CINEC CAMPUS
Beyond A Graduate

SYMPOSIUM PROCEEDINGS

CINEC STUDENT RESEARCH SYMPOSIUM 2021

INNOVATE | CREATE | DISSEMINATE

ON 26TH OF NOVEMBER 2021

VIRTUAL SYMPOSIUM

CINEC CAMPUS

Malabe

Sri Lanka

VISION

To be the international leader in the field of education with a focus to produce functional, work ready and competent global citizens

MISSION

To offer a safe and disciplined environment, best resources, academic guidance and avail avenues in research for a sustainable career of students.

VALUES

Wisdom, Integrity, Discipline and Competence

Proceedings of annual CINEC Student Research Symposium 2021
CINEC Campus, Malabe, Sri Lanka

Editors

Dr Rashini Baragamaarachchi

Mr. Weranga Rajapaksha

Mrs. Gavesha Liyanage

Ms. Gresha Samarakkody

Mr. Amila Kankanamge

Mrs. Yamuna Samarakoon

Mr. Dhishan Dhammeartchi

Mrs. Keshani Abeynarayana

Published by

CINEC Campus, Malabe, Sri Lanka.

Tel: +94-11-263-5268

e-Mail: symposium@cinec.edu

Website: www.cinec.edu

ISBN 978-624-5601-01-1

Published on 26th November 2021

Symposium Chairperson

Dr Rashini Baragamaarachchi

Symposium Co-Chairperson

Mr. Weranga Rajapaksha

Organizing Committee and Session Coordinators

Health Sciences	Mrs. Gavesha Liyanage
Engineering and Technology	Ms. Gresha Samarakkody Mrs. Satanika Lowe Mrs. Udayanga Edirisooriya
Management and Social Sciences	Mr. Amila Kankanamge Ms. Sachini Kalupahana
Information Technology	Mr. Dhishan Dhammearatchi
Humanities and Social Sciences	Mrs. Yamuna Samarakoon
Maritime Sciences and Marine Engineering	Mrs. Keshani Abeynarayana

Content

Message from President, CINEC Campus

Captain Ajith Peiris
President, CINEC Campus

It's my pleasure to issue this message on the occasion of the 2nd annual Student Research Symposium of CINEC Campus, 2021, hosted by the Faculty of Health Sciences. This has a great importance to CINEC Campus since the research outcomes of the graduating students are disseminated to the public. This symposium is an important part of developing a research culture at CINEC Campus.

I sincerely believe the experience the students gain, and the partnerships they build in participating in the research symposium will strengthen and brighten their path to a challenging future.

The proceedings of this year symposium consist of research abstracts presented by over 110 graduating students from all our faculties. The quality of the abstracts has been maintained by reviewing and assessing by a panel of experienced editorial board.

I would like to extend my gratitude and thanks to the Dean of the faculty of Health Sciences, Prof. Menik Hettihewa, and the entire organizing committee led by Dr. Rashini Baragamaarachchi and Mr. Weranga Rajapaksha for devoting their time for this important task. I also wish to convey my sincere gratitude to the heads of the departments, academic and non-academic staff of the Faculty of Health Sciences for extending their fullest support and corporation for this event.

I also congratulate the graduating students and wish them success for their future endeavors. Research helps restore and protect memory and enhance problem-solving skills. In the current highly competitive and fastmoving job market, employers are increasingly looking for graduates who can solve problems. In that context, I hope your experience in carrying out your undergraduate research project successfully and presenting your work in front of an erudite audience will go a long way in garnering the required skills necessary to succeed in life.

Message from the Consultant of Academic Affairs and Research

Professor Veranja Karunaratne
Senior Consultant

I am happy to write a message to the 2nd Annual CINEC Campus student research symposium. It is indeed a great joy to see the interest among the final year students community increase every year.

Research is "creative and systematic work undertaken to increase the stock of knowledge". Research is what drives humanity forward. It is powered by curiosity: we get curious, ask questions, and engage ourselves in discovering everything there is to know. Learning is flourishing and growing. Without curiosity and research, progress would be slow, and our live as we know it would be wholly different. Research involves the collection, organization and analysis of information to increase understanding of a topic or issue. A research project may be an expansion on past work in the field, to test the validity of instruments, procedures, or experiments, research may reproduce aspects of previous projects or the project as a whole. In all of the above endeavors, research must lead to new applications.

Developing and preserving undergraduate research programs benefits students, faculty mentors, and CINEC Campus. Incorporating a research component along with a sound academic foundation enables students to develop independent critical thinking skills along with oral and written communication skills. As faculty, we believe the research experience is very valuable for students at CINEC Campus. It provides numerous benefits to students and faculty, as described above. However, those who have supervised research projects know it can be a trying or frustrating encounter at times. Therefore, it is particularly pleasing to hear our students speak positively about their research projects carried out at CINEC Campus and undoubtedly they look at their undergraduate experience as a means to not only learn how to perform research, but also to learn problem-solving skills that translate to arenas beyond the classroom or laboratory.

CINEC Campus in turn benefits from presentations and publications that serve to increase its visibility in the scientific community. Whether projects are derived through student-generated or mentor-generated means, students benefit from completion of exposure to the hypothesis-driven scientific method.

At a higher level, working on research is overwhelming because students are exposed to opportunities to preview and invent the future. In classes, internships, and most full-time jobs students secure after graduation, students deal with work that will be immediately used in

the present or near future. In industry, the main priorities for young employees are to deliver projects with near-term value in the coming week, month, or year.

It is understood that every individual researcher gets to work on only a small, specialized part of a bigger research problem. But just being there and participating is a great opportunity. One of the main purposes of campus life is to expand your intellectual horizons, and hands-on experience in a research lab is a good way to do so. The broader ideas students are be exposed to in a research lab could well transfer over to their future professional lives in unforeseen ways, even if they move on to other areas.

I wish future efforts at undergraduate research at CINEC Campus a great success.

Message from Dean of Faculty of Health Sciences
(Hosting Faculty)

Senior Professor Menik Hettihewa
The Dean
Faculty of Health Sciences, CINEC Campus

As the Dean of the hosting Faculty in the CINEC campus, I am greatly esteemed to issue this message to the symposium proceedings considering the participated students, staff and all other symposium participants at the prestigious occasion of the second student symposium in 2021. This event has become inevitably an important occurrence for the Faculty of Health Science in CINEC Campus to organize this symposium during this challenging time. As the Dean of the Faculty, I strongly believe that convincing of students for dissemination of the research knowledge is part of our academic duties. Therefore, annual student research symposium of the CINEC Campus is organized to provide undergraduate and postgraduate students of all faculties to excel their organizational and programming skills in research in addition to the analytical and application skills in the relevant discipline.

