International Women in Engineering Symposium 2021

PROCEEDINGS BOOK
21ST OF NOVEMBER 2021

Recognized By

IEEE Sri Lanka Section

Organized By

IEEE Women in Engineering WIE Sri Lanka

2021 WIESymp

ISSN : 2756-908X

International Women in Engineering Symposium 2021

Reinventing for a Resilient Future

Proceedings Book

21st November 2021

Contents

Organizing Committee

Conference Chair

Dr. Rasara Samarasinghe

Conference Secretary

Ms. Heshani Mahalaksha

Assistant Secretary

Dr. Akila Wijethunga

Technical Program Committee Chairs

Dr. Windya Rankothge

Technical Program Committee Chairs

Prof. Jeevani Jayasinghe

Finance Chair

Dr.Saranga Abeygunawardane

Finance Co-Chair

Dr. Maheshi Dissanayeke

Design Publicity Committee Chair

Ms. Gresha Samarakkody

PR Registration Chair

Ms. Abarnah Kiruppananda

Web Committee

Dr. Hiruni Rupasingha

Web Committee

Ms. Shashika Lokuliyana

Program Publication Chair

Dr. Pubudu Jayasena

Program Publication Co- Chair

Dr. Damayanthi Herath

Logistic Committee Chair

Ms. Warunika Hippola

Advisory Committee

Prof Dileeka Dias – Department of Electronic and Telecommunication Engineering, University of Moratuwa

Prof Kumudu Perera – Department of Electronics, Faculty of Applied Sciences, Wayamba University of Sri Lanka

Dr Malka Halgamuge – Department of Electrical and Electronic Engineering, Faculty of Engineering and Information Technology, The University of Melbourne

Prof Saman Halgamuge – Department of Mechanical Engineering, School of Electrical, Mechanical and Infrastructure Engineering, The University of Melbourne

Prof. Bozenna Pasik-Duncan – Department of Mathematics University of Kansas

Deepak Mathur – Director of IEEE Region 10 (Asia-Pacific Region)

Emi Yano – Chair, IEEE Region 10 Women in Engineering (WIE)

Prof. Udaya Madawala – Department of Electrical, Computer Software Engineering, The University of Auckland

Prof. Iain Murray – Distinguished Professor, School of Electrical Engineering, Computing and Mathematical Sciences, Curtin University

.

Technical Program Committee

Honorary TPC Chair

Prof. Janaka Ekanayake

Technical Program Committee Chairs

Prof. Jeevani Jayasinghe
Dr. Windya Rankothge

Electronic and Telecommunication
Dr. Himal Suraweera
Prof. Jaume Anguera
Intelligent Systems and Robotics
Dr. Sanath Jayawardane
Dr. Achala Pallegedara
Information and Communication Technology
Dr. Sulochana Sooriyaarachchi
Dr. Thilina Halloluwa
Power and Energy
Prof. Udayanga Hemapala
Dr. Lidula Widanagama Arachchige

Message from Chair – IEEE Sri Lanka

It is my privilege and pleasure to convey the felicitation for the IEEE Women in Engineering (WIE) of the IEEE Sri Lanka for organizing the second International Women in Engineering Symposium, WIESymp 2021, despite the pandemic and its consequences. The symposium theme "Reinventing for a Resilient Future" is highly appropriate in the current complex milieu the world is facing. The symposium has created opportunities for researchers both local and international to publish their multi disciplinary research under the IEEE banner. Knowing the capabilities and the capacity of IEEE WIE Sri Lanka as well as the quality of the events they have delivered in the past, IEEE Sri Lank section has awarded its recognition to WIESymp 2021. I take this opportunity to congratulate the Chair WIESymp 2021, Dr.(Ms) Rasara Samarasinghe and the Organizing Committee for the efforts taken to organize the symposium. Your contribution and commitment have helped IEEE to uphold research and development in Sri Lanka. Last not least, I also congratulate all the paper presenters and thank all the participants for your share of contribution towards the success of the event. I wish WIESymp 2021 and everyone involved all the very best.

