Although there were different intrusion detection systems have been implemented, none of the systems are capable of being completely flawless. This paper reviews new trends in intrusion detection and current intrusion detection systems. The main objective of this research is to presents a complete study about intrusion detection, failure points, advantages and disadvantages, special features, techniques, methods used, algorithms used, technologies, and concepts used in current intrusion detection systems. When considering the surveyed literature, it is clear that there is a requirement of securing the network against novel attacks. In some instances, the solution can be given as a hybrid, which means the combination of anomaly-based- intrusion detection and signature-based intrusion in providing the most effective solution for some attacks. And finally, implementing an intrusion detection system for research purposes is the ultimate goal. That system is having the capability of detecting and preventing intrusions and intruders.

Keywords: *Intrusion Detection System, Intrusion Detection, IDS Techniques, IDS and Machine Learning, IDS and Data Mining, Hybrid IDS*

IoT based Health Monitoring System – A Comprehensive Survey

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Abstract. The development of a smart cyber-physical network is captured by a massive technology named the internet of things (IoT). Healthcare can be considered as the utmost important factor which connects the community and development of any country. The covid-19 virus can be taken as a recent example and it has directly affected the economy and the day-to-day life of most countries. Experts in the health field get the maximum advantage out of vast improvements in technology and develop new inventions that bring a lot of benefits to the users in the clinical setting. The number of users who are served from the advantages of the new medical inventions, Mobile Health (MHealth) and E-health are countless. Due to Covid-19 patients have to face a lot of problems. as they are not able to visit doctors and get treatments. So as a solution for this problem, the Internet of things provides the capability of connecting to the internet and provides information on the health condition of the patient by allowing the integration of the devices. Today researchers have moved to do more researches to enhance and improve the health sector by finding new innovative technological solutions with the advanced use of IoT. This survey advances different IoT based health motoring Systems that are currently used, IoT based healthcare applications, technologies used to implement these systems, new trends in IoT based healthcare field, challenges and limitations in using IoT in the healthcare field. The survey is based on a literature review and the information that the literature reviewer has collected is represented through this research. Finally, this paper is expected to be useful for researchers, innovators, doctors, students, and health professionals.

Keywords: *Internet of Things, Health Care Services and Applications, Health Monitoring System, IoT Security, Challenges*

Online Medical Consultancy Platform

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Abstract. The Internet was historically a permanent source of medical data; it was used late in the day for private appointments with patients. Since late, applications that offer medical services have seen a rise in the market. An online consultation has secured a foothold on the market and individuals are likely to replace an online visit to a physical facility. This research reports on online medical consultation literature from different sources and reported surveys and reports. According to published works, reports, and surveys, convenience, change in disease trends, cost-effectiveness, confidentiality, and second opinion are the different factors that led to a sudden increase in online medical consultation. By offering new platforms for a greater public voice in the policymaking process, e-consultation brings an equally significant bottom-up approach to policy-making to bear. In many countries, e-consultation is, therefore, the cardinal objective of achieving the goal of sustainable development of just, peaceful, and inclusive communities.

Keywords: *E-Consultation, Medical Consultation*

The Development of Online Self-Defense Platform to Overcome the Weaknesses of Traditional Self-Defense Learning

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Abstract.   Development of the internet technology makes huge changes around the world. Every part of society is trying to make its way to adapt to these changes. Self-defense education is very important to every person and it still depends on the same traditional learning system and it is not a possible solution for every people. Self-defense learning cannot complete without student and teacher interaction but current Systems developed using internet platforms do not satisfy the users. This research will show the barrios and requirements which can happen when developing this online self-defense platform. Required data is gathered by referring to other research papers and using the survey method. This survey design with 10 questions and it got more than 400 unique answers. Many important decisions have been made by using this analyzed data. A self-defense online platform must be designed by considering important factors like gender and age. Most of the people who contributed to the survey have some experience connected to self-defense and it shows the demand self-defense takes. Because of the COVID-19 virus, people use the internet more than any other day and this is a good opportunity for developing the online platform for self-defense and it can provide advantages more than traditional learning of self-defense.

Keywords: *Self-Defense, Online Platforms, Online Learning*

Computer Science

Computer Science

Technical Session Chairs

Technical Session I   *Dr LP Kalansooriya*

Technical Session II   *Mrs WPJ Pemarathne*

Bacteria Identification and Classification in Drinking Water Using Image Processing Techniques and Machine Learning

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Abstract. Drinking water considers as a major requirement for all the animals in this world. But what happens when it becomes polluted? While we can consume purified water by traditional purification Systems why we cannot assure that there can be no threat or harm to public health? The people in rural areas in Sri Lanka are still adapted for traditional reservoirs like rivers, waterfalls, ponds, water streams that may vulnerable to waterborne pathogens which are sometimes harmful (pathogenic bacteria). In this paper, we analyze more about the bacteria that can identify in drinking water like E. coli (also known as Escherichia coli), Salmonella Enterica, Shigella, Legionella Pneumophila, etc. Some bacteria can cause common severe infections like diarrhea, vomiting, loss of coordination, muscle ache, fever but it also can be susceptible to people with bad health conditions which can end up with death. Microbiologists who conduct tests at labs should well expertise with experience to make them accurate and efficient. During the classification of bacteria, it takes much more time and the results may not quite right. Conventional software Systems use mathematics for image analysis algorithms which is hard to adapt, so here we focus on Machine Learning with Image processing techniques for clear identification and classification of bacteria in drinking water. Bacteria Identification and classification experiments are yet trivial and still have a concern on new methods to increase productivity. According to some undergone research works color of microorganisms is the key feature to improve the accuracy of recognition when the shape may appear similar. The most common algorithms used for the classification of bacteria can be dictated as support vector machine, K-nearest Neighbors and Random Forest algorithms.