Student research symposium had become the grand annual event of CINEC Campus and it has become the only event to disseminate the research outcome of all the final year projects to the public for its use in product identification, property protection or commercialization. Experiences which will be gained by all the students and staff in this exposure, will be helpful for establishing partnerships with relevant industry and also revitalize their research and application skills for challenging future.

Proceedings of this year for the student research symposium consists of many research abstracts in different disciplines: Engineering, Management, Pharmaceutical Sciences, Biomedical Sciences Maritime Sciences, Maritime Engineering and Humanity and Education specialties. Quality of the research abstracts are maintained through standard reviewing protocols by the experts in the related fields. As the Dean of the Faculty of Health Sciences, I am exultant to see the students' enthusiasm to prepare and present their mini research work by learning all research methods, data analytical methods ethical applications while they are doing their academic program even before they start their final year projects.

I would like to make my special tributes to the key note speaker, the Chairman of the National Science Foundation, the former Vice chairman of the University Grant Commission, the former Vice Chancellor of the University of Ruhuna, Prof Ranjith Senaratne for accepting our invitation to grace this occasion.

I would like to express my sincere gratitude to all the sponsors who had contributed to this event on our invitation. Organization of a research symposium in this caliber in this challenging era, is not an easy task. Therefore, I wish to thank for all the members of the organization committee for their efforts to make this even in international standards.

Message from Symposium Chairperson

Dr Rashini Baragamaarachchi
Senior Lecturer
Faculty of Health Sciences, CINEC Campus

On behalf of the organizing committee, I warmly welcome you to the Annual CINEC student Research Symposium 2021. This is the premier and flagship academic congregation of CINEC that brings together multidisciplinary research findings of CINEC students to one platform. We have opened up the pathway to all researchers coming from diverse academic disciplines from all educational institutes in Sri Lanka to participate and share their research findings as this will be an ideal platform to debate over new developments/discoveries, refine ideas and an excellent opportunity to meet fellow researchers of similar disciplines.

The theme of this year's symposium is 'Innovate l Create l Disseminate', which recognizes the importance of sharing the innovative findings of young researchers to increase visibility of their research outputs which can be implemented or furbished to successfully implement to address particular problems affecting an individual, group, society or nation.

Given the restrictions imposed on public gathering due to COVID19, this year's symposium is organized as a fully-fledged online research symposium. Over 100 research abstracts were accepted to present at the symposium which span across six broad disciplines representing Health Sciences, Engineering, Management, Information Technology, Maritime Sciences, and Humanities. All research abstracts were stringently selected after a double-blind peer review process. CINEC Student Research Symposium 2021 embraces deliberative pre-symposium webinars, incisive keynote address, intriguing plenary talks and persuasive research presentations.

I take this opportunity to thank Emeritus Professor Ranjith Senaratne, an eminent Scientist and a visionary leader in Sri Lanka for accepting our invitation to deliver the keynote address. I would like to extend my thanks to the invited plenary speakers and speakers of the pre symposium webinar series. My sincere thank goes to the President of CINEC, Capt. Ajith Peiris, Senior Management and Deans of CINEC for their support in organizing this event. I profusely thank Senior Prof Veranja Karunaratne for providing the guidance, support and most importantly the necessary freedom to organize this event. My appreciation goes to the hosting faculty Dean, Senior Professor Menik Hettihewa for assisting and cheering to support our new ideas.

The success of the symposium depends on the committed and dynamic team that helped me in planning and organizing this event. As the Chair of the CINEC student Research Symposium 2021, I take this opportunity to offer my sincere thanks to all members of the organizing

committee, volunteered students, academic and non-academic staff of CINEC, reviewers, session chairs who have been working in different capacities to make this symposium a reality. I also appreciate the cadre of sponsors supporting this symposium.

Finally, I would like to congratulate all presenters. I hope you will enjoy the content, reacquaint with colleagues across faculties, make new friends, get new ideas, broaden the knowledge and above all, have a good time.

Keynote Address

Emeritus Professor Ranjith Senaratne

Chairman
National Science Foundation

R&D, Academia and National Development

Today, we live in a time of great promise and peril, which abounds with opportunities, but is ridden with volatility, uncertainty, complexity and ambiguity (VUCA). Therefore, it is of the utmost importance to equip our citizenry, particularly our youth, with multiple competencies, namely knowledge, skills, values/attitudes, and mind-set in order to deal with manifold challenges and harness the current and emerging opportunities. In the past, higher education institutions (HEIs) produced graduates for a career for life, but today they need to produce graduates for a life of careers – people who are the right fit for a gig economy characterised by the prevalence of short-term contracts and freelance work as opposed to full-time permanent jobs.

In a globalized knowledge-based economy, growth is no longer efficiency-driven, but innovation-driven, and revolves around talents. In this context, inventors, innovators and entrepreneurs have become the critical human resources of economic development. Therefore, HEIs need to produce graduates who can transform new ideas and knowledge into innovative products, processes and services and who can contribute to improving the existing products, processes and services. As knowledge becomes an important part of innovation, HEIs as knowledge-producing and -disseminating institutions play a pivotal role in promoting industrial growth and development. Thus, in a knowledge-based economy, they become a key element of the innovation system, both as a provider of human capital and as a seed-bed of new enterprises. In addition, they provide much of the backbone of the knowledge economy, such as laboratories, libraries and computer networks.

By such criteria as the number of R&D personnel, business entrepreneurs, global innovation index and high-tech exports, Sri Lanka, despite its high literacy rate, rich biodiversity, high agro-climatic potential and strategic location, significantly lags behind other Asian countries.

Development is a process which cannot be imported like goods and services. Therefore, in finding solutions to local and national problems, we should not borrow models from developed countries, and knocking at others' doors will be futile and counter-productive. Therefore, we need to find home-grown answers and home-spun solutions to local issues. Hence, there is a dire necessity to augment the strength and capabilities of the R&D personnel as well as the infrastructure base in Sri Lanka as a matter of high priority. In this connection, the non-

state HEIs, which operate in a freer environment and are not shackled by archaic rules and regulations, show great promise in becoming the true and effective partners of national development.

Confucius said, "By nature people are same; through nurture, they become distinct". The intellectual capacity and creative power of Sri Lankans are not second to those of any nation in the world. There are children and students amongst us with the potential to become Stephen Hawkings or Thomas Alva Edisons. But, we need to create a nurturing, stimulating and conducive environment so that they will blossom in keeping with their innate and inborn talents to the benefit of not only themselves, but also humanity. The CINEC Student Research Symposium constitutes an important step in that direction and I am certain that it will make a tangible contribution towards that end.