Dr. Maheshi Buddhinee Dissanayake,
Chair IEEE Sri Lanka

Message from Conference Chair

Welcome to the Second International Women in Engineering Symposium (WIESymp) 2021 organized by IEEE Women in Engineering (WIE) Sri Lanka Section, being held fully virtually on 21st of November 2021. The organizing committee is pleased to have your participation and contribution to the event. Despite the Covid-19 world pandemic, this event brings us to meet together online for the research presentation tracks, allowing virtual interaction, knowledge and innovative sharing, with regard to the potential and future developments in every disciplines of Electrical, Electronic and Computer Engineering. The event was organized under the guidance of a reputed international advisory board and I take this opportunity to thank all our advisors. We have called for extended under four tracks: Electronics and Telecommunication Information and Communication Technology, Intelligent Systems and Robotics, and Power and Energy from both local and foreign researchers. All the papers were peer reviewed by reputed international and local experts in the relevant fields. After a thorough review process of two rounds, only 65I would like to thank our sponsor Learn Network for sponsoring for the virtual platform. Further, I wish to express my gratitude to IEEE Sri Lanka section for collaborating with us and recognizing our work. I congratulate the authors of the accepted papers and express my sincere gratitude to our organizing committee members, technical program committee members and paper reviewers, as well as all the volunteers and the members of WIESymp 2021. Their contributions have helped me in many ways to successfully deliver this event. I hope you will enjoy the conference and have a pleasant experience with us.

Dr. Rasara Samarasinghe
Chair, 2nd Women in Engineering Symposium 2021

Message from the Technical Program Committee Chairs

The International Women in Engineering Symposium (WIESymp) 2021 is a flagship event of the Women in Engineering (WIE) affinity group of the IEEE Sri Lanka Section. WIESymp 2021 would serve as an open forum for academics along with industry professionals to present the research outputs and practical deployments in four main fields: Information and Communication Technology, Electronics and Communication, Power and Energy, and Robotics Automation. During the period from 1st of July to 15th of September 2021, 33 extended abstracts were received from Australia, Taiwan, UK, Spain, New Zealand, India and Sri Lanka and they were submitted to a single-blind review process. About 50 researchers volunteered as reviewers representing several local universities as well as foreign institutions in USA, Japan, India, Australia, New Zealand and Spain, and each submission was peer reviewed by at least two reviewers. The commendable service rendered by the panel of reviewers laid the foundation for this successful chapter of the IEEE WIE Sri Lanka Section. The Technical Program Committee (TPC) comprises of eminent researchers who made a timely contribution throughout the review process in identifying relevant reviewers, coordinating with them and using their expertise to finalize acceptance. Out of the 33 submissions, only 4 submissions were accepted, 6 were rejected, and 23 were referred back for resubmission with revisions. The revised papers were assessed again by the TPC and a total of 24 papers were accepted to be presented and published. The guidance given by Prof. Janaka Ekanayake (Fellow of IEEE), the Honorary TPC chair is invaluable. The visionary leadership of Dr. Dr. Rasara Samarasinghe, The General Chair of WIESymp 2021 confidently built the pillars of this success story with the support of the dedicated Organizing Committee. The recognition awarded by the IEEE Sri Lanka Section for the symposium is appreciated, as it provided us with the encouragement for this achievement during these difficult times.!

Dr. Windhya Rankothge and Prof. Jeevani Jayasinghe
TPC Chairs / WIESymp 2021

Keynote Address by Professor Celia Shahnaz

Title: Research and innovation in Signal processing , Power and energy

Celia Shahnaz, SMIEEE, Fellow IEB, received her Ph.D. degree from Concordia University, Canada and is currently a Professor at the Department of Electrical Electronic Engineering, Bangladesh University of Engineering and Technology. She has published more than 150 international journal/conference papers. She is a recipient of the Canadian Commonwealth Scholarship/Fellowship and Bangladesh Academy of Science Gold Medal for her contribution in Science and Technology. Her research interests include the areas of signal processing for speech analysis and speech enhancement, audio-visual recognition for biometric security, control system, robotics, pattern recognition, machine learning and deep learning for audio, video, biomedical, power signals, multimodal emotion recognition, and humanitarian technology. Recently, her papers have received best paper awards in IEEE BECITHCON 2019, biomedical Engineering tracks at TENCON 2017 and at IEEE WIECON-ECE 2016, in Humanitarian Challenge track at R10 HTC 2017, and the best interactive poster award at ICIVPR 2017. Her paper has been selected for the top ten best paper awards in the Student Paper Contest of the 2018 and 2014 IEEE International Midwest Symposium on Circuits and Systems (MWSCAS), College Station, Texas, USA and Knoxville, TN, USA, respectively. She was the winner, of the Best Student Paper Award, 2008 IEEE International Conference on Neural Networks and Signal Processing (ICNNSP), Zhenjiang, China. She was selected as one of the finalists of the Student Research Presentation Competition in the 2009 SYTACOM Workshop, Montreal, QC, Canada.

She has served as an Editorial board member, IET Signal Processing From 2018 to date and 2018-20 Member, Technical Committee, Image, Video, and Multimedia (IVM), Asia Pacific Signal and Information Processing Association (APSIPA). She has more than 20 years of experience (20 years as an IEEE volunteer) in leading impactful Technical, Professional, Educational, Industrial, Women Empowerment and Humanitarian Technology, Power and Energy-related Projects at national/international levels.