Keywords: *Classification, Feature Extraction, Bacterial Morphotypes, Convolutional Neural Networks, Supervised Learning, Unsupervised Learning*

Communication Approach for Swarm Intelligent Robotics

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Abstract. Swarm intelligence is a concept that studies decentralized, self-organized systems that can move quickly in a coordinated manner. In nature, swarms occur naturally scientists have studied natural processes such as ant colonization, bird flocking and animal herding to learn how those discrete biological agents work together with their environment to perform a common goal. In robotics, swarm intelligence involves taking what scientists have learned from observing nature and applying the concepts to machines. Swarm intelligence studies the collective Behaviour of Systems composed of many individuals who interact locally with each other and with the surrounding environment, using forms of decentralized and self-organized control to achieve their objectives. When it comes to autonomous robots there was a negative point which that they are suffering from lacking capabilities which they need human intervention to complete the task SI solve the above problem. Swarm robotic is an upcoming topic in the fields of science and technology as a spark that is going to connect natural behavior with technology. This is a collection of robots that will cooperatively work to achieve tasks that have common concepts of behaviors that can be observed in nature. Though Swarm intelligence has an appreciable place in software point of view, once it comes to Robotic and Automation SI is in a primary age, where it's still at the development level. To overcome the above-mentioned problem, it's my wish to introducing a Communication infrastructure that can work with various types of Hardware platforms, implement a Standard Protocol for Communication between Hardware devices and let them make Distributed Decisions. Therefore, I aim to explore the existing primary hardware implementations of swarm intelligence, identify its difficulties, benefits and explore possible applications that use swarm intelligence using robotics.

Keywords: *Swarm Intelligence, Swarm robotic, Machine to Machine Communication*

Review on Blockchain and Multi-Agent Technologies in Clinical Records Maintaining and Transferring

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Abstract. The essence of clinical records in some random emergency clinics or hospitals can't be over-underlined, they are the essential instrument that can be utilized to accomplish the most extreme objectives and they are both significant to the patients and the clinical workforce. Clinical records are an indispensable resource in guaranteeing that clinics and hospitals are running viably and effectively. To achieve this a distributed system should be alternated the present clinical records and maintaining Systems. This paper reviews the existing centralized medical records maintaining Systems and as a distributed system how Blockchain technology and MAS can be used in one system without affecting their fundamental characteristics. This review will help to find out the importance of clinical records maintaining in e-healthcare and how blockchain technology and MAS can be used to develop such a system that effectively preserves the patient's privacy.

Keywords: MAS, BC, Clinical Records

Prevent Cyber Bullying using Machine Learning

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Abstract. Cyberbullying is the utilization of innovation to scare, annoy, undermine, torture, or embarrass an objective. Instances of cyberbullying including sending mean writings, posting bogus data about an individual on the web, or sharing humiliating photographs or recordings. The sentiment of being chuckled at or hassled by others can keep individuals from making some noise or attempting to manage the issue. In outrageous cases, cyberbullying can even prompt individuals to end their own lives. Cyberbullying can influence us from multiple points of view. Be that as it may, these can be survived and individuals can recapture their certainty and wellbeing. Eye to eye harassing and cyberbullying can regularly occur close by one another. However, cyberbullying leaves a computerized impression – a record that can demonstrate value and give proof to help stop the abuse.

__Keywords:__ Cyber Bullying, Machine Learning

Prediction of Non-Alcoholic Fatty Liver Disease using Machine Learning Algorithms

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Abstract. Non-Alcoholic Fatty Liver disease is a chronic disease that is very hard to predict at its first stage. The prediction of this disease is very significant as it will unknowingly occur in people leading to vulnerable damages to the liver. As the liver plays a major role in the human body any damage caused to the liver may be a significant failure of the body functions. NAFLD is a common liver disease among 25% of the world population. However, as for the name, this is not caused by the consumption of alcohol. The prevalence of NAFLD has become a heavy burden for the lives of people as it eventually develops without the knowledge of oneself. The risk is that it won't be diagnosed unless you do a scan for any other reason. However, the prevalence of this disease increases in parallel with diabetes, metabolic syndrome, and obesity. This increase is noteworthy in western countries like ours. Many types of research have been done on the prediction of this disease using various techniques. The early prediction of the disease will make it efficient for both the clinicians and the patients. A study was done based on the prediction of NAFLD using different techniques by various researchers. All the works are evaluated based on extracting knowledge about how the current research has been done, what techniques they have used, what are the main results of using these techniques, and what are the advantages and drawbacks or the limitations of the works. This paper presents a clearer clarification of the objective of this study, a profound explanation of the topic of building prediction models and applying machine learning algorithms as a solution for the Non-alcoholic Fatty Liver disease, and what is the relevance and motivation of this study. Furthermore, the paper presents a summary of the literature survey conducted based on the prediction of Non-alcoholic Fatty Liver Disease. This section will explain how other related researchers have undertaken to solve this issue by applying various approaches. The methodology section will explain how the data was gathered for this study (from which sources) and how the information got from those sources were summarized and analyzed. The latter part consists of the discussion of the entire research work presented in the paper followed by a conclusion of all the achievements and the drawbacks of the researches done up to now. Lastly, it is stated about what are the new directions for the proposed project is, after the study conducted on all these reviews.

