Kelaniya International Conference on Advances in Computing and Technology

"Contributing Computing and Technology to Achieve Sustainable Development Goals"

Friday 28th July 2017
Kelaniya, Sri Lanka.

Proceedings

Faculty of Computing and Technology
University of Kelaniya
Sri Lanka

Kelaniya **I**nternational **C**onference on **A**dvances in **C**omputing and **T**echnology

(**KICACT – 2017**)

"Contributing Computing and Technology to Achieve Sustainable Development Goals"

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Conference Proceedings

Chief Editor

Dr. Asanka Pallewatta

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"Contributing Computing and Technology to Achieve Sustainable Development Goals"

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Dr. Asanka Pallewatta

Message from the Vice-Chancellor

It's with great pleasure that I extend my warm wishes for the 2nd International Conference on Advances in Computing and Technology organized by the Faculty of Computing and Technology. The resounding success of the first ever conference organized by this new faculty last year must have provided tremendous impetus in extending the depth and the breadth of the coverage of the research discussions this year.

The theme adopted for this year, 'Contributing computing and technology to achieve sustainable development goals' is timely because it is a widely discussed topic today, not only locally, in the global arena also. Sustainable development goals adopted by 193 countries in the world in 2015 are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. Computing and Technology are two domains that could make a direct contribution towards achieving these goals, especially in the context of Sri Lanka which has embarked on a journey to create a knowledge economy.

I am confident that the deliberations in this conference would not only contribute to the body of knowledge, but would also present innovative ideas that could be put into practice in the near future.

I wish every success for the conference.

Professor D.M. Semasinghe
Vice Chancellor, University of Kelaniya, Sri Lanka

Message from the Chairman, Research Council

It is with great pleasure that I issue this message on the 2nd Kelaniya International Conference on Advances in Computing and Technology 2017 (KICACT-2017) organized by the Faculty of Computing and Technology, University of Kelaniya.

I hope that KICACT-2017 will provide a platform for all the presenters and participants for presenting novel and latest advances in the fields of Computing and Technology, interdisciplinary exchange of knowledge, sharing of opinion from researchers, engineers, scientists, academia and industry and nurturing international research collaborations.

Therefore, I congratulate the Dean, staff of the Faculty and the conference organizers for organizing this Research Conference on Advances in Computing and Technology with the aim of improving research culture in the University and wish KICACT-2017 every success.

Professor N.P. Sunil Chandra
Chairman of the Research Council, University of Kelaniya, Sri Lanka

Message from the Dean, Faculty of Computing and Technology

It is a great pleasure to greet all attendees to the 2nd Kelaniya International Conference on Advances in Computing and Technology (KICACT 2017). The conference is organized by the Faculty of Computing and Technology (FCT) of the University of Kelaniya. The theme of this year's conference is Contributing computing and technology to achieve sustainable development. This year's conference draws computing and technology experts from Sri Lanka and abroad and focuses on how expertise of these two vast fields will contribute to growing issues in sustainable development.

Modern economies of nations are highly driven by computing and technology innovations as well as products that promote sustainable development. Therefore, R&D in computing and technology will be a major factor in the economic and social development of Sri Lanka. Innovations in computing and technology to the benefit of Sri Lanka is encouraged and promoted through KICACT 2017. I hope that this conference will play its role in enriching the participants' knowledge as well as encourage their contributions to national development through productive collaborations.

The FCT established in 2015 is the youngest faculty of the University of Kelaniya and the most vibrant with well qualified academics with proven track records in research and teaching. The aim of the faculty is to promote collaboration among diverse academic disciplines and empower academics, professionals and students to achieve the highest quality in their teaching and learning as well as research activities. For the 2nd consecutive year the FCT is able to hold KICACT 2017 due to the research conducive environment which is promoted by the Vice-Chancellor, Deans, Heads of departments, academic and non-academic staff of the University of Kelaniya. I greatly admire their support and hope that it will continue throughout the years to come.

I would like to take this opportunity to express my gratitude to our sponsors for their support and contributions for the success of KICACT 2017. I also wish to thank the organizers and all who gave their time and effort for their diligent work. I trust that our international delegates will have a wonderful time in our paradise island, experience the warm hospitality and feast on our delectable cuisines. Finally, I wish all participants a productive conference and hope that you will seize the opportunity offered through KICACT 2017 to network and build new collaborations as well as to develop and expand each research to achieve the highest possible outcomes.

Dr. Gamini Wijayarathna
Dean, Faculty of Computing and Technology, University of Kelaniya, Sri Lanka

Keynote Speech – "Sustainability through Cloud Computing"

Sustainability is one of the most important societal challenges nowadays. This key note will discuss how the cloud computing technology can help in less consumption of power in Information and Communication Technology especially in an organization. And also discuss how the different types and different service models of cloud computing can be used as a tool for sustainable development. This concept of sustainability will help any organization to use the Information and Communication Technology in a better way. At the end of this keynote, it covers some recommendations about energy efficiency which reduce the cost of the services as pay for use.

Keywords: *Sustainable development, Information and Communication Technologies, Cloud computing, Pay for use, Energy efficiency*

About the Keynote Speaker

Prof. Subarna Shakya holds Ph.D. in Computer Engineering from Lviv Polytechnic National University, Ukraine. He is a professor at Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University, Nepal. Prof. Shakya has published more than 80 research articles in International Journals, conference proceedings and book chapters.

He has involved as a coordinator of EURECA (European Research and educational collaboration with Asia), IDEAS (Innovation and Design for Euro-Asian Scholars) and presently he is involving as coordinator of LEADER (Links in Europe and Asia for engineering, education, Enterprise and Research exchanges) project funded by the European Commission through the Erasmus Mundus Program.

He has delivered keynote speeches in Seoul National University Multi Topic Conference (INMIC) 2013, 18th Dec 2013, Lahore, Pakistan organized by University of Engineering and Technology and IEEE, at IEEE ICCCA, 29th April, 2016 at Galgotias University, India. He was an invited speaker on "e-Government Implementation in Nepal", 8th Oct 2012 at San Diego University, San Diego, USA as well as on "e-Government initiative and adopting Cloud computing as an e-Government Platform in Nepal" 8th Oct 2014 at University of Nevada, Las Vegas, USA and also an invited speaker on "Cloud computing for e-Government Implementation", 3rd Oct 2016 at Santa Clara University, Santa Clara, San Francisco, USA. He is an expert member of Board of Studies in South Asian University, India. He is a member of IEEE, an editorial board member of different national and international journals. He has keen interests in research and development in ICT, e-government systems, Information security for e-Government systems, multimedia systems, computer systems simulation and modeling, cloud computing, information system, computer architecture and software engineering.

Tech Talk –
"Ensure to Affordable, Reliable, Sustainable and Modern Energy for All"

Reliable and affordable sources of energy are fundamental not only for wellbeing, but also for economic growth development and poverty reduction.

Fulfilling the energy needs of developing countries without compromising the environment is a challenge, requiring innovative policies and methods. Many rural communities in African & Asian countries do not have access to the national electricity network or related benefits in health and quality of life provided by electricity for lighting and refrigeration.

The ultimate source of energy of the world though common for all, availability of natural energy sources is not equal for all nations. So to encourage the use of natural sources will be the objective of this presentation.

About the Speaker

Eng. Ananda Devasinghe graduated in 1998 as an engineer from University of Peradeniya and, worked in deferent private sector organizations contributing his engineering expertise in many fields of production. He completed a master's degree in 2012 on public management specializing in human resource management.

Presently he is engaged as the Business Manager for Industrial services of SGS Lanka Pvt. and has extended his capacity for technical services.

He also holds the post of the president of Private Sector Engineers' Society (PSES) of Sri Lanka, where the theme of the society is "Entrepreneurship Development of Engineers".

KICACT–2017 Agenda

Inauguration

08:00 Registration

08:55 Arrival of guests

09:00 Lighting of oil lamp

09:10 Welcome speech
Dr. Asanka Pallewatta – Conference Chair, KICACT–2017
Faculty of Computing and Technology, University of Kelaniya

09:15 Address by the Chairman, Research Council
Professor N.P. Sunil Chandra
Chairman of the Research Council, University of Kelaniya

09:25 Address by the Deputy Vice Chancellor
Professor Lakshman Senevirathne, University of Kelaniya

09:35 Keynote speech – "Sustainability through Cloud Computing"
Professor Subarna Shakya – Tribhuvan University, Nepal

10:20 Tech talk – "Ensure to Affordable, Reliable, Sustainable and Modern Energy for All"
Eng. Ananda Devasinghe
President of the Private Sector Engineers' Society, Sri Lanka

10:50 Vote of thanks
Dr. Thilini Rupasinghe, Faculty of Computing and Technology

11:00 Morning tea-break + poster session

Conference Programme

11:30 Morning sessions – 3 Parallel sessions as listed below

Industrial Technology	Intelligent Systems	Theoretical Computing
Session Chair: Dr. Shiran Jayakody	Session Chair: Dr. Sidath Liyanage	Session Chair: Dr. Prasad Jayaweera
Location: Room – 1	Location: Room – 2	Location: Room – 3

12:30 Lunch-break + poster session

13:30 Afternoon sessions – 3 Parallel sessions as listed below

Material Technology	Applied Computing	e-Learning in Technology
Session Chair: Dr. Isurika Fernando	Session Chair: Dr. Lasith Gunawardena	Session Chair: Dr. Namali Suraweera
Location: Room – 1	Location: Room – 2	Location: Room – 3

15:00 Award ceremony

15:05 Afternoon tea + End of the programme

KICACT–2017 Morning Sessions

Track 1: Technology – Industrial Technology

Session Chair: Dr. Shiran Jayakody, South Eastern University of Sri Lanka

Time	Ref.	Title
11:30~11:45	T01	Monitoring of Land Use Changes Using Remote Sensing and GIS, A Case Study in Kandy Divisional Secretariat *Neel Withanage*
11:45~12:00	T02	Improvement of Rubber to Steel Adhesion in Press On Solid Tyres by Varying the NR/BR Ratio in NR/BR Composite Bonding Layer *Amali Weerakoon*
12:00~12:15	T03	Indoor Low Cost Multipurpose Autonomous Blimp Robot: Mechanical Implementation *Sanchitha Dias*
12:15~12:30	T04	Automotive Windshield Wiper Blade from Incorporating RSS NR/SKIM Rubber Blend in the EPDM Formulation *Amali Weerakoon*

Track 2: Computing – Intelligent Systems

Session Chair: Dr. Sidath Liyanage, University of Kelaniya

Time	Ref.	Title
11:30~11:45	C01	A Simple Machine Learning Approach for Identifying Promotional Short Messages Service (SMS) Messages *Dulan Dias*
11:45~12:00	C02	Artificial Neural Network based Emotions Recognition for Tamil Speech *Sanmugasundaram Thirukumaran*
12:00~12:15	C03	Artificial Neural Network based New Hybrid Approach for Forecasting Electricity Demands in Sri Lanka *Kapila Rathnayaka*
12:15~12:30	C04	Applying Intelligent Speed Adaptation to a Road Safety Mobile Application - DriverSafeMode *Shanika Perera*

Track 2: Computing – Theoretical Computing

Session Chair: Dr. Prasad Jayaweera, University of Sri Jayawardenapura

Time	Ref.	Title
11:30~11:45	C05	5G Wireless Communication over Heterogeneous Networks: Solutions for Hardware and Software Fallacies *Aditya Abeysinghe*
11:45~12:00	C06	Detecting and Classifying of Vehicles in Homogeneous and Heterogeneous Traffic Environments Using Gaussian Mixture Model *Vigini Jayathilake*
12:00~12:15	C07	De-Identification for Privacy Protection in Audio Contents *Kaveesha Induruwa*
12:15~12:30	C08	Stock Market Analysis and Prediction *Abin Shakya*

KICACT–2017 Afternoon Sessions

Track 1: Technology – Material Technology

Session Chair: Dr. Isurika Fernando, University of Sri Jayawardenapura

Time	Ref.	Title
13:30~13:45	T05	Finite Element Analysis of Inflation Tyre Simulation Using Simulia Abaqus *Akila Fernando*
13:45~14:00	T06	Coal Fly Ash as an Alternative Substrate to Replace Sand in Cement Mortar Mixture *Guttila Jayasinghe*
14:00~14:15	T07	Dynamic Mechanical and Thermal Properties of Natural Rubber Latex Films Filled with Surface Modified Silica *Chandani Somaratne*
14:15~14:30	T08	Investigation of Efficiency of the Solid-state Dye-sensitized Solar Cells with Metal Centered Dye and Metal-Free Organic Dye *Deepi Varathaseelan*

Track 2: Computing – Applied Computing

Session Chair: Dr. Lasith Gunawardena, University of Sri Jayewardenepura

Time	Ref.	Title
13:30~13:45	C09	Design and Development of a Dashboard for a Real-Time Anomaly Detection System *Harindu Korala*
13:45~14:00	C10	Recognising Elders using Behavioural Biometrics *Sarveswaran Kengatharaiyer*
14:00~14:15	C11	Dynamic Human Workflow handling by PL/SQL *Asanga Ranasinghe*
14:15~14:30	C12	A Similarity based Compression Approach for Efficient Data processing on Cost Optimized Multi-Cloud *Deepa David*
14:35~14:45	C13	On Compression Ratio Info-leak Made Easy (CRIME) Attack and Countermeasures *Sanduni Prasadi*

Track 3: Technology Education – e-Learning in Technology

Session Chair: Dr. Namali Suraweera, University of Kelaniya

Time	Ref.	Title
13:30~13:45	E01	Factors Influencing the Students' Intention to Adopt E-learning Special Reference to Eastern University, Sri Lanka *Kamalachandran Nirushan*
13:45~14:00	E02	Facilitating an E-Learning Platform Beyond the Lectures: Digital Natives Become Active Learners *Amali Weerakoon*
14:00~14:15	E03	Virtual Learning - A Popular Learning Method Among Students *Arundathie Abeysinghe*