Keynote Address by Pasik-Duncan, Bozenna

Title: Passion and skills within and across STEM fields

Abstract: Best practices for a success and happiness in education are based on passion and skills found and developed through collaborative efforts in integrating, research, teaching, and learning. Stochastic adaptive control, a field that spans science, technology, engineering and mathematics (STEM) demonstrates Interdisciplinary research. The human Brain is a platform for integrating STEM disciplines. Challenges and fascinating opportunities in developing innovative skills by using novel tools to work on tough global public health topics including COVID-19 and real data are discussed.

Bozenna Pasik-Duncan received her Master's degree in Mathematics from University of Warsaw in 1970, and her Ph.D. and D.Sc. (Habilitation) degrees in Mathematics from the Warsaw School of Economics in 1978 and 1986 respectively. She is a Professor of Mathematics, a Courtesy Professor of both EECS and AE, and an ITTC Investigator at the University of Kansas. Her research interests are primarily in stochastic systems and stochastic adaptive control, system identification and estimation, and control education as a field that spans science, technology, engineering and mathematics (STEM) education.

Session 1

Electronic and Telecommunication Oral Presentations

ConQr – A Safer and Modern Approach to Minimize the Spread of COVID-19

Teena S Fernando Palappa [1*], Gavin Fernando [1], Thiran Perera [1],Kavindya Sewmini [1]
[1]CINEC Campus
*teenafdop@gmail.com

With the COVID-19 pandemic, strict health guidelines were imposed on the public to prevent the spread of the virus. As of now, most of such guidelines are implemented through manual systems that utilize time and energy of human resources that could otherwise be used in other crucial tasks. The ConQr is a unique device that automates the processes of sanitizing hands and shoe soles with the use of ultrasonic sensors, temperature checking with TMP36 temperature sensor and obtaining details of consumers entering public spaces with the use of a mic module and a camera module. The device consists of Arduino Uno and Nano boards, a few screens, and buzzers to perform tasks autonomously without any direct interference of humans. The approach of ConQr was successful and a working model was created through which demonstrations were done. The project could be improved with the use of more precise methods for the shoe sanitizer unit, and more advanced features such as speech to text and real time displaying of results could be integrated to the unit obtaining consumer details. Although there are many systems designed to battle the spread of COVID-19, ConQr is currently the most advanced system available as it tackles all the processes of sanitization, temperature checking and obtaining details of consumers. The ConQr will have a great positive impact on the community by revolutionizing the way the public faces a global crisis and will create a useful product that can uplift the Sri-Lankan economy.

Keywords: *COVID-19, Automatic sanitizer, Thermometer, Consumer details, touchless*

Cleaning Bot – remote-controlled cleaning robot for the ease of cleaning

Kaveesha V Nanayakkara[1*], Thimira R Botheju [1],Anuka H Boyagoda [1], Roshan Akthar [1]and Gresha S Samarakkody
[1]CINEC Campus
[*]kaveesha.vn@gmail.com

In the present-day scenario as people are occupied with their daily work and as a result, the time utilized to clean the household or office space is very low. That's where this cleaning bot comes into the scene as it's controlled simply by using a mobile app and the need for human intervention is cut off making sure all the work is done just by using a few commands through the mobile app. This cleaning bot can manage not only one but also two of the main methods of cleaning the floor which is vacuum cleaning and mopping the floor which is consuming considerable energy from a human. This device consists of an Arduino Uno board and a Bluetooth module for the transmission of signals. As this robot is light in weight and small, this brings an added advantage to move it from the desired place to another for cleaning. The cleaning bot will help not just people at home but companies, outdoor areas that need to be cleaned with just a mobile app used through the phone making this bot a convenient device for the ease of people all over.

Keywords: *Mopping, Vacuuming, Bluetooth*

Design of a Modified Dipole Antenna for Passive UHF RFID Sensor Tag

Shyama M Wickramasinghe [1*], Jeevani Jayasinghe [1], Melaka Senadeera [1]
[1]Wayamba University of Sri Lanka
[*] shyama@wyb.ac.lk

A passive Radio Frequency Identification (RFID) sensor tag operates in Ultra High Frequency (UHF) band designed by modifying a dipole antenna printed on an FR4 substrate with a thickness of 1.6 mm is presented in this paper. A commercially available RFID IC of Rocky100 by Farsens was selected for the design, as it supports the integration of external sensors with the chip. A conventional dipole antenna, which operates at 868 MHz, was designed first, and its geometry was modified for impedance matching by adding a parallel bridge, as the antenna impedance has to be highly inductive to match with the conjugate of the chip impedance of 64-469j ■ at 868 MHz. Parametric optimisation was performed in ANSYS HFSS (High Frequency Structure Simulator) to find out the optimal geometrical parameters of the modified dipole antenna. Compared to the conventional dipole with the length of 15.2 cm, that of the optimized design could be reduced to 13cm. The inductance of the proposed antenna is 466.32 showing a high degree of impedance matching. Its power transmission coefficient is 0.998, which is very closer to the perfect matching condition. The antenna resonates at 868 MHz with S11 = -54.62 dB, while offering a fair and sufficient bandwidth in the frequency band of 692-978 MHz. The radiation pattern of the proposed antenna is omnidirectional while offering a theoretical read range of 2.35m