PLENARY SESSIONS

Power of RNA as Therapeutics

Prof. W.S. Sulochana Wijesundera

Senior Professor, Department of Biochemistry & Molecular Biology Faculty of Medicine, University of Colombo,

The discovery of naturally occurring noncoding small RNA molecules and their diverse mechanisms of action led to the development and expansion of "RNA based therapeutics". The majority of currently used drugs are either small molecules or proteins. Small molecules act *via* competitive inhibition to inhibit the activity of their target and proteins are either antibodies targeted to various disease-causing proteins or proteins substitutes for lost proteins. The great advantage of RNA based therapeutics is that they can be targeted towards 'undruggable' proteins such as transcription factors, that are pharmacologically difficult to be targeted.

The different classes of RNAs that are used in RNA based therapy are small interfering-RNA (siRNA), micro-RNA (miRNA) small activating-RNA (saRNA), ribozymes, antisense oligonucleotides, aptamers, and messenger RNA (mRNA). Of these the non-coding small RNAs namely, siRNA, miRNA, saRNA, antisense oligonucleotides (ASO) and ribozymes mediate their action through Whatson and Crick base pairing with the complementary target sequence. ASOs are versatile short single stranded RNA (or DNA) which can be targeted to pre-mRNA or mRNA to modulate the splicing of a mutated gene to make a functional protein, sequence specific mRNA degradation to prevent translation, blocking polyadenylation to accelerate mRNA degradation blocking endogenous miRNA to enhance translation. siRNA and miRNA are double stranded small RNA molecules ranging from 21-23 nucleotides and share a common mechanism of action known as RNA interference (RNAi). RNAi is a natural biological process of post-transcriptional gene regulation. These small RNA silence gene expression by binding to complementary mRNA with the aid of a ribonuclear protein complex known as "RNA induced silencing complex" (RISC) either to promote degradation of the mRNA or to block the translation depending on the specificity of binding to the target. saRNA are similar in structure to siRNA but in contrast to siRNA which silence gene expression, saRNA activates transcription promoting gene expression. Ribozymes are catalytic RNAs that cleave phosphodiester bonds in a site-specific manner to decrease the expression of the protein. Mechanism of action of aptamers in RNA based drugs are quite different from the other small RNA based mechanisms. The target binding is determined by its tertiary structure rather than its sequence. mRNAs convey genetic information from DNA to proteins, unlike the noncoding RNAs. *In vitro* transcribed mRNA therapeutic modalities include replacement therapy, immunotherapy, and cell therapy. Synthetic small guide RNAs (sgRNA) are utilized in CRISPR Cas9 technology to guide the Cas9 endonuclease to specific sites in the genome for targeted cleavage of the gene.

In the development of RNA therapeutics, the major hurdles to be overcome are the specificity of exogenous RNA, delivery of negatively charged RNA across the cell membrane, and strong immunogenicity of exogenous RNA. However, with the recent advances in knowledge and technologies these issues have been addressed to some extent to facilitate the development of RNA therapeutics. Several RNA based drugs have been approved by the FDA and are currently in use. For example, antisense RNA based drugs for Duchenne muscular dystrophy, an aptamer-based drug for age related muscular degeneration and siRNA based drug for hereditary transthyretin amyloidosis. A number of new drugs targeted towards various diseases are in pre-clinical or clinical trials at present. RNA-based therapeutic represents a rapidly expanding class of therapeutic opportunities with the power to modulate cellular biology in ways that was never possible previously.

Transformation of an Undergraduate Towards a Successful Industrialist Through Researching Culture

Eng. A.S. Anupama Silva

Senior Manager – Projects,
Hutchison Telecommunications Lanka (PVT) Ltd,
Sri Lanka

Clear demarcation of the differences as well as overlaps between engaging with the research work as the prime function and getting a culture of researching cultivated within the self by absorbing the essential attributes of researching practices will lay the path towards understanding the role of research culture in the industry.

Every industry values the period of work experience as it plays an unparalleled advantage over many other factors when the valued added by an employee towards the organizational output and performance is considered. Here the number of calendar years has no relation with work experience, even most of the people who are stagnated in the positions think so. The effective and meaningful industrial experience is simply the amount of learning gathered through challenging successes as well as failures. What matters towards the future performance is not the history of results, but it is a combination of gathered learnings and ability to utilize them when making decisions in future.

This is exactly what we practice while doing systematic researches. Researching does not limit to engineering or medical aspects, it extends to the aspects of studying the behavior of humans at micro level as well as the behavior of a society at large. Still the major attributes of the research approach remain the same for frame work of the execution of research irrespective of the area of researching. Literature survey, pre-definition of methodology and experimenting tools, analysis of results, proper documentation of results and openness for further improvements as well as learning from the past results are essential attributes developed in a person who consciously gets engaged in researches.

It doesn't mean that an undergraduate is supposed to perform research work in a corporate work environment in the industry, but the industry expects its corporate level employees make holistic decisions so the organizations reach their own business objectives. This is the development which a manager is expected to develop throughout the career gaining the experience. There is no other culture supports a professional than researching culture does to get this behavior embedded in to his decision making pattern so that the right approach is inherently decided most of the time.

This is the unwritten but underlying reason for people with high career aspirations read for their Masters in Business Administration (MBA) while the MBAs awarded by reputed universities consisting of very stringent research programs in the course curriculum.

When the holistic decision making had been embedded in to the working practice, an experienced smart manager will become a master in making effective spot decisions where necessary through the acumen. Acumen is the ability to judge the situations with the spontaneous analysis using the historic results experienced in similar conditions and make critical decisions for future, where time does not permit to detailed calculations.

Culture of systematic researching developed in the self-character forms the mind map of the person so that he/she can store, retrieve and analyze the past literature very effectively in a short time. There is no better way to get this skill and instinct developed in a person so that he/she can transform in to the exact professional demanded in the industry who can be found

in the right hand tail of the normal curve when distributed based on potential and industrial demand.

A manager with a strong record of successful holistic decisions and with a high level of effective spot acumen for critical decision making will never be stopped in reaching his career aspirations in any industrial environment which is driven for profits taking hand in hand with business ethics.

The Challenges and Way Forward in the New Normal Scenario: Logistics and Transportation Perspectives

Prof. Lalith Edirisinghe

Senior Professor, The Dean of Faculty of Management and Social Sciences, CINEC Campus, Malabe.