Keywords: *Non-Alcoholic Fatty Liver Disease (NAFLD), Machine Learning, Prediction Models*

A Systematic Review: Technologies Can be Used to Develop an E-Guide Application for Dancers

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Abstract. Dance is a popular performing art that is highly practiced by the people of Sri Lanka. It is expanded through the vast area as there are many dancing styles. Among them, Traditional dancing which was originated in the 4th century B.C. is the most popular dancing style in Sri Lanka. Though it is highly developed throughout the years, novel technologies aren't much engaged with the development of dancing. Therefore, Sri Lankans still use ordinary methods even for finding choreographers, dance track editors, props providers, and costume providers. These have become the most common problems of Sri Lankan traditional dancers. Although there are many computerized solutions to give support for western dance styles from other countries, there is no such support for Sri Lankan traditional dancing. As a computer-based solution for these problems., the information-providing website was suggested and this systematic review is conducted to select the most appropriate technology for it. As there is not even a proper database that contains data about Sri Lankan dance choreographers, Costume Providers, Props providers, and Track editors yet in an accessible source for all public users, the main objective of this website is to provide such a database to Sri Lankan dancers with easy access to the data. This paper discusses the earlier works done by various researchers regarding several similar automated Systems implemented using technologies such as web intelligence, agent technology, and artificial intelligence. Implementation details, various concepts, classifications, the advantages and drawbacks of those technologies are discussed, and by analyzing all, selected agent technology and artificial intelligence as the best technologies to implement an e guide web application for dancers.

Keywords: *Information Providing Platform for Dancers, Intelligent Web Systems, Artificial Intelligence, Agent Technology, E-Guide Applications*

Enhance the Construction Site Management Using Mobile Application

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Abstract. Effective communication throughout the project participants in construction sites is a major factor for construction project management. There are several mobile apps used on construction sites. providing different services such as the construction field, applications of new technology are more frequent in site works such as pile driving, soil sampling, concrete pouring, excavations, etc. But there is a lack of mobile applications in the field of construction project management. But there is no specified technological solution for issues in the communication area in construction site management. It is a highly required facility because of the busy lifestyle of the people and now most people like to adopt with technological enhancements. The efficiency of the project is enhanced by the rapid provision of these project data. This paper reviews the implementation of a mobile application framework to support the management and communication of construction sites. The mobile application that is planned to be developed will facilitate the contact between managers, field office workers, and mobile users at the sites of construction. Major reasons for construction project failure are ineffective communication between management and site staff and poor planning skills. An effective project management application should facilitate all the staff to receive instructions from the site, send requests for interpretations and retrieving project information, continuously update the material and equipment status. In this study, it is mainly focused on how to apply technological trends to achieve fruitful project management and minimize unnecessary losses on the construction site. There are several trends of new technology that can be applied to increase the efficiency of project management.

Keywords: Mobile Application, Construction Communication, Construction Management, Construction Site, Construction Information

Hospital Clinic Patients Management System

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Abstract. Our Country Sri Lanka Provides health facilities freely for all citizens. And this is an immense service for most of the people of the country as most of the people are benefited from these free health services. Each hospital in Sri Lanka holds clinics for patients. Those clinics are categorized as diabetic, heart, pediatric, dermatology, and mental disease clinics. But there are lots of issues regarding these services. One of the main problems is still using manual-based paperwork Systems, especially in hospital clinics. This process takes at least 4 hours per patient according to the research done with some selected patients at selected clinics. It means the patient has to wait and spend at least 4 hours to meet a doctor and take medicine. This manual-based paperwork system is extremely time-consuming. In this paper, it is proposed to make this process efficient by introducing a Hospital Clinic Patients Management System (HCPMS.). This system is mainly focusing to manage clinic patients of hospitals. This paper presents a clearer clarification of the objective of this study, of building an automated system instead of the existing manual system and introducing a smart card with Radio Frequency Identification (RFID) technology and what is the relevance and motivation of this study. Furthermore, the paper presents a summary of the literature survey conducted based use of an automated HCPMS. instead of using a manual-based paperwork system. This part will clarify how other related analysts have embraced to settle this issue by applying different methodologies. The last part comprises the finish of the apparent multitude of accomplishments and the disadvantages of the investigation done up to now, trailed by a conversation of the whole examination work introduced in the paper. Finally, it is expressed about what are the new directions for the proposed project is, after the investigation directed on every one of these surveys.

Keywords: *Hospital Clinic Patients Management System (HCPMS.), Radio Frequency Identification (RFID), Smart Card*

Review on Heart Disease Prediction using Machine Learning and Data Analytics Approach

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Abstract. Nowadays, heart disease is very prevalent and one of the main causes of death worldwide. Compared to the brain, the heart is the next main organ that has greater priority in the human body. In medical diagnosis, an automated system will increase medical performance and reduce costs as well. I will design a system that can accurately define the rules for predicting the risk level of patients based on their health parameters. This study aims to figure out the best technique for machine learning that is both computationally effective and precise for the prediction of heart disease. The implementation of work is done on the UCI Cleveland heart diseases data set to test on four machine learning algorithms such as Naive Bayes, Decision Tree, Logistic Regression and Random Forest. This paper uses above mentioned four machine learning algorithms for comparing the accuracy among them.

Keywords: *Heart Disease, Machine Learning, Naive Bayes, Decision Tree, Logistic Regression, Random Forest*

Healthcare Chatbot: A Review

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Abstract. Technology is taking a main place in the world now. People are changing their lifestyles according to this technology. Healthcare is an essential thing in people's life. Can we use technology to make things easy in healthcare? Nowadays people are suffering from the COVID-19 pandemic situation (The year 2020). The main way of spreading the coronavirus is physically contacting each other. So, as a solution, we propose a chatbot. A chatbot is a computer program that simulates human conversation through voice commands or text chats or both. There are so many chatbots for healthcare that can understand and respond in English. Also, there is some chatbot that can understand Sinhala also. But, in healthcare, there are no such chatbots that can understand and respond in Sinhala. Srilanka is the only country where there are Sinhala speaking people. So, this will be a unique thing. When developing this system, we suppose to use the concept of AI, ML, and NLP. Python using Flask, Chatterbot, and Django will be utilized for the development of the chatbot. Also, we are going to integrate the chatbot into a web-based system on healthcare.