Keywords: *Impedance Matching, Modified Dipole, Passive UHF RFID, Parametric Optimisation, Sensor Tag.*

Gain Enhancement of a Printed Log Periodic Dipole Array Antenna

Sudeepa Herath [1*],Jeevani Jayasinghe [1],Disala Uduwawala [1]
[1]Wayamba University of Sri Lanka
[*]sudeepah@wyb.ac.lk

The design and simulation of a compact printed log periodic dipole array (PLPDA) antenna is presented in this paper. The designed antenna operates between 3.4 – 9.4 GHz with an initial gain of 7.7 dB at 6 GHz. A parasitic element in the form of a rectangular director cell is added to the designed PLPDA antenna and a novel optimization technique is used to maximize the gain of the antenna at 6 GHz. The optimization is performed on the length of the parasitic element. The single parameter optimization technique used in the research has resulted in an optimal gain of 9.3 dB at 6 GHz while preserving the bandwidth at 3.4 – 9.4 GHz. The statistically driven optimization technique is shown to converge to the optimum value within a few generations. With the demand of high performing, miniaturized antennas on the rise, the robust optimization technique used here shows great potential in antenna design.

Keywords: *log periodic dipole array (LPDA), parasitic elements, optimization. antenna gain*

Development of a low-cost auto guiding system for telescope mount

R. A. E. Manoj[1*] and H.E. Bandara[1]
[1]Department of Electrotechnology, Wayamba University
[*]erangaranasinghe125@gmail.com

Nowadays telescopes have successfully developed. At the same time, automated vision-based star tracking and motorized auto guiding systems have an increasing demand. But many people haven't gone for motorized and technologically advanced telescopes because of their high prices. As a result of this, most people own manual control telescopes, and they hope to combine advanced features into their telescope mounts. Some of the companies have been developed guiding software to overcome this, but those are limited to specific branded telescope mounts. In order to provide a solution, an auto-guiding system embedded with a vision-based star tracking mechanism has been proposed. It can be used for various telescopes available. The star tracking mechanism of the proposed system is based on the Lucas-Kanade optical flow analysis method which is implemented in the python-based platform. It works with a real-time video and tracks the coordinates (x,y) of the corresponding star which was specified by the user. The telescope mount is controlled by the microcontroller-based system, which works according to the control signal received from the vision-based star tracking mechanism, and the telescope mount is constructed with low-cost hardware. We obtained robust star detection and star tracking accuracy from the optical flow analysis by interpreting statistical tests.

Keywords: *Auto guiding, Image-processing, microcontroller-based systems, Star-tracking*

Aggregate Agro - Universal Safety System for Tractor & Rotary Slasher

K.D.N.G Karunarathna[1*],T.G Chandrasekara [1] , C.R Kannangara [1] , J.A.D.I.A.W Jayasundara [1] , W.M.Y.D Weerasinghe1 [1] , J.G.V. Priyanka[2]
[1]CINEC Campus
[2]University of Ruhuna
[*]naveenhp1100tu@gmail.com

In the present era, accidents caused by tractors have become a major issue in the agricultural industry. According to the statistical data from the INAIL_ASL Surveillance states that, from the 2002 to 2012 period, 817 victims have faced accidents within the agriculture industry and 357 were tractor-based disasters. Furthermore, 205 were tractor rollovers out of the statistics stated above. Currently, only a few implementations have taken place regarding the safety of the driver and bystanders in Sri Lanka since it is a developing country. To overcome these kinds of fatal accidents a universal safety system can be introduced. The following system uses an Arduino Mega microcontroller where it consists of 8 sub-systems. These 8 sub-systems consist of sensors such as a Hall effect sensor, an ultra-sonic sensor, an RFID module, and a GSM module. In this report, an in-depth review of the entire system will be thoroughly discussed, how it functions and the implementation of the system. Since various types of accidents occur during agricultural activities, our system provides a solution for such accidents. In addition to that, our system becomes an ideal alternative to the presently available systems involved in detecting accidents while operating a tractor.