14:15~14:30 E04 Introduction of the Four Stage Process of Developing Interactive Multimedia Based E-learning Materials
R.H.U. Jayantha, Mangala Keerthi De Pasqual

14:35~14:45 E05 A Novel Approach to Enhance Students' Attention Span: A Digital Framework Among the Polymer Engineering Technology Students
Amali Weerakoon

14:45~15:00 E06 Accessing a Moodle Based Learning Management System and Exam Performance by Medical Students: A Retrospective Analysis
Gayathri Hettiarachchi

KICACT–2017 Poster Session

Ref. Title

P01 A Scrutiny on Trends in Study Tipitaka as an Electronics and Mobile Sources – *Ven. Deiyandara Pannananda*

P02 Analysis of Road Traffic Accidents Using Data Mining – *Pushpika Liyanaarachchi*

P03 Android Shopping Cart Application (ASCA) – *Kushani Bandara*

P04 Anti-Eavesdropping Data Safety Framework for Highly Secured Enterprise Network – *Fathima Shafana*

P05 Arduino Based Home Automation And Security System – *Nirangani Ranasinghe*

P06 Automated Characters Recognition and Family Relationship Extraction – *Alisha Bajracharya*

P07 Automated Financial Management System with an Android Application – *Tharindupriya Gunathilaka*

P08 Challenges in implementing ERP system in small medium manufacturing companies in Sri Lanka – *Yasotha Paramsothy*

P09 Conflict Categorization of ERP Implementations in Asia Pacific Region – *Padmika Herath*

P10 Foreign Exchange Rate Prediction Using Artificial Neural Network and Sentiment Analysis – *Shruti Shrestha*

P11 Four Legged Walking Robot with Smart Gravitational Stabilization – *Alan Anthony*

P12 Impact on media convergence on media environment (with special reference to Sri Lankan media) – *Nayana Suraweera*

P13 Machine Learning Dashboard for Aviation Fuel Optimization – *Nuwan Samarasinghe*

P14 Online Train Ticket Reservation System – *Shirmila Siriweera*

P15 Smart Home Automation Voice Controller – *Supipi Perera*

P16 The Impact of a Security Culture in Small and Medium Scale Enterprise (SME) on Enterprise Information Security – *Asanka Pathirana*

P17 V-Synch: Rendering Distance A No-issue with the New Feature of Video Synchronization in existing multimedia platforms – *Rashmi Tiwari*

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5G Wireless Communication over Heterogeneous Networks: Solutions for Hardware and Software Fallacies

Aditya Abeysinghe (abeysingheaditya4@gmail.com)[1]
[1] Edith Cowan University, Australia.

Abstract

Proliferating use of mobile communications have urged the need to develop networks able to cater to higher bandwidth, speeds and support a plethora of upcoming technologies. Introduction of 5G networks in a heterogeneous network architecture has been chosen as a viable solution to persistent issues in current implementations. However, these network designs lack several fundamental software and hardware pitfalls associated with problems in designing: associated cell optimizations, schemes on simultaneous base station associations and cooperation between tiers in the architecture. Therefore, this research will focus in fine tuning these software and hardware fallacies for the successful implementation of proposed 5G networks.

A main software drawback in current networks is persistence of lazy caching themes. As shown in figure 1, currently user requests are often matched to arbitrary locations without the use of pre-enabled caching mechanisms. To overcome this issue proactive caching where base stations (BS) identify external clients possessing cached information and dynamic Device-to-Device (D2D) connection creation could be implemented. As shown in figure 2, significant improvements in successful requests could be achieved both under high load and under low load as users are efficiently matched to potential targets.

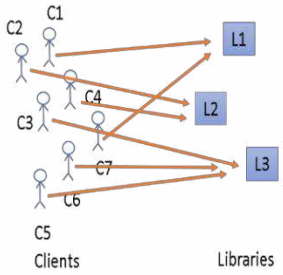

Figure 1 – Reactive loading

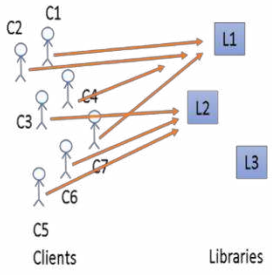

Figure 2 – Proactive loading

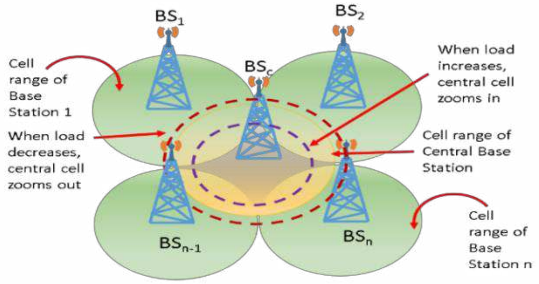

Figure 3 – Cell zooming

A main drawback in mobile network hardware design is high energy consumption proportional to increasing user requests. To overcome this issue cell zooming could be introduced to 5G implementations. As shown in figure 3, the central cell could use an algorithmic approach to identify the network request density around it and zoom its range in or out to efficiently serve while neighboring cells could be switched off for a predetermined interval and vice versa. T-tests carried under this paradigm proved that significant cost savings in efficient use of energy in these cells could be achieved under this solution.

Keywords: *Proactive caching, Heterogeneous networks, 5G communication*

A Novel Approach to Enhance Students' Attention Span: A Digital Framework Among the Polymer Engineering Technology Students

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[1] Division of Polymer, Textile and Chemical Engineering Technology, Institute of Technology, University of Moratuwa, Sri Lanka.

Abstract

In higher education, retention of the digital natives' attention span throughout the lecture is a challenging task. Gibbs (1992) found a drop in attention between 10 and 30 minutes into the lecture, which has been associated with the passive nature of the standard format, and has consequences for learning approaches and outcomes. Usually Institute of Technology of University of Moratuwa (ITUM) offers 120-minutes lengthy lectures. Because of the monotonous nature of the lecture, the students tend to sleep or talking each other without concentrate into the lecture content. So lengthy lectures should be punctuated with periodic activities by introducing lecture breaks to retain the students' attention.

This study was focused to investigate the potential of a digital framework as a lecture break. The implemented digital framework was "kahoot". Kahoot is a web programme and it is a game based response platform. This user friendly website gives the ability to create quizzes and surveys about any subject area. In ITUM, the computer room is the next door to the lecture room. All the students were facilitated with individual computers with the internet facility. After 30 minutes of the lecture, students were allowed to respond for the quiz (5 questions) accessing through kahoot. Depending on answer choice and speed, kahoot give students a score. The students enjoy playing kahoot because it is fast paced, visual, and energetic.

Active engagement of the students for two to four minutes through kahoot helped them to become re-energized for the next 15 to 20 minutes mini-lecture. Three to four quizzes were conducted for one lecture period. Descriptive statistics of the students' responses for the close-ended questionnaire emphasized the new digital framework helped them to actively engage in the lecture, ability to judge their knowledge level and to enhance time management skill, knowledge retention, language skill and further helped them to practice as self-directed learners. This study concludes that a simple digital framework, kahoot can act as effective lecture breaks by enhancing students' attention span while facilitating the development of graduate attributes.

Keywords: *Students' attention span, Lecture breaks, Digital framework*

A Scrutiny on Trends in Study Tipitaka as an Electronic and Mobile Sources

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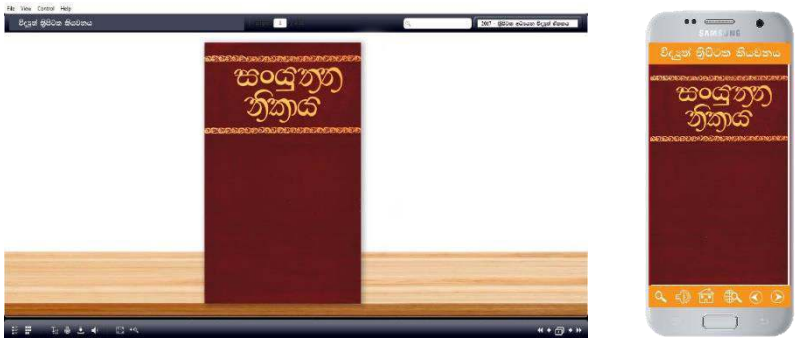
[1] Information and Communication Technology Center, University of Kelaniya, Sri Lanka.

Abstract

During the reign of King *Walagambahu*, the *Tipitaka* which contains lord Buddha's philosophical doctrines was transcribed to text for the first time in 80 AC at *Aluwihare* cave temple, *Matale*, Sri Lanka, for the preservation and use of future generations. Recently, *Tipitaka* is available as an electronic source via the internet which includes advantages such as user friendliness, cost effectiveness and good accessibility as well as carrying Buddhist philosophy to the whole world. However, there are various issues encountered by the users in referring the current electronic versions of *Tipitaka*. These were identified during the current research and it was apparent that an e-book would be more suitable than the conventional PDF format.

Main focus of this study was to identify the possibilities of developing a user-friendly electronic interface for *Tipitaka*. In this study, few selected sections of *Tipitaka* were used to develop a multifunctional e-book that can be read efficiently with accurate pronunciation, with automatic page system as well as possibilities to use internet extensions which enable user-friendly searching facilities. In this work, an efficient Graphical User Interface (GUI) was designed that loads only the thumbnail of the target page, saving time without loading any pdf material.



Designed GUI in a desktop (left image), and in a mobile app (right image)

Conventionally in pdf based e-books, when a user demands for a specific word / phrase search, the result is shown scrolling through the whole pdf document. When referring the *Tipitaka* a summarized result of the searching content is expected to be more useful, rather than directly displaying each and every page. Considering this need, an efficient searching facility was designed in this work, using Optical Character Recognition (OCR) to display a summarized list as the primary result. Since the keywords are already indexed at the editorial stage, the searching function quickly generates the primary result where the user is allowed to choose the exact target page efficiently from that summarized list. This application was developed in Java Programming Language by using the Android Studios Integrated Development Environment (IDE). Android Software Development Kit (SDK) was used to develop the mobile application, embedding a variety of customized tools, on the Android platform. Especially, Android Emulator and the Android Development Tools (ADT) plug-in for Android Studios were very useful in this implementation. Among the growing number of Android based mobile applications available on this area, this *Tipitaka* application is also expected to stimulate the interest of many researchers, encouraging unique prototype mobile applications aligned with their research works.

Keywords: *Tipitaka, Android, e-book*

A Similarity based Compression Approach for Efficient Data Processing on Cost Optimized Multi-Cloud

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[2] Chennai Higher Secondary School, Chennai, India.

Abstract

Cloud computing provides a promising platform for flexible massive storage of data, computing and software services in a scalable manner. Massive storage sensing is prevalent in both industry and research applications where the data storage consumes volume and high velocity. There are five phases in the compression based cost effective multi cloud architecture.

Pre-process phase: In this phase user is intended to upload their local files. The cloud server decides whether these files to be uploaded considering the authenticity of the user and the content priority.

Deduplication process: Once the file is approved for uploading, similarity model is used for compression and clustering, Data chunks are created. Similarity model works with text data and multidimensional numerical data is contributes to the majority of the data available. Markov model is used to calculate the similarity in text data and in tree topology, similarity is determined by the number of leaf nodes. The data is checked for duplication in this step. It is done by generating signature for the data chuck, the signature stored in DDB (Deduplication DataBase) is compared with the signature of the chunk to be stored and then data chunk is stored.

Upload phase: After approval for uploading and clustering, the data chunks are encrypted and uploaded into multi-cloud where the application and data are fragmented and stored in multicloud to enhance security and protection. In multi cloud architecture, no cloud provider learns the complete application logic and overall application results which leads to data and application confidentiality.

Update phase: If user intend to modify, insert or delete some blocks of the existing files, then the corresponding data chunks alone is updated in the cloud.

Proof of storage Phase: The user has a meta data file stored locally to identify which data chunks is available in which cloud in our multi cloud architecture.

To make cloud storage cost effective, on demand resource provisioning is established and the cost is calculated depending on the number of user and number of resources used. On demand resource planning avoids under and over provisioning of the resource enhancing the resource utilization.

Keywords: *Multicloud, Data compression, Resource provisioning*

A Simple Machine Learning Approach for Identifying Promotional Short Message Service (SMS) Messages

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Abstract

Mobile phones play an integral part in the modern lives of humans. Short Message Services (SMS) Messages have become a popular mode for simple communication. Its' simplicity, cost-effectiveness and large audience has attracted the attention of advertising industry to send targeted promotional messages to mobile phones. In Sri Lanka, a survey conducted in Colombo, yielded that 3 out of 5 SMS messages received our promotional messages. Even though extensive research has been carried out in detecting junk SMS messages, the amount of research conducted on filtering promotional SMS messages is rare.

The purpose of this research is to evaluate the success and accuracy of utilizing a simple machine learning algorithm to identify promotional SMS messages. Here, we have used a feed-forward neural network based on a statistical model, which was trained with a training data set consisting of promotional as well as non-promotional messages. Each test message was broken down in to individual words and filtered through by cleaning to form keywords which will have consist of a weight and probability value. With each message that is used to train, these values will be updated according to whether it is a promotional or a non-promotional message. When a message is tested through this neural network, the words of the message will be matched against the keyword's weight and probability, which will then calculate a resultant probability. By setting a par-value, we can classify the test as a promotional or a non-promotional message.

The proposed model yielded a 100% accuracy when tested within the given test data set. In order to get successful results for broader test data sets, the model has to be trained comprehensively with proper amount of promotional and non-promotional messages. Optionally, the results obtained from the feed forward neural network for incoming messages, can then be fed back in to the feed forward neural network for further training.