Keywords: AI, ML, NLP, Web Integrated Chatbot, Healthcare

Suggesting a System to Decipher Cipher Text using Cryptography and Information Security for Sri Lankan Military

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The motive to illegally decrypt encrypted messages could be for economic, security, or political reasons. Finding a secured way of protecting ciphertexts from being stolen and revealed, has been very challenging for existing cryptographic researchers. Data security guarantees that only the intended recipient can view our data and prohibits any change or alteration of the data. Various algorithms and methods have been developed to achieve this level of safety. Data Encryption is one current protocol for securing information, particularly during end-to-end communication through computer networks. This paper mainly discusses the methods of converting cipher text into plain text and the period of key validation. One of the latest technologies in this area is Homomorphic Encryption conversion of data into ciphertext that can be analyzed and worked with as if it were still in its original form.

Keywords: Military, Decipher, Cryptography

Review on Decentralized Blockchain-Based E-Voting System: General Elections of the Society

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Abstract. Voting is a form of collective decision making or group opinion which can be used to solve any kind of ideological issues in society. The most common way to vote is through a paper-based system where it uses a paper ballot to collect votes and marked ballot papers will be put into a box. The cost of this traditional system is very high along with the counting process which takes a long time with an additional cost as well as increasing the time to publish results of the election. Election fraudulently activities violating election rules and corruption charges are also pushing along with this traditional voting system. Which encounters a huge impact on the final results of the election as well as on the public trust towards the system and constitution of the country. As a solution for existing issues for the traditional voting system, an e-voting system can be considered. However, it required a highly secure solution and that's where Blockchain comes in. Blockchain is one of the most suitable technologies which can be used for highly secure environments. Blockchain is a decentralized system with a hashing mechanism that helps to increase security. The Specialty of selecting Blockchain for these e-voting Systems is its collective trust. Using peer to peer networks with decentralized timestamping servers made these Systems are hard to hack or change information. These Systems create an improved secure digital voting method and cost-effective manner to conduct it. This paper presents a review study on cost-effective corruption-free secured voting Systems that have been developed through blockchain technology and agent technologies. Mainly highlighting the social status on how well the awareness of technology and the level of trust among society, how blockchain researchers have been inventing new paths coming out from crypto, Rise and Fall of world 1st e-voting system, limitations and incorporation of agent technology with blockchain for an e-voting platform and security at the endpoints of the blockchain. This review will support the development of a Blockchain-based e-voting system depending on the requirement and behavior of the election process and more favoring to Srilankan constitution. Finally, an e-voting system for the Srilankan election process is proposed by reviewing all the aspects in a technological and sociological manner.

Keywords: Blockchain, E-voting, Distributed Systems, Blockchain Voting, Secure Voting

Software Engineering

Software Engineering

Technical Session Chairs

Technical Session I   *Dr (Mrs) W Gunathilake*

Technical Session II   *Mrs SCM De Silva Sirisuriya*

Android Based Indoor Navigation Solution for Shopping Malls

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Abstract. Nowadays, shopping malls and shopping areas are bigger than traditional markets. When clients are unfamiliar with the area, it can sometimes be difficult to determine where the store is located. This study mainly focused on getting a clear idea about existing Systems and their drawbacks and getting user feedback. This study investigates how identifying difficulties happen in shopping malls and problems in existing Systems related to this research area. This research aims to give the best solution for the indoor navigation system developed for the shopping mall through the mobile application with attractive features. After reviewing related existing papers and conducting a survey using a questionnaire, these were the methods used to gather data for this research work. After using suitable data analysis techniques, provide a clear idea about what will do for future work as a result of this review. This study proved that there is no proper mobile application for customer satisfaction. Finally, conclude that the best solution for this problem is an indoor navigation mobile application based on AR technology. Therefore, using this mobile app, users can quickly and easily find the shops they want in the shopping mall and provide an optimal path using Augmented Reality technology.

Keywords: Indoor Navigation, Augmented Reality (AR), Shopping Mall, Mobile Application

The Use of Blockchain and Biometric Authentication in Smart Voting Systems

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Abstract. Building a more efficient and smart voting system, over the conventional voting Systems has always been a big challenge in recent years. Because it must ensure a lot of qualities like security, authenticity, privacy, integrity, and transparency of the system. Blockchain is a decentralized network that provides integrity, immutability, security to the database. It is a recorded linked-list that is cryptographically connected. There is no central authority to govern the data or control the data. It is governed by the whole network. If anyone wants to change any single data item, he would have to change the data of millions of other blocks in the network, which is technically not feasible. And biometric authentication is a security mechanism, that authenticates people by using their biological factors. Common types of biometric authentication are fingerprint scanners, facial recognition, voice identification, iris scanner, etc. A questionnaire-based survey was conducted to identify and analyze the current problems in traditional voting systems. A literature review has been conducted to identify, analyze how these technologies have been applied in existing Systems. The results indicate that blockchain has established a solid foundation for the security and integrity of the Systems, and has made the databases tamper-free and immutable. Apart from that, Biometric authentication has helped the developers to solve the issues regarding voter's verification procedure, and it has prevented the risks like misusing and duplicating votes. In future works, these technologies will be used to develop and implement a smart voting system as an alternative solution for the conventional paper ballot voting system in Sri Lanka.

Keywords: *Blockchain, Biometric Authentication, Voters, Voting system.*

An Android Application for Smartphone Addiction Monitoring and Preventing

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Abstract. The world is changing with the advancement of science and technology, there is such advancement in the field of smartphones. There is no apprehension that the mobile phone is a very applicable and beneficial tool. It makes it easy to communicate with colleagues, friends, and relatives. Smartphone addiction is sometimes verbally referred to as "nomophobia". A mobile phone or a computer can be a great productive device, but compulsory use of these devices can disrupt day to day work and relationships. This study aims to examine the extent of smartphone addiction and evaluate the impact of smartphone addiction and provide a better solution to address this problem. This article explores the existing methods and ways to investigate the magnitude of smartphone addiction and how they come up with a final solution to reach their objectives. Additionally, this paper presents the drawbacks of existing studies and presents a software solution to overcome smartphone overusing.