Keywords: *Accident, Safety, Microcontroller, Arduino Mega, Hall Effect Sensor, Ultra-Sonic Sensor, RFID Module, GSM Module.*

Session 2

Intelligent Systems and Robotics / Power and Energy
Oral Presentations

Electronic Learning Platform Using Augmented Reality

Shalani A.K. Anudini.[1*] and Saliya HMSS Dissanayake.[1]
[1]General Sir John Kotelawala Defence University, Sri Lank
[*]shalaniavodya@ieee.org

Education is a key factor that is essential for people to enhance their knowledge, way of life, as well as their social and economic standing throughout their lives. Furthermore, education assists people to improve their self-confidence throughout their lives. It has a significant impact on both professional and personal development. Therefore, Electronic Learning is an essential requirement in the world due to the Covid 19 pandemic. Students from kindergarten to university level must continue their education through online platforms. Zoom, Microsoft Teams, Cisco Webex, BlueJeans Meetings, GoToMeeting, etc. are widely used as Electronic Learning (E-Learning) platforms. E-Learning has many drawbacks, including loss of social interaction, student engagement in classes becoming low, and motivation to learning decreasing over time. Another main issue faced by teachers is if they have more students in the classroom, they can't pay attention to each student through those E-Leaning platforms. It is very difficult to conduct classes like Music, Dancing, Drama, and other practical subjects through an online platform. If a teacher is conducting an online dancing class, it will be very difficult to see the dancing movement of all the students and their mistakes. This paper presents an Electronic-Learning platform using Augmented Reality to overcome the negative effect of distance learning during the Covid-19 pandemic. This proposed system helps to increase the interaction of students and teachers. Moreover, this system will help to increase the quality of examinations. This E-Learning platform provides a high level of efficiency, quality, and professionalism to the education systems.

Keywords: *Electronic Learning (E-Learning), Augmented Reality (AR), Artificial Intelligence (AI)*

Empty Parking Space Detection using Mask R-CNN and Computer Vision

Padala Mounika.[1*], Shashi Chandra Shirupa. [1] and Mallellu Sai Prashanth.[1]
[1]Dept. of Computer Science and Engineering, Vardhaman College of Engineering, Hyderabad, India
[*]mounika1999@gmail.com

In the current scenario, finding an empty parking space has become a tedious job due to continuous traffic flow in urban areas. This paper presents a highly efficient approach to detect empty car spaces in a parking lot in real-time. It uses Masked Regional Convolutional Neural Networks and Computer Vision based library OpenCV. Computer vision is used for processing video frames and detecting empty spaces in real-time, whereas Masked RCNN is used to detect cars in the video. As soon as a car leaves the parking space, the OpenCV library will detect it and indicate that the parking space is empty. Our method can work accurately irrespective of the presence of daylight. Drivers can use this method to locate an empty parking space beforehand instead of searching for one. We were able to get an accuracy of 73.8

Keywords: *Mask-RCNN, Deep Learning, Computer vision, Parking occupancy.*

DIABETES PREDICTION USING LOGISTIC REGRESSION

Jaya Teja G, Mounika P.[1],Sai Rakesh Vavilala.[1] and Shoba Rani Salvadi.[1]
[1]Department of CSE, Vardhaman College of Engineering, Hyderabad, India
* jayateja1234@gmail.com

Diabetes is an adverse disease that can affect the functioning of the entire body. Untreated diabetes can lead to cardiac stroke, diabetic nephropathy, and other disorders.[1] Diabetes is a global concern as the cases are rising rapidly. All over the world, millions of people are affected by this disease. Early detection of diabetes is crucial to maintain a healthy life. As the cases are growing, predicting if a person is diabetic or not is important. Such predictions can be made using Machine Learning. Machine learning (ML) is a computational method for automatic learning from experience, improving the performance to make more accurate predictions [1]. Furthermore, predicting the disease from the very early stage helps us control diabetes without any of its severe implications showing up. Machine learning needs a lot of data to train itself and built a model. Huge data from the medical field can be helpful in training ML algorithms. The dataset used is the PIMA dataset. Here we have used the Logistic Regression algorithm and could obtain an accuracy of 80.2

Keywords: *Machine Learning, Logistic regression, Supervised Learning, Diabetes.*

Vegetation Related Outage Prediction using Machine Learning Methods

Adithya Melagoda[1*], Lahiru Karunarathna .[1] ,Saranga Abeygunawardane and Genhatharan Nisaharan.[2]
[1]University of Moratuwa
[*]adithyamelagoda@gmail.com

A large percentage of outages in a power distribution system is caused due to the uncontrolled growth of vegetation near power lines. This paper presents an approach to predict vegetation-related outages using three machine learning models, a Neural Network, Decision Tree Classifier and Random Forest Classifier. The best prediction model is obtained by evaluating the performance of each model. The model outputs the probability of occurring an outage in the next fourteen days using the historical weather data, weather forecasts and historical outage data as inputs.