As future work, we intend to take this solution to an android-based mobile application that extracts promotional messages from the incoming SMS messages as well as from a server, and display them to the user based on his preferences.

Keywords: *SMS filtering, Smart Phones, Machine Learning, Promotional, Marketing, Neural Network, Statistical Model*

Accessing a Moodle based Learning Management System and Exam Performance by Medical Students: A Retrospective Analysis

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Abstract

Considering the high computer literacy of students and the need for being students centred, the MBBS programme of University of Kelaniya introduced a Moodle-based learning management system (LMS) as a supplementary component to its blended delivery approach of the curriculum. Accordingly, LMS is a parallel component to the curriculum delivered face-to-face. Each module of learning in the curriculum is represented in the LMS by giving lecture notes, PowerPoint presentations, web links and assignments. The broad aim of this study is to determine the relationship between the extent of interactively of learners with LMS and their exam performance.

First-year medical students (172 from 2016 intake and 166 from 2017 intake) at University of Kelaniya were considered for the analysis. Student's access to LMS during the first two modules of the MBBS curriculum and the results of the first continuous assessment were compared. Total LMS access for each student during the two modules were calculated by counting the number of views in the course log. The particular course logs of LMS were downloaded and filtered out the details pertaining to students in the above two modules in both batches. Total access during the two modules were calculated for individual student and used for the analysis. Continuous assessment results ranged from grades A to F and we assigned sequential numerical marks in the descending order from 6 to 1 to denote grade A to F. Total LMS access with respect to assessment grades were visualized using boxplots and median with interquartile ranges were calculated. Association between LMS access and assessment grades were investigated. Statistical analysis was done in R.

Median (interquartile range) of LMS access of the students were 43.0 (12.25 – 72.0) times. The number of results grades for the students as follows; A – 3, B – 41, C – 117, D – 122, E – 51 and F – 4 and the respective number of median (interquartile range) access to LMS for the above grades were 110.0 (102.0 – 113.0), 51.0 (21.0 – 76.0), 49.0 (16.0 – 76.0), 39.0 (11.0 – 64.75), 29.0 (6.0 – 59.5) and 6.5 (3.0 – 16.0). There was significant correlation between LMS access and results grades (rho = 0.2, $P < 0.01$). Students with grade A showed significantly higher LMS access compared to the rest of groups. There was no difference in LMS access between students with grades B and C, C and D, D and E, D and F or E and F. However, grade B showed significantly higher LMS access compared to grades D, E and F; and grade C showed significantly higher LMS access compared to grades E and F.

The findings demonstrate that students' interaction with LMS were significantly associated with the performance in the examination. The learning management system has a positive impact on student performance.

Keywords: *Medical students, LMS access, Exam performance*

Analysis of Road Traffic Accidents Using Data Mining

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Abstract

Accident happens unexpectedly and unintentionally, typically resulting in damage or injury or in fatalities. Data mining is the extraction of implicit, previously unknown, and potentially useful information from data collected for various purposes. The main objective of this research is to identify more accurate and useful patterns that would exists in the road traffic accident data using data mining techniques. It is believed that these patterns can be utilized to take measures to reduce the number of accidents or the severity of the accidents.

As part of this research work, details of accidents occurred in Colombo district in the year 2015 were collected from the Traffic Headquarters, Colombo, Sri Lanka. A data set with 9487 accident incidents each detailed with 55 features was created from the collected data. This data consists four types of accidents, namely, Fatal (154), Grievous (877), Non-Grievous (2028) and Vehicle damage only (6428). There are a quite a few published studies on traffic accident analysis using data mining methods. In most of these studies, J48 classifier has produced higher accuracy than other methods. So far no such study has been reported on accidents occurred in Sri Lankan roads.

A correlation analysis was performed on the data set and as a result 10 attributes were removed. In this study, the J48 decision tree classifier was usedin two ways. In the first one all four type of accidents were considered. The decision tree built with 70% of the data was able to achieve an average accuracy of 71.4687%. In the second analysis, three types Fatal, Grievous and non-grievous types were combined into one class and named as Injured. This approach was taken to reduce the effect of the vehicle damage only class, which is around 68% of the total data. The decision tree built with this merged classes was able to achieve an accuracy of 78.7288 % using a tenfold cross validation. The decision tree was converted into 20 rules, which can predict the type of accident based on the identified attribute values. The results were found to be helpful to identify the factors influencing traffic accidents and can be further analyzed to find more subtle reasons or situations that are causing accidents.

Keywords: *Data mining, Decision tree, Road traffic accident*

Android Shopping Cart Application (ASCA)

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Abstract

Due to the busy lifestyle of people in today's society it has become more convenient for them to buy all their daily shopping items in one place. Therefore, shopping grocery items in a supermarket has become a common activity in Sri Lanka too. The major problems faced by customers when shopping grocery items in a supermarket, is the effort they have to put and the time consuming tasks to be faced almost every day during shopping. One such difficulty is the need of frequently visiting the supermarket in order to buy day-to-day items. Also when buying the goods, most of the time, a walk around the shop to select the necessary products is an inevitable task. Even after buying, they need to stand in long queues at the counters to do the payments. Therefore, using the modern technology to build a suitable system to solve such problems is valuable. Mainly there are two approaches to solve this problem. First is a web shopping cart application and the other is a mobile application. Today as most of the people always carry smart phones with them, nowadays every business requires to have its own business application for mobile users.

This research project has two major parts: the mobile application and the website which acts as a content management system. Using this mobile application, the customers are given the facility to buy online or to get the products delivered to their home by the delivery service provided from the shop or else they can send the order confirmation and get the ordered items by payments done at the shop. This mobile application is being developed using the Android Studio Software. The client side of the application is designed as a website, for the supermarket owners to manage the online database which stores the content for the mobile application. In order to measure the effectiveness of the implementation of this project, questionnaires were distributed to a total population of 50 people who buy their daily groceries in a supermarket and having an android smart phone. With the analysis of data, 32% of the people strongly agreed and 48% agreed that traditional shopping will be superseded with online shopping in near future and only 6% has disagreed the above idea. Half of the population agreed and 16% strongly agreed the fact that only credit card holders being able to buy products online is a major drawback in a shopping cart application.

As future enhancements, the application will be developed to run on any type of mobile operating system other than just android. Currently only the bank portal and a link to connect with Paypal is designed and the payment gateway is to be developed further. The client side can also be created as a mobile application. In conclusion, the result of this research project is a user friendly mobile application which runs on Android Operating System and a Content Management System has developed as a Website to interact with the Database. The ASCA was a success in developing an online mobile shopping cart which could satisfy the current problems of customers who buy their daily grocery items in a supermarket.

Keywords: *Mobile application, Shopping, Content management system*

Anti-Eavesdropping Data Safety Framework for Highly Secured Enterprise Networks

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Abstract

The rapid advancement in Internet has paved way for several malicious intrusions which allow information to be accessed without proper authorization and privileges. Thus, the integrity, privacy and confidentiality of data and information are readily lost. One such malicious intrusion is the eavesdropping, man-in-the-middle attack. They often utilize the backdoor of the encryption that jeopardize the security of billions of devices and their communication.

Hardware Security Module (HSM) has been the topper as an anti-eavesdropping device since the time of its introduction, as they were specifically built to create a tamper-resistant environment to perform cryptographic processes. Thus, HSMs are widely used in Military and Security Forces to obtain heightened security and to preserve the privacy of critical data processing. However, high cost, availability of HSM vendors in minor scale and the practical difficulties in its operation and maintenance have made it less prevalent in enterprise networks.

Therefore, there is an immense need for the development of a mechanism that is equally competent to the functionality of HSM to withstand pernicious attacks and unauthorized surveillance on communication, but at a low cost. Since, HSM has proven track record of its performance and tamper-resistant feature, this paper aims to make use of the virtualization process of functionality of the expensive HSM.

The development of the anti-eavesdropping Data Safety Framework can be described, as follows. Through a thorough review of literature, the key features of HSM have been studied and thus, it is proposed to be implemented as a software that comprises its entire functionalities using VMware as the virtualization platform. To the HSM that has been virtually developed, Pretty Good Privacy (PGP), a low-cost privacy ensuring program will be used for encryption processes. A Virtual Private Network (VPN) has to be created by next, as the environment where the particular simulated software will function. The built private network created thus is the test enterprise network in this case. The HSM authorized network system will be managed by an Observer Management Server in order to provide additional benefits such as temporary decryption keys.

Upon building the intended simulated software as HSM and its functioning environment VPN as Enterprise Network, ethical hacking tools will be used to evaluate the robustness and performance of the built simulated software. The simulated software thus implemented and tested will be then tested for interoperability on an Enterprise Network.

Several security policies and security tools exist today. However, security breaches are happening prevalently bypassing the underlying security mechanisms. This particular study has proposed the implementation of a virtual hardware based on HSM, which has proven track record of its robust security feature, as an anti-eavesdropping data safety framework. The simulated software can support enterprise networks to preserve the privacy, confidentiality and security of the data communication.

Keywords: *Hardware Security Module, Anti-eavesdropping, Simulated Software*

Applying Intelligent Speed Adaptation to a Road Safety Mobile Application – DriverSafeMode

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Abstract

During the last decades, Sri Lanka has experienced a highly accelerated growth level of motorized transportation with the rapid urbanization due to the economic development. However, the increasing motorization has also placed a significant burden on people's health in the form of uncontrollable growth rate of road accidents and fatalities. We have focused on excess speed and mobile distraction which are two major factors that have caused majority of road accidents. Exceeding the speed limit, which is enforced under the traffic law, increases both the risk of a road crash as well as the severity of the injuries by reducing the ability to judge the forthcoming events. Use of mobile phones distracts a driver in the means of visual, physical and cognitive. These factors are largely preventable but are unlikely; due to the lack of adequate mechanisms in existing road safety plans in Sri Lanka. Especially in rural areas, roads are poorly maintained which has led to faded, hidden, foliage obscured speed limit signs and absence of appropriate signs at vulnerable locations (schools, hospitals). Existing plans also lack alert systems to avoid drivers from using phones while driving. Proposed application uses Advisory Intelligent Speed Adaptation (ISA) to ensure drivers' compliance with legally enforced speed limits by informing the driver on vehicle speed along with speed limits and giving feedback. There exist many ISA systems deployed using various methods such as GPS, Transponders, compasses, speed sensors and map matching, based on native traffic infrastructures of other countries.

Google Fused location provider API web service was used combined with GPS sensor of the smartphone to obtain continuous geo location points (latitude, longitude). Distance between two location points was calculated using Haversine Algorithm. Using the distance and time spent between two location updates, vehicle speed was calculated. Google Maps Geocoding API was used to obtain the type of road on which the driver is driving. Accepted speed limits were stored in a cloud hosted database according to each road type and vehicle type. Application establishes a connection to the database to gain the accepted speed limit whenever a new road type is detected. It compares real-time speed Vs speed limit and initiate audio and visual alerts when the vehicle speed exceeds the limit. Google Places API was used to identify schools and hospitals within 100m and informs the driver using audio and visual alerts. Application uses in-built GSM service to reject incoming calls and in-built notification service to mute distracting notifications. A test trial was carried out to evaluate the accuracy of speed detection. Mean speed of the test vehicle speedometer was 14.4122kmph (Standard Deviation=14.85891) and that of the application was 13.7488kmph (Standard Deviation=14.31279). An independent-sample t-test proved that the speed values of the test vehicle and the application are not significantly different at 5% level of significance. User experiences of 30 randomly selected test drivers were evaluated. 80% of light-motor vehicle test drivers had stated that the application is very effective. 10% of the heavy-motor vehicle drivers and 20% of tricycle test drivers had found it difficult to perceive the audio alerts due to the noisy surrounding. Evaluations prove that the usage of the proposed system can impose a direct and positive effect on the road safety of Sri Lanka as expected.

Keywords: *Intelligent Speed Adaptation, Road safety, Mobile phone distraction*

Arduino Based Home Automation and Security System

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Abstract

Home security systems are designed to minimize the risk of break-ins and protect families from crime. When studying the discipline of modern society, the homeowners are interested on having an Internet based Home Security and Automation systems with reliable method to remote securely. The Arduino Based Home Automation & Security system can recognize as a new approach to the business which will helps to complete the cheaper and most secure system for the modern society.

The developed system is a low cost and flexible home appliances control and home environmental monitoring system. It employs an embedded micro – web server in Arduino Mega 2560. The IP connectivity is established via Ethernet shield for accessing and controlling devices and home appliances remotely. All components can be controlled through a web application called (SmartHomeWeb) or through an Anddroid app called (SmartHome).For the system development process,Arduino, Android, Video Streaming (for monitoring home environment) and cloud based technologies have been used. The Arduino with Ethernet technology is considered one of modern programmable device and utilize from mobile phone and internet.

This framework is intended to help and give help to satisfy the needs of the elderly and the handicapped at houses. The fundamental control system uses an Ethernet shield device gives a wireless access to smart phones and any web browser. The security system includes whole surround of the home. Outside of security system is working as movement detection (by PIR Sensor) and security camera viewer. Using this system, the homeowners can control the appliances (Switch ON/OFF) and awareness of the home appliances Status from anywhere via web application or through android app. And any intruder attacks are detected from sensor and send an email to homeowner with detection time. Further the home owners can monitor the home area from Security camera using video streaming technology in whatever place. This system is designed to control electrical devices throughout the house with ease of installing it, ease of use and cost effective design and implement.

At the end of the development process, evaluation was done using several testing methods, with the help of the other familiar users. The system was deployed with enhancing the processes and performances. And it can be concluded, it has user friendly interfaces and eases of maintenance and cost effective. As Future enhancements, this project can be extended for automatic doors, automatic lighting floor, Garage etc. And also using WIFI Shield, connect the electronic devices as wirelessly.