The COVID-19 pandemic has left its footprint all over the world and no country, society, industry, nationality, or religions were exempted from, so is the logistics and transport sector (LTS) that is particularly vulnerable to economic shocks since LTS is a derived demand of global trading. While transport is a common term, the acquired meaning of logistics is ambiguous making a clear understanding about logistics necessary to assess the impact of Covid 19 Pandemic which paved the way to new normal scenario (NNS). The word 'logistics' was originally used for the activity of moving equipment, supplies and people for military operation. Later as a general term it began to mean the practical organization that is needed to make a complicated plan successful when a lot of people and equipment are involved. In business, it began to mean the business of transporting and delivering goods. In military operations logistics make an indispensable contribution to win a war. However, overcoming and fighting the challenges created by covid-19 need even more strategies than fighting a war. Health authorities warn about new varieties of the virus every other week despite huge vaccination efforts. Therefore, identifying the challenges and recommending way forward in the NNS from logistics and transportation perspectives will help all stakeholders nearly in all sectors.

Harvard experts say. "A lot of firsts are happening. "It's even easy to reduce road congestion if you just sabotage the local economy." However, some of our adaptations have only accelerated already existing trends rather than bringing totally new practices. For example, cashless society, remote office work, and the decline of brick-and-mortar retail, and virtual education have been there even before the pandemic. NNS changed the economic approach of every country especially those of at developing stage. Globalization generally helps companies to lower the cost of production, increase competition, and offer larger variety of choices for consumers. However, on the other extreme it increased the countries' dependence on imported goods and services. When covid-19 hit the world, all countries were at their peak of globalized economy where the imports and exports are indispensable so as the LTS. Around 80% of global trade volume are being transported by ships. Logistics experts have been promoting to run tight inventory and be efficient, but with major disruption of air cargo, 'blanked' ocean sailings in NNS the frequent shortage of inventory has created a paradox. In passenger transport, cyclists have been hitting the streets in force in NNS in some countries. International Civil Aviation Organization reveals an overall reduction of 50% and 39% seats offered by airlines in 2020 and 2021 respectively compared to 2019 levels leading to USD 371 in 2020 and 327 in 2021 billion loss of gross passenger operating revenues. Nearly 90% of the World's population is subject to some form of international travel restrictions.

According to Pew Research Center in USA, the NNS in 2025 will be far more "tech-driven", presenting bigger challenges to ordinary people. Yet, some people find life is better in a 'tele-everything' world with the convenience of work from home, fast and reliable e-buying, less traffic on roads, fresher air due to less carbon emission, more time to live with family and kids etc. Post-Traumatic Stress Disorder (PTSD) would be a challenging phenomenon as the unpredictability, uncontrollability may exceed the ability of the organism to cope. Younger generation will continue to show higher levels of anxiety and depression than older generations. Entering an adulthood would be a crime where nothing can be planned taking

future for granted because the NNS is full of contingency planning and crisis management. The "coming-of-age" generation may bear long-term impact whose repercussions are yet to be realized. Accordingly, the crucial role played by the LTS should be given its due consideration in the NNS. The government policies and social practices should align well with activities of LTS. The global supply network should continue to cater to the needs and wants of consumers throughout the world in NNS. This cannot be done without efficient and effective logistics and transport system.

The State of Artificial Intelligence Today and Beyond

Dr. Sidath R. Liyanage

Senior Lecturer, Head, Department of Software Engineering, Faculty of Computing and Technology, University of Kelaniya.

Artificial Intelligence (AI) has become such a buzzword that is intoned by technologists, academicians, journalists, and venture capitalists alike. The idea that our era is somehow seeing the emergence of an intelligence in silicon that rivals our own entertains all of us, enthralling us and frightening us in equal measure. Originally coined in the 1950s, the term "artificial intelligence" initially began as the simple theory of human intelligence being exhibited by machines. In today's era of rapid technological advancement and exponential increases in extremely large data sets ("big data"), AI has transitioned from mere theory to tangible application on an unprecedented scale. From evaluating extraordinarily large data sets in near real-time, autonomous driving cars and stream history-influenced video viewing recommendations to online purchase recommendations, advertisements, and fraud detection, AI has become fundamentally ingrained within many facets of society and often functions invisibly in the background of our personal electronic devices. Recently, the phrase "human-imitative AI" has been coined to refer to the original aspiration of realizing an entity that possesses human-level intelligence. This was largely an academic enterprise. While related academic fields such as operations research, statistics, pattern recognition, information theory, and control theory already existed, and often took inspiration from human or animal behavior. Recently a new term, "Intelligence Augmentation" (IA) has been proposed to refer to ML-based applications where computation and data are used to create services that augment human intelligence and creativity. Another new discipline called "Intelligent Infrastructure" (II), has also emerged, whereby a web of computation, data, and physical entities exists that makes human environments more supportive, interesting, and safe. Such infrastructure is beginning to make its appearance in domains such as transportation, medicine, commerce, and finance, with implications for individual humans and societies. This emergence sometimes arises in conversations about Cyber-Physical Systems, and Industrial-Internet-of-things. The human-imitative AI aspiration subsumes IA and II aspirations, because a human-imitative AI system would not only be able to solve the classical problems of AI but it would also be our best bet for solving IA and II problems. In this session, we discuss these novel developments in AI and how these advances would lead to novel branches of human-centric engineering in future.

Reality through Fantasy- A Brief Analysis of Evolution of Drama and Theatre

A nation that does not support and encourage its theatre is -if not dead - dying are the words of famous Spanish dramatics Federico Garcia Lorca as he quite rightly emphasizes promoting theatre is a social responsibility of any nation irrespective of its socio-cultural and political milieu. Drama, a kind of art of representing pleasures of the events that happened or that we imagine happening, is usually a part of human civilization. The primary elements of drama are characters, actions, spectacle represented by scenery, music, and costumes and finally audiences who react to this mixture.

Dr. Swarnananda Gamage

Senior Lecturer, Head of the Department of English Language Teaching, Buddhist & Pali University of Sri Lanka.

One of the greatest Greek philosophers; Aristotle has penned about drama in his legendary work, Poetics. It, provides one of the earliest and most influential theories of drama explains drama as the imitation of an action. Another interpretation of that is "drama imitates life''. However, in the present -day context, a famous dramatist, Peter Hall comes out with a fine comparison of theatre with another popular art form, films; ' Film is simile life- like. Theatre is metaphor about life itself.

Drama also contains the capacity to up an illusion of reality like a reflection in a mirror. Yet unlike the reflection in a mirror, the action of most is not drawn from our actual experience but from our potential or imagined experience. "A Midsummer Night's Dream" by William Shakespeare is a social example to reinforce the fact that audience may be lost in the fantasy at most times in the play. Yet reality is ultimately exposed through fantasy providing insight into profound range of human emotions.