Keywords: *vegetation related outages, power distribution system, reliability, vegetation maintenance, machine learning*

Session 3

Information and Communication Technology- Track 01
Oral Presentations

Factors of Completeness for increasing the Reliability of a Software Product

Egodwaththa Arachchige Nimesha Dilini[1*],Thananthara Arachchige Madushanka Kahawa.[1], Mohamed Rizwan Mohamed NabeelM.[1] and Siththarachcharige Kavindu Gayantha Chandramal Ariyarathna.[2]
[2]University of Kelaniya
[*]nimeshadilini999@gmail.com

This paper provides a Systematic Literature Review (SLR) of software reliability and completeness factors. The aim of this study is to explore different measurements, metrics in reliability and factors of completeness in a software product through an SLR. With the use of review findings, a conceptual model was derived by analyzing the completeness factors that can be used to measure the reliability of a software. The conceptual model presents the relevance of completeness and reliability through their intermediate factors. The result of this approach supports the conclusion that test completeness and Software Requirement Specification's (SRS) completeness factors affect the reliability of a software product. The findings of this research are useful in software development processes to enhance the reliability of the software with the use of completeness requirements. The findings of this study can be used to measure reliability of real-world software development use cases.

Keywords: *Software Measures, Reliability, Completeness, Software Quality*

Blockchain as a Service (BaaS) for Certificate Authentication System

Suranga Prabhath.[1*],K.P.N Jayasena [1]
[1]Sabaragamuwa University of Sri Lanka
[*]mgsurangaprabhath@gmail.com

Blockchain technology is a marvelous technology that can be used to build many systems where anyone can transact data with each other without the involvement of any other third parties or intermediates to handle the transactions between peers. When transforming data there, there may be fraud activities within these transactions. In the certificate issue, systems use a third party the transmit digital certificates to the graduates and so there may be illegal activities. To reduce them a Blockchain as a Service (BaaS) system can be introduced. Using this BaaS system can introduce a secure and efficient digital certificate system. Through this research Blockchain technology is used for the fulfillment of the trust on intermediates in this system and reduces the fraud activities to produce fake or illegitimate digital certificates and used BaaS architecture to increase the efficiency and the reliability of the conceptual model. This research provides a solution for the traditional certificate systems face and also plans to provide suggestions for future researches also

Keywords: *Blockchain, Digital certificate, BaaS System, fraud activities.*

Energy-Efficient Resource Management in SDNbased Cloud Data Center Architecture

Rumes Hemachandra[1*],K.P.N Jayasena [1]
[1]Sabaragamuwa University of Sri Lanka
*kgrphemachandra@std.appsc.sab.ac.lk

The energy consumption of a cloud computing data center is one of the biggest problems in emerging technology today. That is, from the data center architecture that underpins the design of the data center, no matter how advanced the elements, technologies, and tools used for it are, there are many issues regarding energy consumption. Furthermore, considering the data center architecture, the energy consumption due to it accounts for a large percentage of the total consumption of the data center. Then a new data center architecture is much needed to increase the energy efficiency of a data center. On the other hand, Software Define Networking is a new technology that has recently come to cloud computing. Promising features of SDN are enabling programmable network components and separating the control plane and the forwarding plane. Because of this, when using SDN in any network, its components can be managed very easily. Therefore, when this software Define networking concept is used to create a data center architecture, the energy consumption of the data center can be answered. This is because the energy efficiency can be increased by applying a technical part like the existing multicontroller to the new architecture in this SDN concept. In here, as a solution for the energy consumption and to overcome the drawbacks of existing data center architecture this new data center architecture will be produced. Then the flexibility, efficiency and performance of the data center can be increased and the ease of implementation and administration, and operational cost reduction can be achieved

Keywords: *Data center architecture, Software Define Networking, Energy efficiency*

Automatic Room Light Controller System - With A Bidirectional Visitor Counter and Room Light Intensity Detection System

J.A.D. Imasha Ayeshka Jayasundara [1*],Kalupathiranlahaga Don Naveen Karunarathna[1],Tanura Chandrasekara[1],B.A.Janith S. Nandasiri[1]
[1]CINEC campus
[*]jayasundaraia@gmail.com,naveenhp1100tu@gmail.com