Keywords: *Arduino Technology, Automation, Security*

Artificial Neural Network based Emotions Recognition System for Tamil Speech

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Abstract

Emotion has become the important part in communication between human and machine, so the detection of emotions has become important part in pattern recognition through Artificial Neural Network (ANN). Human's emotions can be detected based on the physiological measurements, facial expressions and speech. Since human shows different expressions for a particular emotion when they are speaking therefore the emotions can be quantified. The English speech dataset is provided with descriptions of each emotional context available in Emotional Prosody Speech and Transcripts in the Linguistic Data Consortium (LDC).

The main objective of this project describes the ANN based approach for Tamil speech emotions recognition by analyzing four basic emotions sad, angry, happy and neutral using the mid-term features. Tamil speeches are recorded with four emotions by males and females using the software "Cubase". The time duration is set to three seconds with the sampling frequency of 44.1 kHz as it is the logical and default choice for most digital audio material.

For the simulations, these recorded speech samples are categorized into different datasets and 40 samples are included in each dataset. Preprocessing includes sampling, normalization and segmentation and is performed on the speech signals. In the sampling process the analog signals are converted into digital signals then each speech sentence is normalized to ensure that all the sentences are in the same volume range. Next, the signals are separated into frames in the segmentation process. Then, the mid-term features such as speech rate, energy, pitch and Mel Frequency Cepstral Coefficients (MFCC) are extracted from the speech signals. Mean and Variance values are calculated from the extracted features. To create the classifier for the emotions, the above statistical results as an input matrix with their related emotions-target matrix are fed to train, validate and test.

The neural network back propagation algorithm is executed by the classifier to recognize completely new samples of Tamil speech datasets. Each of the datasets consists of different combinations of speech sentences with different emotions. Then, the new speech samples are assigned to identify the recognition rate of the speech emotions using the confusion matrix.
In conclusion, the selected mid-term features of Tamil speech signals classify the four emotions with the overall accuracy of 83.45%. Thus, the mid-term features selected are proven to be the good representations of emotions for Tamil speech signals and correctly recognize the Tamil speech emotions using ANN. The input gathered by a group of experienced drama artists who have the voice with the good emotional feelings would help to increase the accuracy of the dataset.

***Keywords**: Artificial Neural Network, Confusion matrix, Mel Frequency Cepstral Coefficients*

Artificial Neural Network based New Hybrid Approach for Forecasting Electricity Demands in Sri Lanka

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Abstract

The electricity generation and forecasting are playing a significant role to enhance national economic growth. It has a direct impact on both individual's standards of living and industrial enhancements; especially, it is a prerequisite to enhance industrialization, farming and residential requirements. As a result, most of the countries are allocating a considerable amount for power generation and forecasting from nation's annual budget. The main objective of this study is to focus on analyzing the electricity demands in Sri Lanka using a new proposed combined hybrid approach based on Artificial Neural Network.

The methodology of the study is carried as follows. In the first phase, electricity demand of Sri Lanka is forecasting based on the autoregressive integrated moving average (ARIMA) and Artificial Neural Network (ANN) approaches separately. In the next stage, the new proposed combined approach of ANN and ARIMA (ANN-ARIMA) is applied.

According to the Akaike Information Criterion, Schwarz Information Criterion and Hannan Quinn Criterion results, ARIMA(0,1,1) (R-squared : 45%, Durbin-Watson stat: 2.32) and ARIMA (1, 1, 1) (R-squared : 55%, Durbin-Watson stat: 2.03) are best models for forecasting electricity production and electricity consumption under the linear framework respectively.

As a next step, proposed ANN-ARIMA hybrid methodology is applied to forecast non-linear composite based on MATLAB training algorithms. Furthermore, the model selection results concluded that, Backpropagation Neural Network (BPNN) (1-4-1) with 0.06 learning rates and BPNN (1-2-1) with 0.04 learning rates are the best one-step-ahead forecasting for electricity production and electricity consumption respectively.

According to the empirical results, the electricity production and consumption curves went parallel trend up to 1995. However, after 1995 consumption rate has been increasing rapidly with respect to the production rate. When this is the case until 2020, it will create distortions in the Sri Lankan future. So this study is a good sign for the government and energy sources must be introduced and implemented for national power grid early as possible.

Keywords: *Electricity demand, Electricity production, Electricity consumption*

Automated Characters Recognition and Family Relationship Extraction

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Abstract

"Automated characters recognition and family relationship extraction" is an application of Natural Language Processing to identify characters from the story and determine the family relationship among them. This application is the use of specialized computer programs to identify entities, classify them and extract characters from them and determine relationship between them.

This paper follows basic steps of NLP i.e. Tokenization, POS tagging, sentence parsing followed by the pronoun resolution implementing various algorithms and finally extracting entities and relations among them. Heretofore, we have successfully resolved pronoun from simple sentences by resolving Noun Phrase using the recursive algorithm for tree generation and hence extracting relation between the Noun Phrase (NP). Basic approach towards this project is to do Tokenization and POS tagging first. Then, sentence which is recursive composition of Noun phrase, verb phrase and prepositional phrase is parsed and recursive tree is generated. Then tree is traversed to determine the noun phrase which is replaced by the entity object of that particular noun phrase. Pronoun resolution is the essence of NLP and is of different type. Here, Co reference resolution has been used. After resolving the entire pronoun, then finally relationship is extracted from the story by comparing the relation ID of each Entity.

Given the simple story, entities are being extracted and relationship is also determined. Understanding the approach of NLP and implementing them to showcase its use is the main theme of this project which is being done with as accurate result as possible. This paper can act as a base for story summarization, grasping insight of story and analysis of characters of story as well.

Keywords: *Noun / Verb / Prepositional Phrase, Pronoun resolution, Natural language processing*

Automated Financial Management System with an Android Application

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Abstract

A financial company who offers both daily and monthly loans to their customers had to increase their functionality in an efficient manner to full fill the higher demand. The solution was to introduce an automated financial management system to their company by automating their manual process. The main objective of this project was to develop a main system with an android application to use in the company. The main system included the features to input, edit, update, and store the details such as customer, collector, package and loan. Further, it was required to send massages to collectors' smart phone or Tab, update the system database using incoming massages form collectors' smart phone or Tab, and generate reports. The android application includes features to manage a database in smart phone or Tab, update device database using incoming messages from the main system, send messages to update the system database and generate an invoice through a Bluetooth printer. Therefore, there were two parts in this project. The first part was to design and construct the main system, which was located in the head office. This was implemented using Java Standard Edition. By using the main system, owner or manager can handle the activities done inside the office. When a loan was issued to a customer, the particular details are stored in the main system and send to the mobile phone of the field collector via SMS using a GSM modem. Further, the details received via SMS to the modem from field collectors are used to update the MySQL system database. The second part was to build the android application using Dalvik Virtual Machine on Linux Kernel to use in field collectors' mobile phone. Furthermore, the application is automatically updated with the details received from the main system located in the head office. While field collectors are collecting loans, they can access the details through the application and they can print an invoice using a Bluetooth printer to issue for the customer. Further, the collection details are stored in the device and are sent to the main system via SMS. The two parts were connected through a mobile network. Since, they have to use this android application in the areas with lower or no internet facilities, online solutions could not be provided. Although, the internet facility is not available, the main system and the application can be upgraded with software agents using JADE or JaCa like platforms. Further, system testing was conducted by the colleagues using about 100 test cases. In addition to that, the customer acceptance testing was conducted according to the criteria defined by the company. Hence, it was able to prove the completeness and the functionality of the entire system. Finally, with the automated system, they were able to improve the performance of the company by saving the human and physical resources and removing the unnecessary queues in the head office.

Keywords: *Financial Management System, Android Application, Message Transferring*

Automotive Windshield Wiper Blade from Incorporating RSS/Skim Rubber Blend in the EPDM Formulation

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Abstract

Ethylene-propylene-diene rubber (EPDM) is one of the highly demanded synthetic rubber to manufacture automotive windshield wiper blades. In order to Sulphur vulcanizing of EPDM, powerful synergistic systems are needed to cope with the low level of unsaturation in the EPDM rubber. Blending natural rubber in the form of ribbed smoked sheets (RSS) and skim rubber is an obvious method of taking advantage of the relatively low price of skim rubber whilst minimizing its disadvantages, not least that possible variability. In addition, the vulcanization characteristics of skim rubber better due to presence of higher amount of non-rubber ingredients in skim, which act as co-accelerator activators for the vulcanization reaction. Hence skim rubber is used for increasing the rate of vulcanization of SBR. Similarly, non-rubber ingredients present in skim rubber can act as co-accelerator activators for the vulcanization of EPDM also. Optimum amount of skim rubber that can be used as an additive to improve cure characteristics and physico-mechanical properties of EPDM lies are around 5 phr with TMTD/TBBS accelerator system.

This research was focused to investigate the potential of EPDM/RSS /skim rubber composite to manufacture automobile windshield wiper blades. The used blend ratios of EPDM/RSS /skim rubber composites were 30/70/0, 30/65/5, 30/60/10, 30/55/15, 30/50/20 and 30/45/25 and the composites were prepared according to the ISO 4097-1980 (E) formulation with TMTD/TBBS accelerator system.

Optimum cure time of the composites progressively has decreased from the first composite to the last composite. Torque difference of the composites has increased with the increment of skim rubber content up to 15 phr and after that it has decreased. However, scorch safety has gradually increased when increasing the skim rubber quantity of the composite. Cure characteristics after 30/55/15 ratio implies the decrement of crosslink density of the composites due to decreasing the number of cross linking sites in the composites. Highest hardness value (61 IRHD) and the lowest compression set % (27) was also obtained with the 30/55/15 composite. The overall results of this study shows that even though the amount of non-rubber ingredients increases with the increment of skim rubber, the number of cross linking sites available for the Sulphur vulcanization has been decreased. This research study concludes EPDM/RSS/skim rubber composite of 30/55/15 ratio can be used to manufacture automotive windshield wiper blades.

Keywords: *EPDM/RSS /skim rubber composite, Cure characteristics, Physico-chemicalproperties*

Challenges in Implementing ERP Systems in Small Medium Manufacturing Companies in Sri Lanka

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Abstract

There are numerous information systems available in the market to be selected for implementation in manufacturing organizations. When many information systems manually intergraded for management reporting for a company, there are high risks for accuracy of information. ERP is one of the information systems with inbuilt capacity to integrate many parts of the functional areas that provides meaningful information to the management. This paper describes the experiences on how a small medium size growing roof manufacturing company in Sri Lanka problem and then overcome in implementing ERP system. Small medium size manufacturing companies in Sri Lanka do not normally have electronic information system in all part of business process, whereas some processes such as production process operates outside the information system. Therefore, it is very important to predefine what level of integration to be done, who are the related parties to be consulted and what level of management information is required. The success of ERP implementation is partially depending on the selection of suitable ERP system compatible with company business process and the capability of implementation partner to map those standardized business processes into ERP by conducting BPR. This manufacturing company has many automated manufacturing plants with Programmable Logic Controllers (PLC) versions from year 1960 to 2013. When these PLCs try to integrate into ERP system, there are so many problems faced by the company that leads up to modification of plant. Finally, company decided to implement ERP by postponing the PLC integration. Well tested bugs free less customized SAP B1 system has been implemented to the company by monitoring progress by several log books. The big bang approach has been followed to implement the SAP B1 system with short term parallel run of legacy system. More importantly, top management support and motivation on change management has fuelled up the success of the SAP B1 implementation. This paper reveals the experience gained during the planning to implementation stages of SAP B1 that may occur in small medium manufacturing companies in Sri Lanka.

Keywords: *ERP, Small Medium Manufacturing, Parallel Run*

Coal Fly Ash as an Alternative Substrate to Replace River Sand in Cement Mortar Mixture

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Abstract

Coal is the most extensively used primary source of energy that accounts globally for 25% of total energy consumption. The global generation of coal fly ash (CFA) is estimated to be above $6x10^8$ Mg per annum and its recycling rate is rather low (15%). Sri Lanka is also facing major economic and environmental problems of disposing CFA from Norochcholai thermal power plant and part of CFA disposal is being used as a raw material for cement production. However, CFA with high loss on ignition (LOI) values cannot be used for blending with cement and this study was designed to investigate the potential utilization of high LOI-CFA as an alternative substrate to river sand in cement mortar preparation. Compressive Strength (CS), water demand (WD), moisture content (MC), initial setting time (IST), and final setting time (FST) were examined to select the most suitable mixing ratio of CFA and river sand.

Treatments were prepared in accordance with SLS ISO 1253−107: part 2−2008, with 30 replicates for LOI and MC. Treatments were defined as the percentage of added CFA into sand as T_1=0 (control), T_2=5%, T_3=10%, T_4=12%, T_5=15%, T_6=18%, T_7=20%, and T_8=25%. Four replicates per each treatment in different three ages (one day−1D, seven days−7D, and twenty-eight days−28D) were tested for CS of mortar in accordance with SLS ISO 679:2008. Initial and final setting time of cement CFA mixture was determined in accordance with SLS ISO 9597:2008(E) with 8 treatments.

Results have proven that high LOI-CFA can be used as an alternative substrate to sand up to 20%. The average CS for 1D, 7D, and 28D of control treatment were 16.8 MPa, 41.3 MPa, and 51.3 MPa respectively. The highest CS for 1D (21.9 MPa) and 28D (71.1 MPa) were given by 10% CFA treatment, but the highest seven-day CS results (50.1 MPa) was given by 12% CFA treatment. Each treatment was significantly different from other treatments. Means for CS of T_2, T_3, T_4, T_5, T_6 and T_7 were not significantly different from the mean of control treatment, while T_8 (25% CFA and 75% sand) was significantly different from the control. R^2 between WD and CFA percentage obtained by regression analysis was 93.2%, which showed a strong relationship between them. R^2 of IST versus WD, and FST versus WD were 97.7 % and 94.8 % respectively, which showed strong relationships with WD. Hence, it can be concluded that increasing CFA percentage up to 20, gave increased WD, IST, and FST.