Keywords: *Android, Nomophobia, Smart Phones*

A System to Detect Fraudulent Websites by Using Data Mining and Blockchain Techniques

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Abstract. Nowadays the Internet saturates our day by day lives. With the expanding and rapidly developing information technology, the digital world has changed itself into a dominant platform, where individuals can exchange information, lead the business, and connect with others from everywhere in the world. The detection of fraudulent raters isn't simple since they can carry on deliberately to disguise themselves. Phishing sites are commonplace beginning stages of online social engineering assaults, including numerous ongoing online scams. The attackers develop pages impersonating genuine sites and send the noxious URLs to victims to tempt them to include their confidential and sensitive data. In this paper, the aim is to identify the problem domain, Reviewing the related literature work in-depth, and identifying the methodologies, technologies, and evaluating techniques related to each review. Finally, the achievements and the limitations of each related System are discussed to obtain a better understanding of the future directions of fraudulent website detection.

Keywords: *Phishing, Fraudulent Web Sites, Scams.*

A Review on Technologies Used by the Beauty Industry to Market Beauty Products

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Abstract. The beauty industry can be considered as one of the sectors that contribute to the global economy. The reason for this is because achieving one's "perfection" and "self-care" with the usage of beauty products became a trend. Keeping on par with this trend and implementing new methodologies to increase sales in the industry, the beauty industry moves forward with the utilization of technology. One aspect that utilizes the technology can be considered as the marketing aspect of the beauty industry. It was discovered, for successful marketing of beauty products to remote users who pick products according to how products "look" and "feel" require interactive technical methodologies. This paper investigates the technologies adapted by the beauty industry that provides an in-store experience at the tip of their fingers to customers around the world. Also, through this investigation, the necessity of such applications in Sri Lanka will be further elaborated.

Seeking an Optimum Route Based on Machine Learning and GIS During Hazard

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Abstract. Natural disasters can be characterized as a combination of natural hazards and vulnerabilities that threaten vulnerable communities that are unable to cope with their adversity. Flooding is the most prevalent and destructive natural disaster that have detrimental effects on human life (loss of life, injury), properties (agricultural property, development of yields, homes, and buildings), communications networks (urban infrastructure, bridges, roads, and railways), cultural heritage, and ecosystems. Moreover, according to estimates, almost 600,000 people in Sri Lanka are displaced by floods every year. Therefore, many people stay in refugee camps because lost their residence. The National Relief Service Centre (NRSC) plays a major role in the distribution of subsidies, and private sector agencies, media organizations, and citizens contribute to this. One of their primary goals is to reach the refugee camps carry subsidies expeditiously. But one of the biggest issues being that they were unable to supply them with subsidies quickly and unable to reach the camps that locate in highly affected and vulnerable areas as well. In this paper, the literature was focused on addressing the single effect of transportation caused by floods that faced Relief Services distribution. A combination of Machine Learning and the Geographical Information System (GIS) is the ideal area for achieving this challenge. Machine learning (ML) approaches have contributed significantly to the development of prediction Systems offering improved performance and cost-effective solutions over the past two decades to replicate the complex mathematical expressions of physical flood processes. Furthermore, the Geographic Information System (GIS) is one more gigantic area that uses in route optimization. GIS is used in that case is used to display information over the Earth's surface. The information could apply to a specific area, demographic, or geographical area. Machine Learning needs information and data from observation and real-world interactions. GIS is an authoritative system of record for such data. So, those algorithms used in machine learning finds the best possible route from a set of routes calculated using different GIS data sources (route analysis). The primary purpose of this literature is to propose an effective and efficient solution to a problem faced by distributors of relief services.

Keywords: Route Optimization, Machine Learning (ML), Geographical Information System (GIS), Flood, Relief Services, Resettlement Camps

GPS and GSM Based Driver Safety using Microcontrollers for Minimize Road Accidents

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Abstract. The unavoidable threat of road traffic affects the general public now more than ever. Population increasing and the manufacturing of vehicles growing exponentially, road accidents are all but avoidable. As a service to the community, we can help in a way that increases the response time towards accidents and helps contain this catastrophe. In recent years, road crashes have produced a large number of deaths and injuries the world over. It has been calculated that 1 million deaths and 20 to 50 million injuries are occurred due to driver inattention. Driver drowsiness and driver distraction are two leading causes of this driver's inattention to help in minimizing these fatalities, this paper introduces a new Driver Care Automated System. The proposed system using Arduino, Sim 808 GPS/GSM module, and other modules such as gas module, vibration module, and speed detection module to detect driver drowsiness and distraction and sends an alert of the accident to pre-assigned parties with information such as Geolocation. Global Positioning System (GPS) device finds the exact location of the vehicle. Global System for Mobile (GSM) module sends a notification message including the link of location in the google map to the pre-assigned parties. This system has been tested on prototypes and has a very high success rate. This review paper aims. to make drivers more cautious about their speed and intoxication, develop a new Driver Care Automated System, and minimize road accidents.

Keywords: *Driver Care Automated System (DCAS), Global Positioning System (GPS), Global System for Mobile (GSM), Geolocation, Speed Limit*

A Domain Related to Semantic Web Technologies: A Review on Semantic Sensor Networks