Right to information is a very significant human right which recognized internationally since the world human right movement begins with the end of the Second World War.. According to the quotation of public right to know emphasize the importance of information stating “Information is the oxygen of democracy.. Democracy is the information. Transparency and the right to information are the two main conditions in 17 and 18 centauries. To fill the gaps and implement new policies; the freedom of access to information is needed. Right to information act is empowering the citizen and it focuses the development of public sphere against the corruption The main aim of this research is to identify how this right to information act affects for the development of democracy in Sri Lanka. To collect the data apply interviews, Questionnaire & Observation. Research sample it represents 100 people who live in both rural and urbanely areas of the country. It was gain by Hambanthota, Anuradhapura and Gampaha districts .Right to access information is a Key mechanism for ensuring transparency and is a proven anti–corruption tool. The harmful effects of corruption are specially serve on the poor, who are hardest hit by economic decline, most dependent on the provision of public service, and at least capable of paying the extra costs associated with bribery, fraud, and the misappropriation of economic privileges. In this context the right to access information has proven to be an effective antidote to Corruption, equipping parliamentarians, anti–corruption bodies and the public with a tool to break down the walls of Secrecy that shield Corrupt officials. The right to access information also serves as an important deterrent; the Knowledge that a decision may be open to review by the public at a later stage can discourage decision–maker from acting dishonestly.

Keywords: *Right to Information, State Transparency, Develop Democracy*

Session 4

Information and Communication Technology – Track 2 Oral Presentations

Automated Approach for Real Estate Retailing Process

Hiruni Rajapaksha.[1*]
[1]General Sir John Kothelawala Defece University
* hirunirajapaksha8@gmail.com

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 compete 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 decreases production cost. The increasing number of potential buyers perusing listings through the Internet produces high potentials and requests 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. Clients can expect to find out professional photos with clarity, virtual tours, mortgage calculators, field maps, on-premises institute information, the comparative sales data of similar properties within the same area, real estate taxes, and if available, preliminary sales price. To resolve these declared issues, a website that retails property or real estate online is projected with compatible features like Virtual tours, Real estate guides, Transactions details, Marketplace analysis, Development information, Online value estimations, Online forums, Property updates and FAQ responding procedures related to real estate.

Keywords: *Digital marketing, land valuation, digital technologies*

IoT enabled Smart Home System

Hansima Nethmini .[1]
[1]General Sir John Kotelawala Defence University
*hansimanethmini@ieee.org

The Internet of Things (IoT) is a modern technology that is transforming our world. Without the Internet of Things, the concept of a linked world would be impossible to envision. IoT based smart home is a good example. Rapid technological advancements and architectural advancements have resulted in several issues, including how to govern and regulate the entire system, Server security, smart home security, and so on. Various objects such as lighting, household appliances, laptops, security cameras, and so on are all connected to the Internet in an IoT enabled Smart Home environment, allowing users to monitor and control things independent of time or location constraints. The IoT-based Smart Home collects interior environmental parameter information such as temperature, humidity, and gas concentration, among other things, as well as information on different household equipment, using sensors. Smart home technology helps you save energy and money on your utility costs. Smart homes are those that can remotely monitor and control household appliances and equipment. The entire system can be referred to as a smart home or IoT-based smart home in an IoT environment when the various home appliances in the smart home are connected to the Internet using accurate network design and standard protocols. This paper discusses not only the issues and challenges that arise in IoT and Smart Home systems using IoT, but also the various solutions that can be used to address some of these issues and barriers. The some of the components that discussed in the home Automation Simulation are RaspberryPi 2 version B, Servo motor, the infrared (IR) sensor, smoke detector and wifi-dongle.

Keywords: *Internet of Things (IoT), Smart Home, Security*

Throughput and Delay Analysis use of IOTA Tangle Technology during the Traffic Congestion

Malka Halgamuge .[1*]
[1]The University of Melbourne
*malka.nisha@unimelb.edu.au

Tangle is one of the technologies that seem to be most effective in storing and verifying information. It differs from the blockchain structure; however, the mechanism is the same. It builds an independent and self-management network. The tangle is a suitable solution for the vehicular network that is engaged with blockchain technology. Previous studies show that some drawbacks are aligned with blockchain technology. Such as vehicles have to wait more time on the road when the transmission range is detected as being malicious because each node needs to check every previous node to identify the malicious threat. It takes a certain amount of wait time on-road with a low level of security. Our main objective is to analyse the throughput and delay and introduce a higher security mechanism of double hash calculation to enhance throughput and minimize delay early. If we assume, when m data packet initiates the message from the source node to send it to the destination node time process can be calculated use of three conditions as (i) hash calculation, (ii) contention window for channel access, and (iii) wait time for checking and modify the message after the malicious attack. In this study, two previous nodes are used for the hash calculation to approve the newest node. Thus, two hash calculations are used for each node to identify the malicious attacks and minimize the delay time.