In the fifth and sixth centuries B.C, Greek theatre flourished marking the first masterful dramatic era, which expanse from the Birth of Aeschylus (525B.C) to the death of Aristophanes (385B.C). Thus, Greek theatre was established and maintained by public funds, and the greatest of Greek tragedians; Aeschylus, Sophocles and Euripides competed at the Dionysus drama festivals.

Theater was extremely important to the Greeks as a way of interpreting their relationship with their gods and of reinforcing their sense of community. The fifth- century B.C audience, mostly wealthy citizens, came early in the morning and spent the entire day in the theater. Drama

for the Greeks was not mere escapism or entertainment, not a frill or a luxury, it was a cultural necessity.

Roman theatre was mostly and largely influenced by the Greek theater. Romans became the most dominant nation by 3rd century B.C. They are the first important Greek actors and playwrights, and subsequently produced great Greek plays inculcating Roman essence into them. One such play, "The king Oedipus" depicts violence which were quite common in Roman emperor. Seneca is re-known as the most famous tragedian of Roman theatre while plenteous and Terence are well- known for their comedies.

After the fall of Roman emperor, there was a long pause of drama although there may be some development, significant contribution to the universal drama and theatre was minimal. After more than five centuries of relative inactivity, European drama was reborn in religious ceremonies in churches. This trend paved the way for mystery miracle and morality plays that developed over years initially in churches later outside in public places too.

Elizabethan Era approximately from (1590 - 1640) which includes Jacobean period (1603-1625) too is the golden age of theatre in Europe after classic Greek theatre. There were many influential dramatists like Christopher Marlowe and Ben Jonson, yet Shakespeare with his stand tall many aspects as the most dominant with his ever-lasting tragedies, comedies histories (and sonnets too). The tragedy and comedy introduced by great Greek dramatists were brought to a new level by Shakespeare with his masterpieces like Othello, Macbeth, Hamlet, Julius Caesar, Merchant of Venice, A Midsummer Night's Dream Romeo, and Juliet etc.

In the Eastern Context Sanskrit Drama, in Indian and Noh and Kabuki in Japan were well-established for centuries. Sanskrit drama is a poetic play that represents a long-lasting tradition maintained over thousand years. The earliest Sanskrit drama goes tact to centuries A. D. However, the plays are almost impossible to date accurately. Noh the traditional dance-drama in Japan, started in the 14th century. It is mostly identified with slow-movement and the mask, worn by characters while Kabuki is easily recognizable for their elaborate costumes, overly- exaggerated movements, dynamic sets and ingenious props.

With the utmost contribution of the two of the greatest dramatists, Henrik Ibsen and Anton Chekhov, Realistic theatre flourished in late 19th century and early 20th century. This drama forms attempted to highlight everyday life that deals with actual realistic of life from idealism and romantism. As a reaction to realistic theatre, different kinds of art forms came into existence in the universal context with the expansion of trade commerce. Consequent to the second world war, the absurd theatre, that reflects plot less plots, actionless actions, characterless and themeless themes, marks an extremely notable trend in modern theatre. Drama, therefore, is an extremely dynamic art that goes from strength to strength despite inevitable challenges in the modern-day contexts.

Development to Maritime Training with Special Emphasis to Sri Lanka and CINEC Campus

Capt. Kanchana U.B. Dolapihilla

Senior Lecturer, Cum Cadet Placement Officer, CINEC Campus, Malabe

Looking at the maritime industry, being one huge process of international transportation of goods, passengers, and other living things known as livestock have been statistically estimated to be responsible for a share of ninety percent when compared that with other modes of transportation, i.e. other than road, rail, and air, by further adding to it that transportation has even reached or extended to a mode through space as well with a simple example of how the international space station is being replenished and crewed.

Having the precise information sourced, the routes or passages to destinations carefully analyzed and drawn, the well trained and qualified navigator will now proceed to where he or she had aimed at arriving using economical and eco-friendly processors, to safely navigate and operate the respective vehicle which accommodates the invaluable goods and people needed to be transported.
Focusing on Maritime Transport alone, today over fifty thousand vessels used as means of transportation on waters are being handled by such men and women.

It can be the passion when looking at it from a bird's eye view, but, from an eagle's eye view, one should have not only the passion, but more outstandingly, "the ability to do" as well.
Having begun my seafaring carrier approximately four and a half decades ago, today I envy the perfect and well organized local maritime training facilities conveniently offered here in Sri Lanka, as at that time, the relevant training and qualifications had to be sought from various other parts of the world, not forgetting the fact that the sums of money spent, the extended times spent away from home and loved ones, being an alien to most entities, perhaps breaking rest on part time simple jobs designed for students for the purpose of earning something to have in hand in addition, the pressure of running out of available funds, have all contributed to a stressful state of living and existing, especially just before facing exams away from your place of domicile.

Today, an advanced Maritime Training Center such as CINEC which has vastly diversified and which still keeps diversifying to a number of other important branches of education, with no doubt, has opened the door to facilitate the necessary training for required qualifications to school leavers and professionals as well. CINEC has also become an eye-opener to many other zones of the world.

In order to keep up with the related enhancing technologies, rules, regulations and legislations, and, development in the industry, CINEC has proved fail proof and fruitful results by being in phase with the current standards of professional education in the maritime sector in Sri Lanka. The continuous improvement in training has allowed Sri Lankan seafarers to be accepted in shipping entities world-over.

The seafaring community in Sri Lanka is also facilitated by CINEC alone achieve parallel or secondary professional training and qualifications. To name few, an ordinary seafarer looking at being trained on welding work, junior and senior deck and engineering officers qualifying with management degrees and / or IT related programs can be few out of many under one roof.

I may without hesitation, assertively and moreover proudly declare that CINEC continues to serve and provide the concerned industrial training and education to anyone who may require its services so he or she achieves the goals and objectives to fulfill the visions with no doubt.

ABSTRACTS

Health Sciences

HS001

Evaluation of Practice on Self-Medication among Allied Health Science Undergraduates of Sri Lanka, Therapeutic and Toxicity Implications

K.L.C. Perera[1#], B.A.D.E. Chamara[1], W.K. Amarasinghe[1], M.A.C.T. Ariyadasa[1], H.W. Masimbula[1], S.B.H.P. Kumari[1], H.H.V.K.N. De Silva[1]

[1]Department of Pharmacy & Pharmaceutical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.

chathrangiperera@gmail.com

The practice of self-medication can lead to adverse reactions for which the data are unavailable among undergraduates in Sri Lanka. This study was focused on self-medication and potential harmful outcomes. Objectives were to identify the classes of medicines used, sources and reasons for using self-medication, health conditions to which self-medication are used and to identify any adverse reaction. A descriptive cross-sectional study was conducted by obtaining the self-medication history of the target participants during the last two months prior to the data collection period. The data were collected as a google form. Out of 371 questionnaires, 220 respondents reported with practicing self-medication. The prevalence of self-medication was 59.45%. Commonly used medicines were analgesics and antipyretics (77.82%), expectorants, antitussives (36.95%) and antibiotics (24.34%). Some of the reasons why undergraduates practiced self-medication were influenced from past experience (62.17%), previous doctor's prescription (34.78%) and because of the convenience (30.87%). Headache (70%), gastritis (35.21%), runny nose (27.82%) and fever (27.39%) were the main four conditions for using self-medication. The reported adverse reactions were headache (40.00%), vomiting (22.17%), nausea (20.43%) and diarrhoea (13.04%). In conclusion, more than half of the respondents (70%) think that self-medication is safe yet, majority of participants faced with adverse reactions after self-medication (56.72%). Therefore, we suggest to educate and implement policies regarding selling, advertising and the safe use of self-medication to prevent the adverse reactions.