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Abstract. The Semantic Web is a complex extension of the internet, a framework that allows data to be shared reused across application, enterprise, and community boundaries. Since sensor data is a vital stream of data that is needed in many applications, we must have a way to extract, collect and structure this data. Imagine a criminal is on the loose, to identify him in plain sight a satellite could be used to find him, but to further describe him rather than just having a picture of him from a geographical view we could obtain metadata from various sensors in the environment. Semantic web technologies and the relation to a domain of how this framework is integrated onto sensor network platforms and sensor webs is discussed in this paper. Technological use of multiple layers of knowledge models and methods of analysis of sensor networks and various ontologies used in application domains are also discussed. A familiar method of tracking down entities using multiple sensors and their autonomous interoperability with a usable ontology for all sensors is discussed in the literature survey as well. Another category where sensors would be used would be the home environment for the safety as well as detection of anomalies is categorized. Home sensor ontologies consisting of sensors in a home such as lighting and home appliances and security devices interoperating and communicating with each other, smart methods of sensor networks applied in mobile phones, machine to machine semantic sensor network architectures are described in this paper. Further on reviews of ontologies, their extensions to adapt to specific applications in our day to day lives are also discussed to exhibit the interest in our approach. Out of all these research articles and information, we can learn that a feasible method for sensors to communicate efficiently and increase their interoperability is the target in semantic sensor networks. Knowledge bases, models, and layers of architecture in which sensor nodes may use to acquire knowledge to act methodically is also very important for the function of sensors in this semantic sensor web domain. The application domain of semantic sensor networks is a vast and diverse region in which man has just got familiarized with but has not acquire enough knowledge to manage efficiently. With this research, we aim to show the branches of semantic sensor networks their ontologies, and the way they originated from the semantic web application domain.

Keywords: *Semantic Web Technologies, Semantic Sensor Networks*

Analyzing the Effectiveness of Distance Education During Crisis Situations

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Abstract. With the development of the world, people have realized the significance of learning. Education is recognized as a prominent fundamental right of all human beings and it should be free and fair. People who belong to rural communities have also started using modern technologies for education. Distance education also known as distance learning is a method of disseminating knowledge when students and teachers are separated. Although the concept of distance education gives a full idea of the opportunities it can offer, it has some shortcomings that need to be considered. Despite the drawbacks, distance learning has become the best solution for the younger generation in education even in times of crisis. A crisis such as public health crisis and environmental crisis will always negatively affect the ongoing procedure of a country including the education sector. Education can be a linked-to crisis in three main stages such as in crisis prevention, a crisis as well as in the post-crisis. The most recent crisis that affected the education system is the pandemic caused by COVID-19. As a result, education is conducted online instead of traditional education. The impact of such crises can be interpreted as barriers to education. Hence, the younger generation has started relying on technology as a solution for these kinds of barriers. This study provides the effectiveness of distance learning during the above mentioned three stages of crises. Furthermore, the advantages, as well as the disadvantages, will be critically analyzed in this study.

Keywords: Distance Education, Distance Learning, Crisis Situation, Traditional Education

Analyzing the Effectiveness of an Automated System for Bariatric Surgery Patients and Medical Officers

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Abstract. Obesity has become an epidemic condition in Sri Lanka as well as around the world. It is proven beyond doubt that Bariatric Surgery (BS) is the most effective option in treating morbid obesity patients whose Body Mass Index (BMI) is greater than 40.0. After undergoing the surgery, it is required to monitor patients' weight for eighteen months until they reach a healthy weight that falls within the normal BMI range (18.5—24.9). In this study, we have analyzed records of 241 bariatric patients registered at Colombo South Teaching Hospital, Kalubowila. Records show, due to a lack of continuous assessment after Bariatric Surgery, some patients have to go through the same operation more than once which will lead to an increased risk of complications that may result in high life risk. Since this process is done manually, the majority of patients have lost track of weight before reaching the eighteenth month. To fulfil this gap this study aims. to analyze the effectiveness of an automated system for Bariatric Surgery Patients and Medical Officers by using a mobile application. By developing a mobile application, it will fulfil the gap of follow up of eighteen months after the surgery until they achieve the ultimate goal of a healthy weight and avoid getting the Bariatric Surgery more than once. Further, in this review, several physical and mental factors have been identified which can affect the patient weight loss journey and introduces some proven technological solutions for them. Another important feature of adding telemedicine in a pandemic situation to the introduced system is presented in the study. Also, predicting, the score for each patient after the surgery every month will help them to track their weight loss journey and at the same time by providing alternatives if a change occurs. The features, which we are concerned with within this study for developing the application, are used in separate applications in the current world, but this research is attempting to add those features into one single application.

Keywords: *Bariatric Surgery (BS), Body Mass Index (BMI), Obesity, Morbid Obesity, Telemedicine, Automated System*

Electrical Bill Predicting & Managing Application

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Abstract. In a globalized world, the electricity demand grows at a high rate, and electricity consumption is something people do not pay much attention mostly because of ignorance about electricity generation using different energy sources and how it affects the environment. The problem with electricity generates is most of the time the initial cost of making is high and so electricity bill can be costly due to rate consuming energy sources. The heavy usage of electricity shows that reduce electricity consumption is important. The importance of managing these costs not only helps a home but also help to whole energy-saving process. This article is about design applications for predicting electricity bills and help to manage according to own user preferences. The prediction algorithms can be used to make predictions about electricity bills and give users a chance of managing costs. The algorithm can be a simple statistical calculation or machine learning-based algorithm and the choice is made of how much percentage of accuracy the algorithm provides. The literature review has been conducted to find the most suitable algorithms for the system. The system should be able to provide reporting and viewing usage of electricity. It would provide the user a chance to manage electricity bills through their mobile phone. The goal here is to integrate exiting prediction algorithms to make a mobile application to manage electricity bills and ultimately reduce electricity consumption.