Keywords: *IOTA, Blockchain, IoT, Tangle, Throughput, Hash calculation, Malicious node.*

Feature learning for malicious attack detection in IoT networks

Maheshi Dissanayake .[1*]
[1]Department of Electrical Electronic Engineering.
University of Peradeniya
*maheshid@ee.pdn.ac.lk

Internet of Things (IoT) has become a global household word during the past few decades. IoT enabled devices with communication agents, creates communication networks and exchange data to facilitate specific services. With the popularity of IoT, security of the sensitive data shared in IoT networks has arisen as top priority. In this study we analyse the IoT traffic to identify malicious attacks using state of the art machine learning (ML) models. Feature importance analysis was performed on the collected traffic dataset to identify the most important features which help to detect an attack efficiently. XGB Classifiers was utilised to identify the key features in the collected dataset, which aid the detection of the presence and non presence of malicious attack. Base on the feature importance, the size of the dataset is reduced by half with the intention of improving the model training time. It was observed that removing low impacting features through careful feature engineering does not make a negative impact on the ML model performance. The ML models trained, namely neural network, Random forest, and XGB Classifiers were able to perform with average accuracy of 90% with both full dataset and feature extracted dataset. However, Naive Bayes model showed lower performance, 78%, 67% respectively in both datasets. This may be because Naïve Bayes assume conditional independence across all features, which is not present in this task. Furthermore, all models showed a considerable improvement in the model training time with the feature exacted dataset.

Keywords: *Feature Engineering, Security threats, IoT, Machine learning*

Identifying Keywords in Legal Articles Using Machine Learning Techniques

Kshithija Dilhani [1],Ishani Madhuwanth [1],Wathsari Premathilaka [1],Damayanthi Herath [1]
[1]University of Peradeniya
* kshithija147@gmail.com,ishmadhuwanthi@gmail.com,

Finding a satisfying e-resource that consists of legal documents in Sri Lanka is difficult. In order to make a good platform to facilitate lawyers and other people who work with legal documents to search and refer legal documents, it is vital to categorize and summarize the documents. With that aim, we did this research to identify keywords in legal articles in Sri Lanka using machine learning techniques. Considering only two types of legal documents, hundred New Law Reports and fifty Supreme Court Documents were used to extract keywords. A comparative analysis was done using the TF-IDF method and the Text Rank algorithm. The TF-IDF method performed well in the legal domain. Further work on this will enable the development of an effective e-resource for legal documents in Sri Lanka.

Keywords: *keyword extraction, Machine Learning, Text Rank, TF-IDF, Legal Articles*

List of Reviewers

Professor Chinthaka Premachandra- Shibaura Institute of Technology
Professor Jeevani Jayasinghe- Wayamba University of Sri Lanka
Professor Piyal Ekanayake- Wayamba University of Sri Lanka
Professor Pradeep Abeygunawardhana- SLIIT
Professor Sanath Jayawardana- university of moratuwa
Dr Sanika Wijayasekara- KDU
Professor Shanmuganathan Vasanthapriyan- Sabaragamuwa University of Sri Lanka
Dr Achala Pallegedara- Faculty of Engineering University of Peradenya
Dr Akila Wijethunge- Department of Materials and Mechanical Technology, University of Sri Jayewardenepura, Sri Lanka
Chakravarthy Vedula- Raghu Institute of Technology
Dr Damayanthi Herath= University of Peradeniya
Dr. Ruwan Ranaweera- Faculty of Engineering, UOP
Dr. Saranga Abeygunawardane
Dr.Anuradha Jayakody- Sri Lanka Institute of Information Technology
Dr Himal Suraweera- University of Peradeniya, Sri Lanka
Dr Hiruni Rupasingha- Sabaragamuwa University of Sri Lanka
Dr Jaume Anguera Pros- Universitat Ramon Llull
Dr Maheshi Dissanayake- Department of Electrical Electronic Engineering. University of Peradeniya
Dr Nalin Harischandra- Faculty of Engineering, University of Peradeniya
Dr Nuwan Balasuriya- Open University of Sri Lanka
Dr pubudu jayasena- Sabaragamuwa University Of Sri Lanka
Dr Rasara Samarasinghe- University of Moratuwa
Dr Susantha Wijesinghe- Wayamba University
Susara Thenuwara- Embassy of France University of Moratuwa
Dr T Weerakoon-Department of Electrical Electronic Engineering University of Peradeniya
Dr Tharaka Samarasinghe- University of Moratuwa
Dr Thilina Halloluwa- University of Colombo School of Computing
Dr Vidura Jayasooriya- University of Sri Jayewardenepura
Mr Tharindu Weerasinghe- Austal Technology
Ms Yashodha Karunarathna- University of Peradeniya
Ms Gresha Samarakkody -University of Moratuwa
Mr Maleen Jayasuriya- University of Technology Sydney
Mr Sampath Ediriweera- Wayamba Univeristy of Sri Lanka