Keywords: Self-medication, Undergraduates, Adverse reactions.

HS002

Demographic Data on Selection, Usage Duration and Disposal of Face Masks During COVID-19; Sri Lankan Perspectives

K.G.V. De Silva[1#], C.K.K. Batagallage[1], L.L.M. Hirunika[1], N.T. Kalupahana[1], L.M. Hettihewa[1]

[1]*Department of Biomedical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#]desilva.gaya@yahoo.com

Responsible use of face masks (FM) is pivotal for the prevention of COVID-19, it is linked to the rapid spread and many post-COVID complications. A web-based, self-administered questionnaire comprising of 23 questions, of which eight assessed the usage pattern of FM, and validated by the health sector, was used to investigate the common usage and disposal practices of face masks in the study population: the general public of Sri Lanka. The study represented all districts, 99% of participants had used the FM, and 55% were females while 45% were males. Of the participants, 71% were young, 17% middle-aged, the rest (12%) were above 40 years. Further, 74% of participants who used FM are tertiary educated, and the rest are school educated. Of them, 50% used KN95/N95, 40% disposable surgical masks, 6% reusable cloth masks and 4% used other. 85% of them had used all disposable FM. Out of them, 65% had reused it, 35% of them had not reused it. Participants who used reusable cloth masks, 58% washed every time, 36% after several uses, 2% rarely washed, and 4% never washed. Regarding using time, 30% used < 1 hr, 32% for 1-3 hrs, 28% used 3-6 hrs 5% for 6-12 hrs, and 5% > 12 hrs. 95% of participants mentioned that they do proper disposal. However, only 35% practiced the correct method. Most of them reuse disposable FM and also use cloth masks without rewashing. Importantly, no significant knowledge on proper disposal. We recommend a detailed health education program in this regard.

Keywords: Face mask, Usage pattern, Dispose

HS003

Face Mask Usage Related Complications, Misconceptions, and Usage Practices during COVID-19 Pandemic; Sri Lankan Perspectives

C.K.K. Batagallage[1#], K.G.V. De Silva[1], L.L.M. Hirunika[1], N.T. Kalupahana[1], L.M. Hettihewa[1]

[1]*Department of Biomedical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

#charunikaushalya123@gmail.com

Using of an accredited face mask (FM) is one of the most important preventive measures for COVID-19 and having the awareness of healthy usage patterns is also mandatory. We assessed the complications associated with FM usage, knowledge on good practice of different types of FM among the general public of Sri Lanka. 384 samples were collected using web-based questionnaire from all districts after ethical approval for the study. Among the participants, 99% used FM, out of which 57% touched and 43% did not touch the front side of the FM during wearing and removing. Majority (75%) had not removed the FM, while 25% removed it while speaking. 88% of them reported washing or sanitizing their hands after removing the FM, while 12% did not clean their hands. Among the study participants,57% believed a potential risk of using non-surgical masks, and 10% did not. Interestingly, 33% of participants had no knowledge to answer. Most participants (82%) suffered from difficulty in breathing and communication, sweating, skin infections while wearing face masks, but 18% were free of symptoms. The majority of the respondents knew that KN95/N95 masks provide the best (71%) while 19% said it is the surgical masks, and 7% had no idea and 3% said cloth/cone masks are not effective. Majority of the Sri Lankan general public possessed basic knowledge regarding the usage and disposal, but some showed misconceptions and malpractices. This data can be used to improve the good practice on usage and disposal of face masks in our country by health authorities.

Keywords: Sri Lanka, Attitude, Knowledge, Face masks

HS004

Positive Correlation of BMI with Educational Stress by Psychometric Analysis via Perceived Stressed Scale in Non-state University Students

B.S. Gamage[1#], N.G.I.A. Deraniyagala[1], K.M.D. Perera[1], A.A.K. Aishwarya[1], P.A.P.N. Perera[1], L.M. Hettihewa[1]

[1]*Department of Biomedical Science, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

#buddhisgamage@gmail.com

Overweight and Educational Stress had become two dominant problems in young population. We evaluated the effects of Educational Stress on BMI among non-state university students. Gender deference on stress and BMI, correlation between BMI and stress were determined. A Google form was used for collection of data from 384 participants and stress was analysed by Perceived Stress Scale (PSS). Majority of our study group 55.2% were female, and 44.8% were male. Mean BMI was 23.54kgm^{-2} (Overweight) and it was 24.70kgm^{-2} (overweight) in male and 22.60kgm^{-2} (normal) in female. As per the PSS, 52% of male participant showed moderate stress and 48% male showed high perceived stress. In female population, 50% showed moderate stress, 47% showed high perceived stress and 3% showed minimum stress. Results show >90% of students suffer from moderate to high perceived stress and it was positively correlated with BMI ($p=0.01$, $r=0.239$) seen in both genders. We suggest that educational stress can increase the students BMI. This finding is important for an institutional intervention for better outcome of the student performances. We recommend considering program interventions to minimize the educational stress and to reduce the high BMI related non communicable diseases in future.