Keywords: *Cement mortar, Coal fly ash, Compressive strength*

Conflict Categorization of ERP Implementations in Asia Pacific Region

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Abstract

An Enterprise Resource Planning (ERP) system is an integrated software system, typically offered by a vendor as a package that supports the seamless integration of all the information flowing through Business Processes, Business Intelligence, Business Integrations, Collaborations, etc. This research is intended to discuss on complications in ERP implementation in Asia Pacific (APAC) region with the client, vendor, implementer, consultant and project management perspectives.

The objective of this research-in-progress paper is to develop a clear visibility of categories of conflicts in ERP projects in multicultural environments. Categorization of ERP project implementation related conflicts would provide better preparation for a successful project implementation and delivery. This is the first attempt for the journey to consolidate the literature on the conflicts associated with ERP projects. Also seeking for uplift the understanding of conflict and managing the same effectively in APAC region.

In this case our research question is "Can we categorize ERP project related conflicts?" and if so, "What are the categories of conflicts in relation to ERP implementation in APAC region?" Alsulami (2013) on his "Consolidating Understanding of ERP Conflicts : A dialectic Perspective, Computer Science and Information Systems Faculty, Umm Al-Qura University" categorised ERP projects conflict related to Australian experience into two; such as "Technical related and Process related". However, thirteen business cases in Sri Lanka, India and Malaysia show us conflicts can be categorised as "People related, Technology related & Methodology related". These findings can be effectively used by ERP Implementers, Vendors, Consultants, Project Managers and Researchers in their respective projects.

***Keywords**: Conflict Management, ERP Implementations, People*

De-Identification for Privacy Protection in Audio Contents

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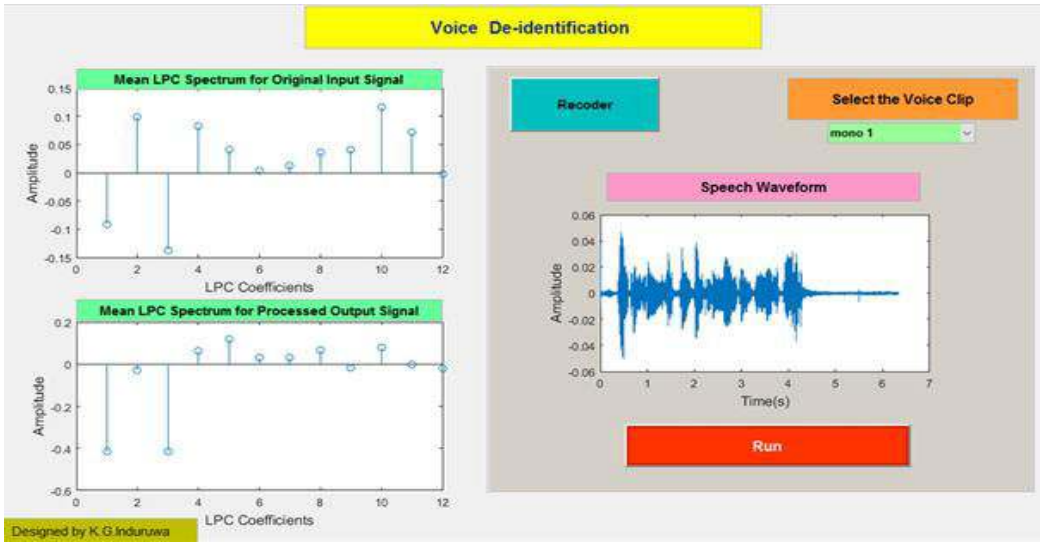
Abstract

Among different forms of audio data or information, the author wishes to limit the scope of this research to privacy protection in voice contents of speakers, because voice generally conveys intelligence such as gender, emotion and it differs from speaker to speaker. De-identification of voice may bring numerous advantages, such as preserving the privacy of speakers during communication, maintaining confidentiality of inquirers who conduct critical investigations and improve the clarity of voice signals used in airport/aviation communication by standardizing the voices of Pilots and Air Traffic Controllers. Though advanced voice encryption methods are available to deteriorate the intelligence of speech, they do not directly address the issues of speaker de-identification. This research project aims at de-identification of voice signals while preserving the intelligence of the speech during communication.



Designed GUI for mono LPC spectrums of original and de-identified voice signals

In this project, the de-identification process was done at three stages, where the last two processes are irreversible. First, in the frequency normalization stage, pitch of the original signal is changed and slightly de-identified the voice in frequency domain. Then 12 LPC (Linear Predictive Coding) co-efficient values of the subject-person's original voice signal is subtracted from the 12 co-efficient values of the reference sample voice signal. As a result, features are slightly moderated by the second stage. In the third stage the features are destroyed again by shuffling LPC co-efficients randomly within three categories. Therefore, this whole process is expected to preserve a higher level of privacy. Based on the test carried out by using 15 samples of male and 15 samples of female voice produced a degree of 10% and 20% de-identification, which could be accepted as a very satisfactory result.

Keywords: *De-identification, Privacy Protection, Audio Voice Data*

Design and Development of a Dashboard for a Real-Time Anomaly Detection System

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Abstract

Web logs contain a wealth of undiscovered information on user activities and if analyzed in a proper way they can be utilized for many purposes. Identifying malicious attacks and having a daily summary on user activities are some valuable information that can be extracted from these log files. At present, many tools and algorithms have been developed to extract information from these log files but on most occasions, they have failed to present this information to the user to make decisions in real-time. This paper presents a novel approach taken to design and develop a dashboard for a real-time anomaly detection system with the use of some open source tools to process complex events in real-time, batch process stored data using big data tools and dashboard development techniques. The system accepts web log files as the input; first they are cleaned by a preprocessing unit and then published to WSO2's complex event processor as events to identify and filter out special patterns and summarised by using a set of user specified rules. If an anomaly is detected, an alert or warning will be displayed on the widget based dashboard in real time. Furthermore, each and every event stream that comes to the CEP will be forwarded to WSO2's Data Analytic Server via 'Thrift' protocol. That data will be saved in a Cassandra big data database for further batch processing which is used for drill down purposes. A widget based Dashboard has been developed with the use of modern dashboard concepts and web technologies to display information such as daily summary, possible security breaches in an interactive way allowing system administrators to make operational decisions then and there based on the information provided. Moreover, users can drill down and analyze the historical security breach information and also can customize the dashboard according to their preference. The evaluation techniques used fall under the criteria of evaluation against well-established standards and evaluation by external expert review. Evaluation for security standards has done against the security standard set by the PCI security standards council and evaluation for dashboard has been carried out against the dashboard standards defined by Oracle which describes about the best practices in developing an effective dashboard. Evaluation by external expert review was done in line with the people who have prior experience in dealing with a dashboard in different contexts. Ten expert evaluators from different expertise areas (System Administrators, UX engineers and QA engineers) have been used for this evaluation and a score based model was used to determine how efficient this dashboard is to view and drill information. Based on the results yielded from the evaluation, it is identified that the dashboard meets with the international standards of dashboard designs, well established security standards in dashboard design as well as provides the best user experience for users in different functional areas.

Keywords: *Log files analysis, Big data, Visualization*

Detecting and Classifying Vehicles in Video Streams of Homogeneous and Heterogeneous Traffic Environments Using Gaussian Mixture Model

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Abstract

Traffic and transportation play an important part in modern national economics. Efficient use of transportation infrastructure leads to huge economic benefits. Traffic can be classified into two main categories as homogeneous traffic and heterogeneous traffic. In transportation engineering, sufficient, reliable, and diverse traffic data is necessary for effective planning, operations, research, and professional practice. Even though, Intelligent Transport System are used to find answers for that issue still it is not yet fully successful.

Many technologies have been developed to collect different types of traffic data. Traditional data collection technologies have several drawbacks. On the other hand, video based traffic analyzing has become popular. Computer vision techniques are used for detecting and classifying data in traffic videos. Those technologies are highly beneficial as it can give us more information about the parameters, easy to install and maintain and has got wide-range operation. In Computer vision, vehicle detection process has two main steps as Hypothesis Generation (HG) and Hypothesis Verification (HV). Background Subtraction is a popular method used in HG. There are several algorithms used in Background Subtraction and Gaussian Mixture Model is one of them. These methods are used in homogenous traffic situations. The objective of this study is to detect and classify vehicles from a homogenous and heterogeneous traffic video stream using Gaussian Mixture model.

This study was conducted using an experimental method. Several set of road traffic videos were collected. One is collected at off peak time; i.e. 9.00am to 10.00am. At that time behavior of the traffic is similar to homogenous traffic environment. The other set of videos is collected from 7.00am to 8.30am. At that time, road traffic has no order and the traffic density is high. It is similar to heterogeneous traffic environment. After Gray Scaling and Noise reduction, the videos were submitted to algorithm based on Gaussian Mixture Model. The algorithm was implemented using Math Lab software. Vehicles are classified as large, medium and small. Manual observation results and experiment results were compared. Accurate results were observed from homogenous traffic conditions. But results in heterogeneous traffic conditions is less accurate. The Gaussian Mixture Model can be used to detect vehicles in homogenous traffic conditions successfully, but it is needed to be improved in heterogeneous traffic conditions.

Keywords: *Detecting of Vehicles, Homogeneous / Heterogeneous Traffic, Gaussian Mixture Model*

Dynamic Human Workflow handling by PL/SQL

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Abstract

Human task assignment is a predominant operation in organizational problem-solving process which can rapidly change from situation to situation. Current workflow handling systems are less-adaptable and less-customizable regardless of whether the workflows are manual or automated. This study introduces a series of algorithms written in SQL to handle human task workflows by executing XML based objects.

The given solution consists of entity objects which can either be a single person or a group of people. The two types of entity objects were connected to each other by the relationships. The relationships from one entity to another entity will hold the actions that the first entity can perform. Based on the action taken by one entity will decide the proceeding path of the workflow. These entity objects consist with a property called status which can be true, false, or null which represents whether it is available for the execution or not.

SQL scripts were developed to handle the workflow components written in XML format which will provide a better opportunity to gather information of each entity and relationship objects through Graphical User Interfaces. As the first step of the SQL script, it will convert the XML data into a SQL table format which provide a better way to handle the information gathered.

Backward Process is used whenever a component is being executed, previous components from that level will be checked for status values and it will set status false whenever finds a component without any status value. This process will prevent the execution of unwanted branches of the workflow and speedup the execution process because only the components with true or null as the status value will be considered in the execution time.

Reset Workflow is used to reset status values of the objects from directed object onwards when the path of the workflow directs to a previous level of the workflow. It will make sure that previously taken actions will not effect on the next execution cycle.

Execute an Action method will handle the actions taken corresponding to a certain object. It will decide the proceeding path of the workflow hierarchy according the action taken. Then it invokes the “execute next component” method to move along in the selected path.

Execute next component method will check all the other objects related to the object which used to invoke the method. It will execute all the logical operations based on the action taken by an entity in order to decide the proceeding path of the workflow.

Method given in the study was tested by integrating to an existing system where it showed the capability of executing complex workflows accurately. Contrary to manual workflow engine, this architecture is efficient and effective in business process as it can increase the performance of organizational workflow allocation. Instead of using a separate application, this solution can be integrated with an existing system since it is very adaptable and customizable. Approach to handle scheduled tasks can be identified as a major future aspect for the study where the performance can also be improved in future.

Keywords: *Organizational workflow, Automated workflow engine, SQL procedures*

Dynamic Mechanical and Thermal Properties of Natural Rubber Latex Films Filled with Surface Modified Silica

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Abstract

Natural Rubber Latex (NRL) is used in numerous fields due to its outstanding performances such as excellent elasticity and essential eco-friendly nature. However, the existing tensile and tear strength of NRL is not sufficient for the functions of extra thin film products. Therefore, scientists work on reinforcement of NRL with silica filler. However, the hydrophilic nature of silica particle makes an unsupportive role to its compatibility with hydrophobic rubber. Hence, surface modification of silica is essential to convert the hydrophilic surface into hydrophobic and it has been successfully accomplished by using hydrophilic polymers. The modified filler is succeeded in preceding studies for the reinforcement of NRL films. Beyond the reinforcement, properties like low stiffness, mechanical and thermal stability also play a major role in enhancing the quality of a consumable thin film product. In order to investigate those properties, Dynamic Mechanical Thermal Analyzer (DMTA) is widely used. The present study focuses on studying such properties of NRL cast films reinforced with silica filler. The surface modification of silica particles and preparation of modified filler (8phr) added cast films are carried out as per the reported methods of our team and the films filled with modified (8M) and unmodified (8U) filler and unfilled (STD) films are analyzed by using tension and dual cantilever modes of DMTA instrument to investigate their thermal and mechanical properties as a function of temperature.

The obtained storage modulus and tan delta curves show the energy dispersion throughout the rubber film with the temperature increment. The tan delta curves shown in Figure 1 illustrate the lowest peak value of tan delta given by modified filler added rubber film (8M). It reveals that 8M has higher energy dispersive ability. The rate of decrease in storage modulus also low in 8M sample at the phase transition region; from glass state to visco-elastic state. It proves that improved interfacial interactions between modified silica and rubber matrix. The higher energy dispersive ability reveals the sustaining of foremost rubbery properties whilst improved interfacial interactions reveal the reinforcement property of modified filler added rubber film.