Keywords: *Electricity Bill Management, Monitoring, Prediction Algorithms, Electricity Usage Reduction*

Computer Engineering

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Technical Session II   *Dr B Hettige*

Plant Disease Detection Device through Machine Vision

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Abstract. Floriculture has become one of Sri Lanka's leading foreign exchange business in recent years. Among many other floriculture ventures, Orchid cultivation is more pleasurable and profitable. Orchids are a more economically important flowering plant in the world. Failure to cultivate properly orchids can have a variety of diseases. Beginners who like to grow orchids but do not have a good knowledge of orchid cultivation cannot easily identify orchid diseases. Therefore, it needs automatic monitoring of diseases of plants instead of manual. This paper presents an orchid leaf disease detection system at the early stage by using image processing techniques and machine learning. This system has been developed to determine whether the plant is infected or not. It attempts to develop an automated system that detects the presence of disease in the plants. The only input to this system is an image of an orchid leaf that is captured by using a raspberry pi camera and the system will provide the Perimeter of the leaf, total area, infected area, and the percentage of infection region of the leaf as the output. Use Raspberry Pi and Raspberry pi camera module to capturing the image of leaves to identify the disease through the implementation in Raspberry pi and it is used to interface the camera & the data is streamed lively. This allows the grower to decide as to whether to remove the virus-infected plant from cultivation or to cut only the infected part. This system will be a great help for beginners who love to grow orchids but don't have knowledge about the orchid diseases of their plants. The accuracy was calculated through the evaluation results. The experimental result shows that the system can identify the total area, Infected area of the leaf, and percentage of infection region of the leaf with more than 90% accuracy.

Keywords: Image Processing, Machine Learning, Raspberry pi, Camera

Develop a Smart White-Cane for Visually-Impaired People

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Abstract. We present sensor-based mobility assistive device for visually impaired people. 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 Their quality of life. Unfortunately, many of these systems are limited in their capacity. 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 people. We had 25 participants on the survey to understand their day-to-day life difficulties and how many existing devices are effective in their lives. Thus, the contribution of this literature survey is to discuss the most important aspects in detail the tools presented in the literature to support and highlight this population are: Advantages, disadvantages, and accuracy. We aim to design a device that ensures the safety and independent mobility to visually-impaired people.

Keywords: *Assistive Devices, Visually-Impaired People Obstacle Detection*

First Attempt to Automate Sri Lankan Traditional Puppetry: Rookada

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Abstract. Traditional puppetry is a popular source of entertainment around the world and, it is popular among Sri Lankans. With the digitalization of the world traditional puppetry fade away from the culture. Not only that not enough puppeteers are also caused by the disappearance of this valuable art in Sri Lanka. There are only a few families able to carry the traditional puppetry from generation to generation. But with an insufficient income, they will also give up on their job. And the huge cost of a puppet play makes people not interested in puppet shows. But we can use the technology for our benefit. To uplift the Sri Lankan traditional puppetry, we can suggest an automated approach for prevailing manual Systems. Without affecting the cultural values, we can automate puppetry using an automated marionette by replacing the puppeteer. The only change that happens is to replace the puppeteer. Throughout the project, we will be discussing how the manual traditional puppetry goes and their traditional way of doing this. And where can we apply our technological part for the project without harming or changing the prevailing tradition? Through the project, we expect to give a solution cost-effectively and accurately.

Keywords: Marionette, Puppetry, Puppeteer, Automation, Choreography

A Review on Efficiency, Environment Friendly, and Mosquito Friendly Trap to Rid of Mosquitoes

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Abstract. World Health Organization is reporting that the mosquito is the greatest menace, spreading malaria, dengue, and yellow fever, which together are responsible for several million deaths and hundreds of millions of cases every year. World Mosquito Program in Sri Lanka also reporting that in Sri Lanka, dengue is an increasing health concern with other mosquito-borne diseases such as Zika and chikungunya. 34,274 dengue cases in Colombo and 186,101 across Sri Lanka reported between 2010 and 2016. The above-confirmed information is a strong fact to prove that mosquito was the main and worst problem in the world. There are so many ways to prevent mosquitoes but many of them are not useful. Mosquito traps get more attention nowadays. So now scientists and biologists are more focusing to research mosquito traps. In this paper, we will review what are efficient traps and how we evaluate more effective and efficient mosquito traps. and review what are the biological factors and other techniques to trap mosquitoes.

Keywords: *Mosquito Trap, Biological Factors*

Image Processing Approach to Detect Tokens on a Nerenchi Board

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Abstract. Nerenchi is one of the oldest board games which has been discovered in Sri Lanka (c. AD 10), in which the board has diagonal lines joining the corners and horizontal and vertical lines joining the midst of three concentric squares. Nerenchi has mainly two phases. In the first phase, pieces have to be laid on the board. In this phase, 22 pieces must be placed from the 11 pieces each player has. When three pieces are placed in a straight line horizontally, vertically, or diagonally, the player is rewarded with a bonus chance called 'Nerenchi'. When either the number of pieces on the board reaches 22 or one player placed all his/her 11 pieces on the board, the second phase of the game begins where the players can move and capture each other's pieces when the player is rewarded with a Nerenchi. The behavior of each of these phases is governed by a set of simple rules. There is another board game that has very similar features and qualities which is the ancient Greek board game "Nine men's Morris". The issue at hand is that the art of the game and its skill and craft have almost come to extinction, and as Sri Lankans, we have to try and conserve our culture. Hence, in this research, I have implemented the first step of automating the game, by designing an Image processing system to identify the current positions of tokens of both parties on the board and to produce the current positions of tokens as an array.

Keywords: Nerenchi, Image Processing, Automation

Review on Smart Fencing for Crop Field Protection

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Abstract. People living in countryside areas of Sri Lanka are facing difficulties as wild elephants who live in forest areas entering into villages. These wild elephants strike people and smash the properties of villagers. The dump yards, garbage management areas and, lands that have been cultivated are tempting elephants for food. Elephants enter the villages from the nearby forest in search of food. To stop elephants from coming into the village the government has made the electric fence. Elephants smash the electric fence and coming into the village putting these efforts in vain. Elephant attacks have increased over the years killing humans as well as elephants. These existing systems can take some action to minimize elephant attacks, but these systems have many failures. The methods like shouting, firing shots, setting up fires in farming grounds are some primary methods that can be used. Electric fencing is the present common solution to this problem, but this has not given expected protection due to several reasons. In this review, we are discussing some computing solutions to this problem. Raspberry Pi, Arduino, NodeMCU platforms and other technologies such as GSM, RFID, ZigBee based Smart fencing system is a good system that we can use to solve this human-elephant problem and also other animal issues that affect the cultivation. Artificial Intelligence, Machine learning, Deep Learning, Computer Vision can be used to further develop these kinds of Systems by analyzing complex behavior patterns, sounds, and images of wild animals.