Keywords: Body Mass Index, Perceived Stress Scale, University Students

HS005

Screening for Risk Factors Associated with Obstructive Sleep Apnea Among High Skilled Occupants of Western Province, Sri Lanka

G.D.H.S. Wijesekara[1#], P.D.W. Panapitiya[1], A.M.T. Thilakarathna[1], V.D. Hewaarachchige[1], R.Y. Baragamaarachchi[1]

[1] *Department of Biomedical Science, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] hansiwijesekara678@gmail.com

Obstructive sleep apnea (OSA) is a highly prevalent, potentially serious sleep disorder identified worldwide. However, the disorder remains undiagnosed and unrecognized despite its high prevalence. This study aimed to assess the prevalence of risk factors associated with obstructive sleep apnea among the high skilled occupants, who work in demanding work environments. A cross-sectional study was conducted using data of 390 study participants comprising managers, senior officials, and legislators in Western Province, Sri Lanka. The target population was assessed for risk of OSA using the Berlin Questionnaire (BQ). The baseline characteristics of participants were surveyed in another section of the web-based questionnaire. The study participants were classified into high or low risk based on their BQ score. Collected data were analysed using SPSS version 28.0. Among the studied population, 20.8% of participants were identified as being at high-risk of OSA and 79.2% were at low risk. The prevalence of high-risk OSA in males was higher than in female participants (26.6% vs 11.3%, OR=2.84, P<0.001) and the high-risk category contained mostly middle-aged (41-60 years) men (48.1%). Participants with >30 BMI (OR=14.0, P=0.018) and > 17-inch neck circumference (OR=2.67, P<0.001) displayed a positive correlation with high-risk OSA. Moreover, frequent smokers (OR=3.34, P=0.068), and alcoholics (OR=8.73, P<0.001) had relatively high odds of contributing towards high-risk OSA, although smoking was not statistically significant. Compared with those who were at low risk, the participants screened as high-risk were more likely to have associated with the comorbidities, diabetes (49.12%, OR=5.1, P<0.001), stroke (65%, OR=8.24, P<0.001), heart failure (53.3%, OR=5.18, P<0.001) and hypertension (53.6%, OR=10.52, P<0.001). A significant number of high skilled occupants were afflicted with high-risk OSA and associated risk factors. OSA is associated with important health outcomes. Therefore, measures should be taken to reduce the consequences resulting from it.

Keywords: Sleep Disorders, Obstructive Sleep Apnea, Risk factors, Berlin Questionnaire, Skilled occupants

HS007

Knowledge and Practice Regarding Basic First Aid Among Commercial Three-Wheeler Drivers in the District of Colombo, Sri Lanka

S.C. Sooriarachchi[1#], A.Y. Randeniya[1], G.M. Yasasvi[1], H.A.K.S. Gunawardana[2]

[1] *Department of Biomedical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[2] *Department of Health & Medical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] shamangasooriarachchi@gmail.com

Road traffic accidents are the leading cause of death and permeant disabilities in developing as well as in developed countries. First aid is the immediate care given at the site of accident to someone who is injured or suddenly taken ill until proper medical care is supplied. Commercial three-wheeler drivers would serve as an effective first responders, because they are the first to arrive at the accident scene. The aim of this study is to determine commercial three-wheeler drivers' knowledge and practice of basic first aid to road traffic crash victims. A quantitative cross-sectional study was carried out with stratified random sample of 389 from Colombo District, Sri Lanka. A pre-tested interviewer-administered questionnaire was used to collect the data. Out of all participants, 91% were males and 45% of them had studied up to Advanced Level. Majority of the participants (40.6%) were taking 1-5 hires per day. 54.5% of the participant have witnessed a road traffic accident more than once during their trips. But 36.2% participants only volunteered to provide first aid. Overall, 45% had heard about "Good Samaritan law" and 69.6% of the participants knew the medical emergency number they have to dial during an accident. Only 43.7% participants had the knowledge regarding correct spinal motion restriction procedure after an accident. Almost half of the participants (50.4%) chose ice application over direct pressure to control bleeding. Significantly low proportion (35.5%) knew how to provide Cardiopulmonary Resuscitation (CPR) and 13.6% had performed CPR at least once. 30% of them had difficulty in recognizing situations where CPR was required. Considerable number of participants (29.7%) were afraid to perform CPR due to the fear of legal issues. 90.9% participants were willing to participate training programs in first aid as they think it will help to save lives. Although the Commercial Three-wheeler drivers at the front line of experiencing or witnessing the emergencies, their knowledge and practice regarding basic first aid were not satisfactory. But majority shows the positive attitude. Improving their knowledge regarding proper first aid practices will be beneficial to save lives and prevent permanent disabilities.

Keywords: Knowledge, Practices, Commercial Three-Wheeler Drivers, First aid, CPR

HS008

Prevalence of Primary Dysmenorrhea and Its Impact on the Day-to-Day Activities of Undergraduate Female Students in Colombo District, Sri Lanka

S.N. Madampe[1#], M.S. Weerasooriya[1], W.A.C. Lakshika[1], S.D.R. Kariyawasam[1], R.C. Fernandopulle[2], S.P.S.M. Silva[1]

[1] *Department of Biomedical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[2] *Department of Obstetrics & Gynaecology, University of Sri Jayewardenepura.*

[#] sajmini19@gmail.com

Primary dysmenorrhea is a common menstrual disorder in young women of the reproductive age which can disturb their normal routine. The aim of this study was to analyse the prevalence of dysmenorrhea in undergraduates and the impact of it for their daily activities. Ethical approval was obtained for the research from Ethics Review Committee, CINEC campus. The questionnaire was validated and circulated on-line to 364 undergraduate female students, aged 18-25 years, across 5 selected non-state universities in Colombo District, Sri Lanka. According to the results, the prevalence of primary dysmenorrhea was 90% (n = 309). Around 42% of the students reported mild pain, while 58% reported severe to extremely severe pain. Symptoms associated with primary dysmenorrhea were identified as lower abdominal pain 95%, thigh pain 57% and back pain 46% from all participants. The Chi-square test showed a significant association between primary dysmenorrhea and family history ($p < 0.001$). Moreover, frequency of occurrence of pain was significantly associated with duration of menstrual bleeding (No. of days > 5) ($p < 0.001$). Most of the respondents experience difficulty in sleeping 73% and difficulty in moving 48%. Consequently, to relieve the pain, many prefer the consumption of analgesics 74%, while, some prefer bed rest 64%. Despite, the significant prevalence of primary dysmenorrhea and corresponding inconveniences, only 19% had visited a specialist for medical advice. It could be concluded that primary dysmenorrhea is a significant issue which impacts day-to-day activities.

Keywords: Primary dysmenorrhea, Menstrual, Prevalence

HS009

In-vitro Evaluation of Anti-Inflammatory Activity in Bark of *Madhuca longifolia* (mee) for the Development of Novel Herbal Balm

C.M. Ruwanpathirana[1#], S.K. Hettihewa[2]

Department of Pharmacy, Faculty of Allied Health Sciences, University of Ruhuna, Sri Lanka.