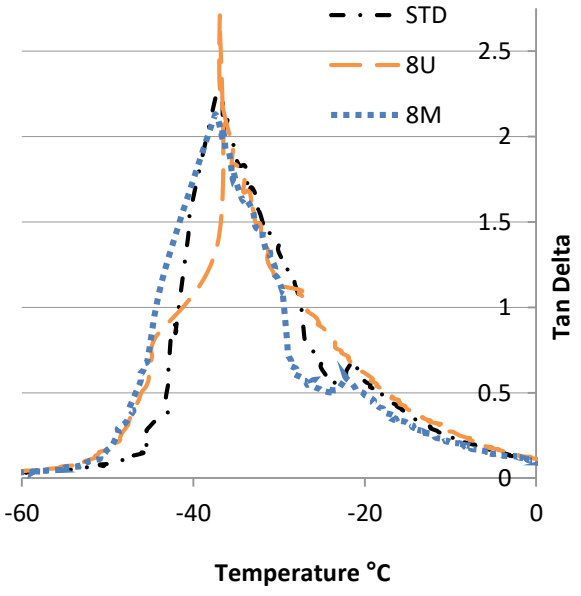

Figure 1: Tan Delta Curve of STD, 8M & 8U samples

Keywords: *Natural rubber latex, Surface modification, Thermal and mechanical properties*

Facilitating an E-Learning Platform Beyond the Lectures: Digital Natives Become Active Learners

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Abstract

The traditional lecturing can't inspire the digital natives towards the engagement in active learning to succeed them in the university environment and beyond in the real world context. In 2004, Romiszowski declared that e-learning presents an entirely new learning environment for students, thus requiring a different skill set to be successful. In 2008, Markus stated that e-learning is a learning process created by interaction with digitally delivered content, network-based services and tutoring support. E-learning is also called web-based learning, online learning, distributed learning, computer assisted learning, or internet based learning. This study was focused to explore the impact of a poster exhibition project on the active learning of digital natives by providing an e-learning environment.

This study was carried out with Level 2 Polymer Engineering Technology students and four consecutive annual poster exhibitions has been conducted with four different batches. Each poster exhibition project was a one-month project. The students were grouped into 12 teams of 2 students in each group and each group had to prepare one poster after finalizing a theme for the poster exhibition project and the topics for the individual posters. The theme and the topics were selected to cover more than the 75% of the syllabus content of DPT 207 Polymeric Materials subject. In preparation of the posters, each group had to write a report in prior to create the rough skeletons for the poster by referring relevant articles including journal articles through the internet and each group was asked to email that report to the researcher before the given deadline. Through the constructive feedback the students had to modify the rough skeletons several times and finally came up with amazing posters. At the end of the poster exhibition project the students were given a questionnaire with both open-ended and close-ended questions. Descriptive statistical results reveal the facilitation of e-learning helps the students to learn actively, motivationally and to enhance self-monitored learning along with the collaborative learning.

By enabling learners to be more active participants, a well-designed-e-learning experience can motivate them to become more engaged with the subject content and further develop them as life-long learners.

Keywords: *E-learning, Poster exhibitions, Graduate attributes*

Factors Influencing the Students' Intention to Adopt E-learning Special Reference to Eastern University, Sri Lanka

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Abstract

E-Learning is becoming an important part of learning process. With the evolvement of Information Technology, the "Teacher Centered" traditional learning methodology has started to change to "Learner Centered" methodology. As per this change in learning process, the use of technology plays an important role to enable students to engage fully in their program of study. Moreover, e-learning process makes the students very easy to engage with their academic activities. In most of the developed countries, "Distance learning" became huge popular with the use of e-learning process. In Sri Lanka, also most of the higher institutions are trying to provide e-learning facilities to their students in order to utilize the advancement of modern technologies. However, it is necessary to identify the influencing factors regards to e-learning process to fuel the utilization of this emerging technologies such as Virtual Classroom, Learning Management System (LMS). This study examines the influencing factors on students' intention to adopt e-learning as a tool of learning. Therefor 210 students were randomly selected from Eastern University, Sri Lanka and data were collected through a structured questionnaire. Correlation and Multiple regression analysis were done based on the Technology Acceptance Model (TAM). More than this model a variable called "Prior Knowledge on ITC" was added and analysis was run. Correlation denotes that Perceived ease of use has significant medium positive relationship with intention to adoption of e-learning where $r=0.483$, $p=0.000<0.01$. Perceived usefulness and prior knowledge has significant positive strong relationship with intention to adoption of e-learning where $r=0.773$, $p=0.000<0.01$ and $r=0.863$, $p=0.000<0.01$ respectively. However, multiple regression analysis reveals that "Prior knowledge in ICT" is the most influencing factor on intention of adoption to the e-learning activities. Chi-square test confirms that there is a difference between two gender group in intention of adoption to e-learning activities and crosstabulation analysis shows that boys are more intent to adopt e-learning activities than girls.

Keywords: *E-Learning, Adoption of e-learning, Technology Acceptance Model*

Finite Element Analysis of Inflation Tyre Simulation Using Simulia Abaqus

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Abstract
Finite Element Analyses (FEA) are conducted in tyre industry either for a safety verification or prediction of the characteristics of virtual tyres. In the design stage of a tyre, it is impossible to determine its manufacturing performance. Therefore, modeling of a virtual tyre plays a significant role when predicting the performance and the characteristics of the tyre. At the end of the virtual simulation if the results do not satisfy the customer requirements, the tyre parameters can be easily changed without manufacturing a prototype sample. This inflation simulation is conducted to determine the outer diameter and the section width of the tyre after pressurizing it under given loading conditions. To obtain the required characteristics of the tyre, the input parameters are adjusted accordingly. It leads to analyze several versions of this virtual tyre simulations. Here, three different versions of virtual tyres are individually analyzed and, the best fitting parameters are determined. The accuracy of the FEA method is estimated by comparing simulation results with that of the prototype dimensions. In the method, three versions of the virtual tyres and the prototype tyres are individually compared to verify the results. As per the estimation, FEA of virtual model simulation shows low dimensional variance (2.38%) compared to that of the actual prototype simulation. Therefore, the results confirm the high accuracy of FEA method in virtual tyre simulation and the importance of implementing it in local industries. It would certainly cause to save precious time, unnecessary cost while increasing the quality of the products.

Keywords: *Finite Element Analysis, Inflation Simulation, Tyre Pressure*

Foreign Exchange Rate Prediction using Artificial Neural Network and Sentiment Analysis

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Abstract
Foreign currency exchange plays an important role for currency trading in the financial market. Modern approach to the foreign currency exchange market requires support from the computer algorithms to manage huge volume of transactions. There occurs problems like trading without a plan, failing to adapt to the market, having unrealistic expectation and many more. Due to these problems, predictions are to be done. This paper investigates on prediction of foreign exchange market using neural network and sentiment analysis. There are many algorithms for performing prediction but different algorithms have different accuracy. One of the best method with high accuracy is given by Artificial Neural Networks (ANN). Neural network parameters include number of hidden layers, number of neurons, use of bias neurons, activation functions and training methods. Input nodes are price of gold, crude oil, Nasdaq index, yesterday's price. Our model contains 4 input node, 1 hidden layer and 7 hidden nodes. At first, pre-processing is done and inputs are fed to the neural network. By using backpropagation algorithm, training is done and then testing is performed. Mean absolute percentage error is found to be 0.39%. The price movement is also directly related to market sentiment. We aim to employ a statistical technique to the opinion of different traders and finding the overall sentiment. Sentiments are taken from tweets and then filtering the tweets are performed. After that, features are extracted and by using Naïve Bayes algorithm, the results are classified as positive or negative.

Keywords: *Foreign Exchange Rate, Back propagation algorithm, Naïve Bayes algorithm*

Four Legged Walking Robot with Smart Gravitational Stabilization

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Abstract

There are many dangerous jobs which could be safely replaced with an adequately designed robot: bomb disposal; construction in high rise buildings; examination of radioactive environments and combat oriented police/military operations. A machine must then achieve a level of dexterity and reliability greater than that of a human worker.

One of the most versatile dynamic robots that can be seen today was made by Boston Dynamics: the quadruped robot named Spot Mini is capable of handling objects, climbing stairs and operating in an office, home or outdoor environment (Bostondynamics.com, 2017).

One of the main shortcomings of such robots are their size, cost and inherent need for power. Additionally, a dog inspired gait structure is not optimal for climbing.

The aim addressed in this study was to design a robot that would be inconspicuous, capable of maneuvering through small environments and be able to climb inclined surfaces with minimum processing power and cost. To this end, the robot was programmed with an insect inspired gait mechanism for maximum surface area while climbing and a novel ability to maintain the center of gravity by leg movements as shown in figure 1A. Table 1 shows a direct comparison of mobility between the finished robot and an average human being. It would either walk or stabilize once instructed via Bluetooth. The newfangled placement of legs ensured bipod gait during locomotion for faster and efficient motion and monopod gait during the stabilization phase for agility. The desired positions were calculated by the use of inverse kinematics and data from the IMU.

Table 1: Mobility Comparison between the robot and a human

		Robot	Human
Angle of motion per leg	Hip	180°	130°
	Knee	180°	130°
	Ankle	180°	45°
Max. Climbable Inclination		55°	30°
(DOF) Degrees of Freedom		12	6

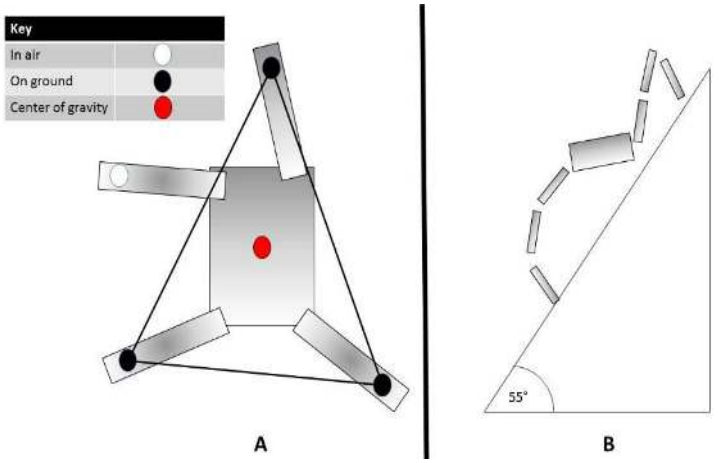

Figure 1: A: Robot's novel balancing algorithm; B: Depiction of robot's posture at maximum inclination

The finalized robot was able to successfully walk and proceed through various terrain including grass, sand, small stones and miscellaneous household objects such as books, bags, pencils etc. The auto balancing function worked for as steep an angle as 55°.

Keywords: *Smart Robot, Auto Balancing, Microcontroller*

Impact of Media Convergence on Media Environment (With Special Reference to Sri Lankan Media)

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Abstract

Revolutionary changes and developments communication and technology have, in turn, facilitated changes in the media environment. Convergence is one of the main trends of these new technological revolutions. It brings together one or more things to support one single media channel. It is used to describe multiple processes that are changing audience habits worldwide. In the media context, convergence is the process by which existing technologies combine into new forms that bring together different types of media and applications. Convergence has given to media the ability to adopt new forms of publication never investigated before. Furthermore, media convergence is the combining of mass media outlets, for example print, radio, television as well as the internet along with transferable, connective technologies through various media platforms. Nevertheless, convergence media generally controls one medium or accomplishes some basic functions. The media massage can interact with a broad audience. For example, any type of newspaper can be included to audio and video text on their web publications. Convergence media can disseminate any type of news or other information within a few seconds. Broadcast stations also have the capacity to include text and video on their web publications. Audience have vast choices and can obtain news and other information on same media at the same time. On the other hand, the media organizations can reduce products and software cost and create multi skilled journalists. Media convergence has become a vital element of new millennium and all media industries have to get accustomed to this technological innovation.

This paper studies the impact of media convergence on media environment with special reference to Sri Lankan media and also examines how it impacts audiences, massage journalists as well as organizations. Both primary and secondary data have been used in this study. Interviews, questionnaires and self-observation were used as primary data. And also secondary data to gather reviews of literature qualitatively. This study found convergence of technology has changed the whole media environment, at present journalists can used the internet, networking sites, digital cameras and new mobile phone technologies for news gathering around the world within one second.

On the other hand, they not only use one way to disseminate their news and other information. Therefore, they have to maintain on line publication and used massage as a text, audio and video. Media convergence has created multi skilled journalists, they are not only trained to report news stories but also to report with the audios, photos and videos of the event using their mobile phones or devices. Audience are also not ready to take news and other information through one channel, therefore media is also providing exciting, interesting and thoughtful news stories through all channels on their web publication.

Keywords: *Convergence, Media environment, New technology*

Improvement of Rubber to Steel Adhesion in Press-on Solid Tyres by Varying the NR/BR Ratio in the NR/BR Composite Bonding Layer

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Abstract

Press-on solid tyres are typically made from a tread compound and a bonding layer as a composite on to the pretreated and adhesive (primer and cement) coated steel band. The so called intermediate bonding layer is a NR/BR composite. A significant problem in solid tyres is the loss of adhesion between steel and rubber with time. This limits the ultimate useful lifetime of the reinforcement and hence, of tires. This research was focused to investigate the improvement of the rubber to steel adhesion by varying the NR/BR ratio in the NR/BR composite bonding layer. In 1984 M.G. Huson et.al reported, even though NR and BR are differing little in either polarity or degree of unsaturation NR/BR blends have been shown to suffer uneven crosslink distributions in sulphur vulcanizates and effects the physico-mechanical properties of the NR/BR blends. D. Freitas (2003) showed in preparation of NR/BR rubber blends, the addition sequence with which the components of the formulation are mixed does have influence on the behavior of the final material. Fluctuation of the prices of NR and BR in the market also significantly affect to the cost of NR/BR composite.