Keywords: *Elephant Fence, Agricultural Lands, Wild Elephant, Human-Elephant Conflict, Crop Damages, Automated Electric Fence*

Review on IoT Based Systems for Remote Patient Monitoring

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Abstract. The Internet of Things (IoT) is an important part of the health sector in the modern world. A lot of the patients are dying for no proper help and no time. For this IoT base health, monitoring Systems are very useful for the disease patients who are not in the hospitals because in this covid-19 situation this is a very important factor. For this IoT, based Systems are enabled to all the patient data to doctors to see online. The IoT component such as sensors, hardware components, medical equipment are used to develop these Systems and termed the Internet of Medical Things (IoMT). This paper reviews that the existing overview of the IoT based on remote monitoring healthcare, mobile monitoring health applications and web applications, smart hospitals, and IoT related modern medical devices.

Keywords: *Internet of things (IoT), Internet of Medical Things (IoMT), Smart Hospitals, Mobile Health*

Measuring Muscle Tone in Infants: Current Concepts and Challenges

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Abstract. Muscle tone is affected by a constellation of diseases affecting nervous and muscular Systems. Congenital Muscular Dystrophies (CMDs) are the second most common myopathic cause of floppy infant syndrome that may lead infants from troubles in feeding to exhibit shallow breathing. Despite recent advancements, there are currently no objective criteria to evaluate muscle tone in infants. This paper summarizes the existing tools and novel instruments for measuring muscle tone in infants and children while critically evaluating their advantages and disadvantages.

Keywords: Congenital Muscular Dystrophy, Floppy Infants, Muscle Tone.

Review on Communication Technologies for Home Automation

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Abstract. Automation has been a critical element of the modern era. The concept of home automation or smart home is considered as a significant subset of this domain. The primary idea of this concept is to enable people to monitor and control home appliances from remote geographical locations. The home automation concept gives out positive consequences such as energy conservation and enhancing human living standards. Communication technology is the platform or medium which is used to transfer data between home appliances and the user. Design and development of home automation Systems are done incorporating various communication technologies. Many researchers in this domain applied different communication technologies to develop a smoothly running home automation system. This paper elaborates and differentiates those communication technologies based on different parameters (data rate, coverage, power consumption, etc.). The advantages and drawbacks of each approach are emphasized through this paper while pointing out the applicability of each communication technology. Classification of communication technologies in the context of home automation falls into two main categories wired and wireless communication technologies. All those technologies exhibit a unique set of specifications. This paper focuses on certain situations and locations where each of those technologies can be used to optimize the available resources and assets to achieve the primary goal of the smart home concept.

Keywords: Home Automation, PLC, ZigBee, Wi-Fi, Li-Fi

Existing Systems and Approaches for Smartwatch based Ambient Assisted Living: A Review

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Abstract. This review paper, mainly considering Ambient Assisted Living for elderly care, people who live and work alone. With the development of the fields like Wireless Sensor Network (WSN), Internet of Things (IoT), Machine Learning, Image Processing, Cloud-based network, etc. in near future all of us be able to experience Ambient Assisted Living. Wearable Sensors are the new trend of the modern days, developers and scientists are thinking in the future lots of technology come with more portability features. Therefore, they are more considering developing new devices with the use of wearable sensor technology. There are many problems. that occur when developers try to implement these Ambient Assisted Living solutions because many of these solutions are targeting the elder generation of the society and most of the people from the elder generation are not familiar with these modern technologies. That kind of situation we can easily observe in mainly Asian and African regions. In the African region, many people from the younger generation also not very familiar with these modern technologies. Therefore, awareness about Ambient Assisted Living is more helpful for the people and as well as developers. Developers found a new solution, based on wearable sensors and other above-mentioned technologies. Here it is mainly considering the smartwatch-based solution. Nowadays people tend to wear smartwatches and it was the main reason to take this smartwatch-based solution for ambient assisted living as a topic. Also, other methods used in ambient assisted living cover in this review paper. After reading this paper we able to understand what the pros and cons are also in the other methods.

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

Review on Wireless Technologies for Long Distance IoT Applications

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Abstract. Global Market for the Internet of Things – IoT is expected to grow to 212 Billion U.S Dollars at the end of 2019(IoT market size worldwide 2017-2025, no date). Connectivity is presumably the most fundamental structure of the IoT paradigm. This paves the way to numerous business opportunities in various fields like telehealth, smart-cities, smart-homes, smart-transportation grids, and much more since these devices are powered with the world's largest meshed heterogeneous network and infrastructure; internet, to corporate and build up the network among devices applications are unlimited. IoT also supports the fact of achieving ubiquitous computing all around the globe. Due to the increasing demand for IoT devices new wireless Technologies have been evolved way over passing our daily life term, WIFI (Wireless Fidelity). They are usually in either unlicensed spectrum or licensed spectrum with legacy technology like GSM/GPRS. Using a licensed spectrum has advantages way over than using an unlicensed spectrum. Mainly they are differentiated over better performance, great reliability, and less noise in the Licensed spectrum. This review analyses industry-leading technologies such as Sigfox, LoRa, NB-IoT, and the different versions of LTE. This paper reviews these emerging and available wireless technologies in the market for long-distance IoT applications and evaluates their behaviors and capabilities concerning their matrices like data range, Radio Frequency Channels, Power consumption, and bandwidth. This paper has highlighted the key technical challenges of the current IoT connectivity technologies for enabling massive industry-grade connectivity. This review will help in choosing a long-distance wireless technology for the development of an IoT application of choice depending on all the aspects of the need and facts to be taken care of. Finally, a classification of IoT applications is considered in terms. of various service requirements. For each group of classified applications, we outline its suitable IoT connectivity options.

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