In this study, NR/BR composites were prepared by varying the NR/BR ratio from 100/0, 90/10, 80/20, 70/30, 60/40, 50/50, 40/60, 30/70, 20/80, 10/90 and 0/100. Curing characteristics and the physico-mechanical properties including the adhesion value were measured in each prepared NR/BR composites. The best adhesion value obtained with the 50/50 NR/BR composite and it was 25.61 KN/m and that was in the excellent level according to the figures given for levels of adhesion for rubber to metal in ISO 813 peel test. The best tensile strength, hardness and the rebound resilience values also obtained from the 50/50 NR/BR composites and those values were 22.6 MPa, 63 IRHD and 55%. These properties together with cure characteristics and the ageing properties also were the best in the 50/50 NR/BR composite.

Adhesion values were higher than the adhesion value obtained from the currently utilizing NR/BR composite. The results further concluded that the so called properties including rubber to steel adhesion properties obtained from 50/50 NR/BR composite is better than the currently existing NR/BR composite which is with 70/30 NR/BR ratio.

Keywords: *Press-on solid tyres, Rubber to steel adhesion properties, NR/BR rubber blends*

Indoor Low Cost Multipurpose Autonomous Blimp Robot: Mechanical Implementation

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Abstract

Various conventional implementations of popular autonomous flying robots have restricted time of flight, due to their inefficient power consumption. Main reason for this inefficient power consumption is the unavoidable load caused by usage of brushless or DC motors to provide lifting force. This issue can be solved by implementing an airship balloon that uses a gas lighter than air such as Hydrogen or Helium to provide the required lift. But, the use of such gases significantly affect the cost of the flying robots.

Considering these practical issues, technical structure implementation of a flying robot, capable of auto navigating in indoor environments was carried out under this project. This project has focused on the structures, materials as well as hardware requirements to ensure both the functionality and the cost efficiency for multi purposes of a blimp robot.

Implementation of the blimp robot was done, firstly by conceptually designing it in SolidWorks CAD tool and determining all the relevant materials and chemical requirement. The robot was mathematically modeled to determine its dimensions and propulsion system. Next the hardware circuitry required to control the blimp was implemented and according to the dimension restrictions the designed mechanical parts were 3D Printed and assembled as shown in Figure 1.

Importance of such flexible robot causes to make it applicable for multi purposes through modifications such as providing mobile security for an indoor environment, risky environment inspection, RFID tag scanning for malls and High tension power line inspection. Therefore, factors including excess weight support, sustainability for drags and performance were thoroughly ensured in this project.

Figure 1: Front view (left image) and Side view (right image) of the implemented Blimp Robot

Keywords: *3D Printing, Flying Robot, Hydrogen*

Introduction of a Four Stage Process of Developing Interactive Multimedia Based E-learning Materials

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Abstract

Interactive multimedia-based learning materials have been commonly used to facilitate teaching and learning. Technological tools have made the task of creating expression through multimedia more easily available. Invariably this has altered the dynamics of interactions that have traditionally constituted educational ecology of the classroom.

Sri Lankan higher education sector has slightly move towards student-centered (collaborative) e-learning based around construction to increase equity of access to education, to improve teaching and learning, and to promote students and academic staff in student-centred and activity-based teaching and learning. In designing pedagogically sound interactive multimedia-based e-learning materials, a high premium needs to be placed on leveraging a judicious mix of various presentation modes to cater to user's differing learning styles and needs. This will ensure that learning is optimized which is essentially student-centred in nature in multimedia rich learning environments. However, as identified by National E-Learning Resource Center (NELRC) at University of Kelaniya, Sri Lanka, most of public higher education institutes largely use face-to-face teaching while e-learning is used as a supplementary tool. There is a lack of understanding of developing technological and pedagogical sound interactive multimedia based e- learning materials which are current problem areas seeking attention.

This study used qualitative methodology which made use of qualitative method such as content analysis. This includes three distinct approaches: conventional, directed, and summative. This study used conventional content analysis where coding categories are derived directly from the text data. Based on conventional content analysis of e-learning literature which published in 2010-2016 and retrieved from EBSCO database, the four-stage process i.e. Analysis, Design, Develop, and Delivery has been developed to be used in developing technological and pedagogical sound interactive multimedia based e-learning materials in the Sri Lankan higher education system.

After understanding the requirement of developing e-learning materials, the identified process start with the analysis stage which include multiple stages i.e. analyze the needs, cost, content, market, technology, and delivery method and assessment strategies. Design, develop, and delivery stages can be then carried out which also include multiple steps. This process will be useful as a guide for any e-learning centers or any teaching and learning organization for developing interactive multimedia based e-learning materials.

Keywords: *Interactive multimedia, E-Learning, Sri Lanka*

Investigation of Efficiency of the Solid-state Dye-sensitized Solar Cells with Metal Centered Dye and Metal-free Organic Dye

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Abstract

Converting solar energy into electricity provides a much-needed solution to the energy crisis the world is facing today. With continuous research studies conducted in this field, we have come across the third generation of solar cells; the dye sensitized solar cells. Several types of dyes have been individually employed to study sensitization process of TiO_2|sensitizer|p-semiconductor type solar cells. Highest efficiency has been achieved from dye-sensitized solar cells using ruthenium based metal complexes as dyes on glass substrate. However, ruthenium metal complexes cause environmental issue and they are very expensive. So we are in a need to find an alternative method. In this study metal free organic dye was used to prepare DSSCs to compare the efficiency of the solar cell with metal centered dye. In this study, an environmental friendly dye, 1-(2-hydroxycarbonyl-phenyl)-5-(2-hydroxy-5-sulfophenyl)-3-phenylformazan (zincon) is used as a dye (sensitizer) to fabricate a solar cell. Zincon is an azo dye used as indicator for detection of metal ions. Zincon dye exhibits solvatochromic behavior due to enforcement of Van der Waals interaction between dye molecules and solvents depending on their polarity. Zincon was coated on titanium coated conducting glass substrate. Zincon dye has different surface chelating groups and making bonds easily with metal oxides. Coupling of zincon dye by COOH group with Ti^{4+} was confirmed by FTIR measurements. A platinum coated plastic substrate is attached to the dye coated film and the space was filed by the $I^-|I_3^-$ electrolyte by capillary action. I-V characteristics were measured under light illumination. Photocurrent of 1.6 $mAcm^{-2}$, photo-voltage of 395 mV, fill factor 26.5 % and efficiency of 0.2 % were observed as the best performances of the cell. Performance of this DSSC is very poor when comparing this with metal centered dye used DSSC as it gives nearly 15.3$mAcm^{-2}$ photo current and having efficiency up to 3.8%.

Keywords: *Zincon, Dye-sensitized Solar Cell, Azo dye*

Machine Learning Dashboard for Aviation Fuel Optimization

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Abstract

The aviation industry is the one of the fastest-growing travel industry in the world. This industry is growing 7% per year and is giving its facilities for more than 1.5 billion passengers. The International Air Transport Association (IATA) indicates that this number will pass in the next 20 years by 7.3 billion of passengers. Due to this large growing passenger count, airplane manufacturing companies such as Boeing & Airbus are making more efficient planes to handle this amount.

Aviation fuel is the biggest cost in air transport. IATA (The International Air Transport Association) figures show that everyone dollar increase in the cost of oil per barrel increases the airline industry's costs by about $1 billion. So that airline companies do their best to optimize the fuel usage managing many types of maintenance, weight flowing management to reduce the plane taxi fuel. Airplane manufacturing companies are also gearing up to make more fuel-efficient planes. This research project built finding suitable variables and providing a solution to overcome the high fuel usage by using a neural network model to predict the fuel usage, CO_2 emission dashboard to get necessary steps to reduce CO_2.

Finding the suitable variables are the most challenging part in this research. To find them, correlation coefficient method was used. Before using this method need to normalize the dataset using the statistical normalization method after that used this method to find the linear combinations of the fuel usage & other dependent variables. If the value is next to -1 then it gives a perfect negative relation or if +1 then it is a perfect positive relation. For this analysis, the best fit regression model was created based on the variables Actual passenger count, Flight wing size, Flight length, Flight height, Distance between airports, zero fueling weight identified are those variables. For a prediction model, it is more practical to use simple model than a complex model.

Before developing this model, data need to be clean (without empty data sets) and eliminate the outlier data from the data set after the normalization process which was done by using the statistical quartile method. For this model 2 types of training, functions were used to create the models 'Bayesian regularization back-propagation' and 'scaled conjugate gradient back-propagation'. 'Bayesian regularization' method is the best training to train noisy data sets. After training these 5 layers (4-hidden layer) 5-10-5-10 hidden neuron model, then it was selected as the minimal error rate. There were 26, 834 data points & 70% were used to train this model and the rest 30% was used for testing. For this research, there are lots of future works could be done adding weather data, giving a recommendation in flight scheduling process.

Keywords: *Aviation industry, Fuel Optimization, Bayesian regularization*

Monitoring of Land Use Changes Using Remote Sensing and GIS, A Case Study in Kandy Divisional Secretariat

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Abstract

Multi-temporal satellite imageries help in understanding land use dynamics. The study illustrates the spatial-temporal dynamics of land use and land cover of Kandy Divisional Secretariat Division (DSD). Understanding and quantifying the spatial temporal dynamics of urban land use and land cover changes and its driving factors is essential to put forward the right policies and monitoring mechanisms on urban growth for decision making. Main objective of the study was to analyze land use and land cover changes in Kandy DSD by integrating remote sensing and GIS techniques for the period of 2000 - 2015. In order to achieve this, Landsat satellite imageries of three different time periods were acquired and quantify the changes in the Kandy DSD from 2000 to 2015.The images of the study area were categorized into four different classes namely water bodies, dense forests, built up areas and other. The Maximum Likelihood Algorithm of Supervised Classification has been used to generate land use and land cover maps. For the accuracy of classified land use and land cover maps, an error matrix was used to derive overall accuracy. The results of this study have shown that from 2000 to 2015, the rate of dense forest area has massively declined by 14.44 km^2 (24.54%) and the built-up area has increased by 9.28 km^2 (15.81 %). In addition to that, water area has increased by 0.14 km^2 (0.25%) during this period. Category of other has increased by 4.96 km^2 (8.48%) which includes mixed forest lands, scrubs, home gardens, other crop fields etc. The overall accuracy performed in this study was identified as 88%, 87% and 90% for year 2000, 2007 and 2015 respectively. These changes were mainly attributed by the increase of population associated with high demand for urban development as well as unplanned urban expansion. GIS based land use models have high potential as a tool in land use and land cover change studies. But using high resolution imageries such as IKONOS and Quick Bird are essential in generating good quality land cover maps. For optimum utilization of rare land resource, national policy should be enacted which is directed towards sustainable development not only in Kandy DSD but also in the country.

Keywords: *Land use, Land cover, GIS, Remote Sensing, Dynamics*

On Compression Ratio Info-leak Mass Exploitation (CRIME) Attack and Countermeasures

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Abstract

Header compression is desirable for network applications, as it saves bandwidth. However, when data is compressed before being encrypted, the amount of compression leaks information about the amount of redundancy in the plaintext. This leads to the CRIME attack on web traffic protected by the SSL/TLS protocols. In order to mitigate the CRIME attack, compression is completely disabled in the TLS/SSL-layer. Although disabling compression completely mitigates the CRIME attack, it has a drastic impact on bandwidth usage.

The attack is carried out with the assumption that the attacker has the ability to view the victim's encrypted traffic. An attacker can accomplish this with a network protocol analyzer. It is also assumed that the attacker has the ability to make the victim client to send requests to the targeted web server. This can be accomplished by coercing the victim to visit an attacker-controlled site (which contains a JavaScript code that sends requests to the targeted server with attacker-injected values in request headers). The attacker will coerce the victim to send a small number of requests to guess the first byte of the secret cookie. The attacker then measures the size of the (compressed) request headers. With that information, the CRIME attack algorithm determines the correct value for the first character of the secret cookie. Since the attack relies on LZ77 loss-less data compression algorithm, the first byte of the target secret must be correctly guessed before the second byte is attempted.

Separating secret cookies from compression is presented as a proven-secure countermeasure against CRIME attack in a previous work: (1)--separates all the secret cookies from the request header. (2)--rest of the header is compressed, while the secrets are kept uncompressed. Since the secret cookie is not compressed with the attacker-injected values, the origin of the compression leakage is shut. Thus, the proposed solution completely prevents the CRIME attack and also enables header compression. This is useful in reduction of network bandwidth usage.

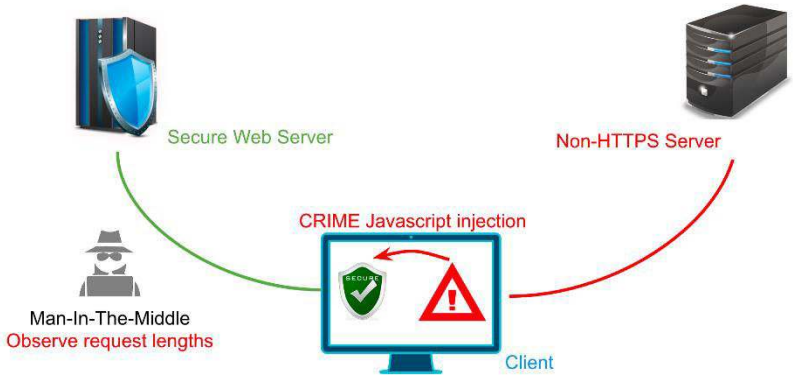

Figure 1 CRIME attack setup

In this work we create a test environment to replicate the CRIME attack and to test countermeasures.

Keywords: *CRIME attack, SSL/TLS, Security cryptography*

Online Train Ticket Reservation System

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Abstract

Railway is one of the most important means of transportation, and plays a vital role in the transport industry. With such a huge customer base, purchasing train tickets has been a very prominent problem. Railway E-Ticketing systems have been developed with the acceleration of technology but, they are not economically viable as mobile applications. After considering the above facts, "Sri Lankan Railway (SLR)" has been developed as a mobile application for making online reservations and accessing relevant information across different locations via are Internet.

In SLR Application, user should create an account as first time and then can make a reservation by adding the train details. As soon as the payment is done, reference number is generated on the application. While this is convenient for most people, it has made things particularly easier for people residing in remote areas. It is much easier than standing in long queues. So they can book tickets with a tap and they can check available train for required date and time, which seats are already booked in relevant compartment and which are the seats available for booking. They can graphically see those details.

The system has a separate application called checker application (SLRCS) for validation of ticket. Since Checking application it saves a huge work of the ticket checkers for validation of tickets by moving from manual ticket checking process to digital ticket checking process. This is done by just scanning with their own android mobile to validate the ticket. Using this application, Railway department's employees can log on to checkers account and the system verifies the ticket reservation by comparing generated reference number. Further the android and cloud based technologies have been used for the development process of the both applications.

The SLR application was a success in developing an online mobile ticket booking which could satisfy the current problems of passengers who reserve tickets. The testing process has been successfully done by reviewing users in different backgrounds.

An application for managing server side can be proposed to further enhancement for the project. In order to manage the database as the admin, it can provide a dashboard. In current application, the database updates manually. Need to focus on a way of letting it to be updated automatically. And a payment gateway should have to apply for the implementation stage.

The developed SLR application will contribute for a positive impact in the business economy in Sri Lanka. Hopefully, it will be beneficial for all the users who travel in trains and it will make their lives easier.

Keywords: *Android, Reservation System, Railway Department*

Recognising Elders using Behavioural Biometrics

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Abstract

The elderly population continues to grow everywhere and it finds difficulties to access websites due to various reasons including functional impairments like lack in vision, hearing, mobility and movement. Therefore, websites are usually made separately for elders to improve their user experience. However, first it's important to recognise whether a user is an elder or not, and for that usually user profile information such as date of birth or age are used. Users may reluctant to feed information or may even feed a wrong one. This research proposes a method using which elders can automatically be recognised using behavioural biometrics of them. Based on the initial observational study on elders it was noted that elders shake the mouse to identify the mouse pointer location, do scrolling fast without much control, and the elders take a lot of time to click on a link or button after moving over it. These three observation were considered as behavioural biometrics to recognise elders. A data set was compiled in a control environment from 24 people of different ages including 18 elders who are more than age of 65. All the people were asked to follow a same set of tasks in two websites. Thereafter, the collected data were cleaned and a decision tree was built to recognise elders using j48 algorithm and Weka tool. The results showed that elders move the mouse faster than 5.7928 pixel/millisecond, scroll faster than 3.455561/millisecond, and take more than 1, 158.6875 milliseconds to respond over a link or button. Thereafter more behavioural biometrics were collected from random users in open environment in which users were asked to fill a questionnaire with the intention of collecting their age. The collected data then were used to validate the decision tree. It was found that speed of mouse movement recognises the elders with 84.51% accuracy, scrolling speed recognises with 96.08% accuracy, and response time recognises elders with accuracy of 97.68%. The results show that instead of rely on user profiles, elders can be recognised using user behavioural biometrics with significant accuracy. Though the response time shows a high recognition rate, it is planned to explore the combination of different behaviour biometrics together to see whether recognition rate can be improved.

Keywords: *Recognising elders, Behavioural biometrics, Website for elders*

Smart Home Automation Voice Controller

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Abstract

Each day we are aiming for a smart living condition and make our lives more convenient and fast. The traditional wired electrical device controlling switch is an old concept now. "Voice operated device controlling" utilizes human voice commands to control electrical appliances. This research aims to design and implement a cost effective, portable, user-friendly, secure and simpler Home automation voice controller that can be operated by using Android smart phone. It also reduces the energy usage in the residential sector. This system is also designed to assist and provide support in order to fulfill the needs of elderly and disabled in the home.

This research describes the way of remote controlling and monitoring electrical household appliances using Android Smart Phone Bluetooth features and wireless Bluetooth technology module depending user voice commands. The proposed system has two main components, namely voice recognition system and clicking mode facility. When automating a home load not available in the visible range, fault identification system in this design helps the user to ensure that their home appliances had gone exactly ON or OFF. The app was designed by allowing the user to add or edit the appliances. The user had the freedom to add appliances names to this app. User can select either voice mode or clicking mode. Even he/she can check the current status. Changing the language is also available in this app. As an example device name is Fan. The user has to say "Fan" to switch ON. If user wants to switch off, again, has to say "Fan". Google voice recognition with its voice recognition and voice command features has been used to determine the voice of the user. From the commands received from an android device, the electrical appliances' current status can be controlled. Android Phone will convert voice into a string of data using Google voice recognition feature. This string of data will be sent to Bluetooth module and then to Arduino UNO. After that, Arduino decodes and process it. The Figure 1 expresses the system architecture of the entire system.

Figure 2: System Architecture of Smart Home Automation System

Arduino UNO is very popular, cheap product and very easy to use. Bluetooth module, relays are interfaced to the Microcontroller. The data received by the Bluetooth module from an Android smart phone is fed as input to the controller. The controller acts accordingly on the relays of the electrical appliances. The electrical appliances in the research can be made to switch on or off using the Android phone. The application shows the status of switch whether on or off. In achieving the task, the controller is loaded with a program written using Arduino language.

This system facilitates features such as automation, multi-functionality, adaptability, interactivity and efficiency for home appliances controlling. As future enhancements, hope to design input voice commands in different language and hope to design smart watch with hand gestures to control in a more user friendly.

Keywords: *Smartphones, Electrical Appliances, Voice recognition*

Stock Market Analysis and Prediction

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Abstract

Stock price and stock index price forecasting system, used by investors and financial managers to describe the market and compare the return on specific investments, has been a topic of research for very long now. When in the stock market, there are more buyers than there are sellers, the price must adapt or no trades are made. This tends to drive the price upwards, increasing the market quotation at which investors can sell their shares, enticing investors who had previously not been interested in selling and vice versa. These demands and supplies are ever changing, resulting in highly-fluctuating, non-linear stock prices which poses a threat against the credibility of those prediction systems which only view the market from one perspective. For a reliable system, it is therefore important to explore the market on multiple grounds, basically through Technical, Fundamental and News Analysis. Under Technical Analysis, SMA (Simple Moving Average) is used as a preliminary data smoothing technique, which helps reduce the fluctuations substantially. Artificial Neural Networks (ANNs) is then employed to analyze the nonlinear relationships between the stock closed price and various technical indexes, and to capture the knowledge of trading signals that are hidden in historical data. Features like traded share, traded volume, opening price, closing price, high price and low price are fed as an input parameter in Neural Network. Backpropagation algorithm is then implemented to train the given Network model. The neural network layers and neuron numbers in hidden layers are then tuned by training and validating the data set iteratively.

The fundamental analysis involves thorough study of financial statements of companies, also known as quantitative analysis. This involves looking at assets, liabilities, revenue, expenses and all other financial aspects of a company. It gives insight on the company's future performance. The results moreover reflect the company's success or failure over the long term than immediate future. Hence, unlike technical analysis, it helps predicting stock price on a long run. In news analysis, we focus on understanding the news sentiment and its affects which may cause the investors to either buy or sell the shares based on positivity or negativity of the news. The news analysis problem can be mapped into similarity based classification. A set of vectors are created from analysis of historical news, where each component of a vector represents the features in data set. The required labeling are done based on historical rise/fall of stock prices. The increase or decrease of the trend is then predicted based on similarity measures. In short, news analysis predicts the price of share of the following day by comparing the most recent news with past news using K-nearest neighbor algorithm.

Thus, through the circumstantial application of the above-mentioned analysis, the paper proposes to predict the stock market in a more generalized manner.

Keywords: *Stock Market Prediction, Artificial Neural Network, Crossover Points*

The Impact of a Security Culture in Small and Medium Scale Enterprise (SME) on Enterprise Information Security

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Abstract

An information system is much more than computer hardware; it is the entire set of software, hardware, data, people, procedures, and networks that make possible the use of information resources in the enterprise. In current world, the information is stored in the computerised system in the form of digital data, including sensitive data, which can be extracted as needed. It is much better than maintaining hard copies in traditional manner by using physical storages. The information system security is crucially important for a business with that background.

The SME introduces in many forms. Many use the number of employees, capital amount invested, turnover amount, and nature of business. In Sri Lanka, main banks use value of fixed assets as a way to introduce SME, whereas the World Bank uses number of employees as the criteria. Even though enterprises are relatively small and run with a limited budget, SMEs can now target national and international market segments, enabled by the Internet. Therefore, this complicated the business process at SMEs.

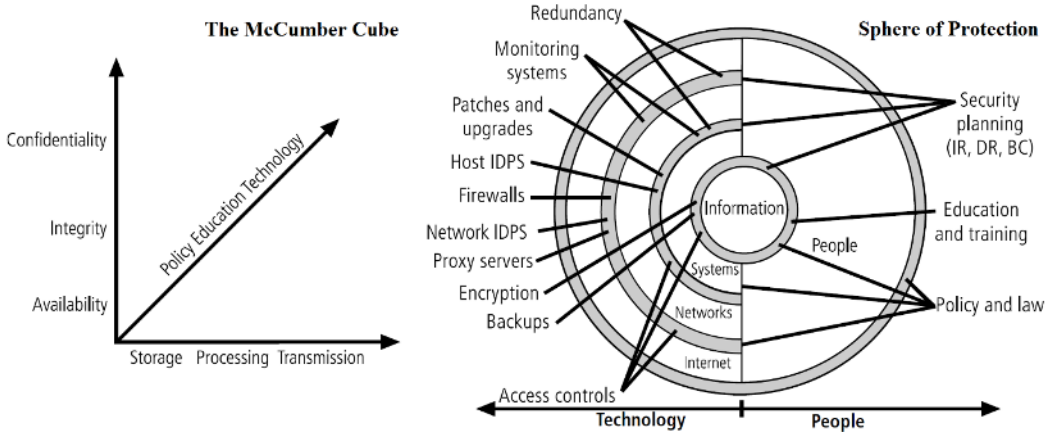

Figure 1: The McCumber Cube and Sphere of Protection

The computer security represents confidentiality, integrity and availability (CIA) from the mainframe-computing era. The rise of the Internet and complex computer systems means that data is now decentralized. As such, the security measures now must extend form the CIA domain to cover additional areas, depicted in the McCumber Cube in three dimensions. This challenges SME's to assure information security with a limited operating budget, and there are two approaches presented by the 'Sphere of Protection', focusing on both technology and people aspects. The technological aspect is expensive, whereas the people aspect is cost effective by introducing security culture. The policy implementation is the better tool for security culture by considering business in process level emphasizing laws to acknowledge people on the importance of assuring secure environment, and education and training are important to share the knowledge among employee. This paper explores the need for effective people based security measures for better security culture, before the implementation of technological controls is considered for SMEs.

Keywords: *Security Culture, Small / Medium Scale Enterprise, Enterprise Information Security*

Virtual Learning – A Popular Learning Method Among Students

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Abstract

A virtual learning environment (VLE) or e-learning is a popular method of learning at present. But VLE depends on student acceptance of such kind of programs; if they prefer e-learning or classroom learning. Though VLE could save time, cost, space and motivate students to learn in a new dilemma, VLE poses several drawbacks in addition to those experienced by traditional methods of learning. These include difficulties in adapting to this system of learning, lack of computer literacy, lack of student motivation as well as technical issues. This trend is prominent, especially in developing countries where students are still in the process of adapting to a web and mobile app-based culture of learning. Also, students in developing countries often face problems of low speed Internet as well as lack of Internet access. Therefore, this research focuses on how switching from a traditional culture to an Internet-based culture could be achieved and how distance learning could be promoted in the distant world thus minimizing the digital divide. This research focused on solving these issues under four main themes: providing foundation on how websites and mobile apps could be used, providing streaming and caching facilities for slow Internet connections, creating surveys among students from different demographic, ethnic and geographic backgrounds and designing courses appropriately and ensuring multilingual course availability. According to the research, it was found that these solutions could be achieved in the near future with the advancement of the Internet and new technologies in developing countries. As such, it was inferred that virtual learning could be promoted as a learning method among students in developing countries.

Keywords: *Distance learning, Digital divide, Virtual learning, Internet-based culture*

V-Synch: Rendering Distance a No-issue with the New Feature of Video Synchronization in Existing Multimedia Platforms

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Abstract

Social media are computer mediated technologies that allow creating and sharing of information idea, career interests and other forms of expression via communities and networks. They introduce substantial and pervasive changes to communication between businesses, organizations, communities and individuals. Various features are being introduced in this field with the objective to make it more attractive to users.

"V-Synch" is aimed at introducing features like video and sketch pad synchronization to develop a full- fledged app that also has the current popular features like internet call and chat. We intend to make an android application in which users can always stay connected through multiple platform synchronization (watch the video and use sketch pad in synchronized way in real time) although they are distance apart. All the devices connected to the group can take control of video playback. When any user of that group starts, pauses, or performs specific action on a video, the state of that video is synchronized to all other connected devices in real time. The elements drawn on sketch pad are also shown live in real time to everyone connected to the group. NTP algorithm is used to synchronize all participating devices to within a few milliseconds of Coordinated Universal Time (UTC). The synchronization is correct when both the incoming and outgoing routes between the client and the server have symmetrical nominal delay. V-Synch could be very much beneficial to students for group study, long distance friends to hang out together and Serve a great deal in case of tele-education.

Keywords: *Android app, NTP algorithm, Symmetrical Nominal delay*

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