[#] chamee139@gmail.com

Madhuca longifolia is well known universal panacea of ayurvedic medicine. The aim of this study was to develop novel herbal balm using bark extract of *Madhuca longifolia* and, evaluate in-vitro anti-inflammatory activity. 80% aqueous methanol crude extract was prepared by macerating technique and subjected for the evaluation of total phenolic, flavonoid contents and in-vitro anti-inflammatory activity by using Folin-Ciocalteu assay, aluminum chloride colorimetric and membrane stabilization methods respectively. Different formulations (F1-F6) were prepared by incorporating the freeze-dried powder of the extract and tested for anti-inflammatory activity with compared to the commercially available herbal balm as the positive control. The physicochemical stability parameters (pH, appearance, odor, homogeneity, spreadability and, phase separation) were observed for a period of 20 days. The results of total phenolic and flavonoid contents of the extract were 7990.322±100.809 mg Gallic acid equivalent (GAE)/100 g and 5939.329±81.484 mg Catechin equivalents (CAE)/100 g DW of the bark respectively. The results of the percentage inhibition showed that the 80% aq. methanol had significantly high percentage inhibition (82.256±1.448) compared to Aspirin (72.305±0.744) at the concentration of 2 mg/ml. Physicochemical stability parameters of all herbal balms showed no remarkable variation during 20 days. Among the formulated herbal balms, F6 was found to be the most active formulation with significantly high in-vitro anti-inflammatory activity (75.758±0.772 %) compared to the commercially available balm (57.213±1.718%) at the concentration of 12.5 mg/mL. Therefore, it is concluded that the formulated balms have promising anti-inflammatory activity and F6 is recommended for clinical trials.

Keywords: Anti-inflammatory, Extract, Formulation, Herbal balm

HS010

Diversity and Bionomics of Sand flies (*Diptera: Psychodidae*) Vector of Cutaneous Leishmaniasis in the District of Matara, Southern Province, Sri Lanka: Effect of Ecological Factors

Ayesha Sarathchandra[1], A.D.U. Karunarathne[2], N.Y. Samaraweera[2], N. Rajapaksha[2], Tharaka Ranathunge[3], Menaka Hapugoda[1#]

[1] *Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Sri Lanka.*

[2]*Reginal Director of Health Service Office, Matara.*

[3]*Department of Biomedical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] menakaha@yahoo.com

Leishmaniasis is an emerging public health problem in north-central and southern Sri Lanka. A total of 456 Cutaneous Leishmaniasis patients were recorded during 2019 in Matara District. Therefore, current study was focused to identify diversity and seasonality of sandflies to evaluate the risk of leishmaniasis transmission in the District of Matara. Entomological surveillances were carried out in selected Medical Officer of Health (MOH) areas namely; Dikwella, Devinuwara and Thihagoda over a period of 18 months since January 2020. Seasonal fluctuation was evaluated through the monthly deployment of cattle traps and hand collections in each locality. A total of 4712 sand flies were collected during the study. Cattle baited traps yielded 38.6% of total captured sand flies while aspirators contributed to 61.1% of the total collected specimens, respectively. The highest number of sand flies were captured from Devinuwara MOH area while the lowest number from Thihagoda MOH area. The indoor sex ratio of males to females was 1.3: 1 while the outdoor was 2.3:1. *Phlebotomus argentipes* showed a bimodal peaks pattern nevertheless the peaks were much different in outdoor and indoor. The seasonal activity of sandflies extended from April to September, showing two peaks, one from May - June and the other from August - September. The indoor highest prevalence of sand flies was recorded in June and September while the outdoor was recorded in May and August. *P. argentipes* was the only recorded sand fly species during the study period by cattle baited net traps and hand collection methods. Results of this study provide important baseline data for planning control interventions.

Keywords: Leishmaniasis, Sand fly, Entomology

HS011

Diversity of Medically Important Mosquitoes in Mentic Microhabitats Prevalent along the Ma-Oya River in Sri Lanka

K. Wickramasinghe[1], L. Udayanga[2], M. Hapugoda[1], Tharaka Ranathunge[3#]

[1] *Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Sri Lanka.*

[2] *Department of Biosystems Engineering, Faculty of Agriculture & Plantation Management, Wayamba, Sri Lanka.*

[3]*Department of Biomedical Sciences, Faculty of Health Sciences, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] tharaka.ranathunge@cinec.edu

Mosquito borne diseases are one of the major health problems all over the world. Mosquitoes exploit almost all types of lentic aquatic and specialized lotic habitats for breeding. Species composition and abundance of mosquitoes in these specialized breeding sites and characterization of larval breeding sites are key components of the implementation of vector control interventions. Therefore, the current study evaluated the diversity and abundance of medically important mosquitoes, which is of paramount importance for successful vector control programs. The present study was conducted at 20 sentinel sites located in the Ma-Oya river basin located in the District of Kegalla from November, 2018 to April, 2019. Different medically important mosquitoes present in potential lentic water habitats were collected using standard dipping and siphoning methods at monthly intervals. Collected larvae were microscopically identified using taxonomic keys. A total of 85 rock pools and sand pools were monitored along the river basins. A total of 184 immature stages of mosquitoes belonging to four genera, namely, *Aedes* (15.76%), *Anopheles* (31.37%), *Culex* (52.39%) and *Mansonia* (0.48%) were found in the river basin. *Cu. quinquefasciatus* (28.32%), the vector of Filarisis in Sri Lanka, was the most prominent mosquito species, followed by *Cu. gelidus* (19.35%), a major vector of Japanese encephalitis. *Cu. tritaeniorhynchus* (10.32%), *Cu. pseudovishnui* (5.96%) and *Cu. vishnui* (2.31%) which are considered as major vectors of Japanese encephalitis were also found as medically important vectors. Relatively lower levels of *Aedes vittatus* (1.29%), *An. subpictus* secondary vector of malaria and *Mn. uniformis* (0.12%) vector of rural filarisis were recorded from rock pools. The abundance of mosquito species differed significantly throughout the study period ($p < 0.05$ at 95% level of confidence) as suggested by the statistics of Chi square test. A higher abundance level of medically important vector mosquitoes were found during the study, suggesting that routine entomological surveillance is important especially since the vectors of Japanese encephalitis and Filarisis were recorded.

Keywords: Mosquito vectors, Ma-oya basin, Filarial vectors

Engineering and Technology

ET 002 EE

Automatic Bidirectional Visitor Counter and Room Light Controller System

J.A.D.I.A.W. Jayasundara[1#], K.D.N.G. Karunarathna[1], T.G Chandrasekara[1], B.A.J.S. Nandasiri[1], W. Satanika Lowe[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] jayasundaraia@gmail.com

In this modern era, the use of advanced technology has become the preferred choice for humans as certain activities can be done automatically. With these advancements, people have accustomed to progressive lifestyle routines. As a result, people tend to waste energy on a large scale due to their impatience and negligence. Hence, this has led to more innovations related to Smart Home applications. However Smart applications are ever so costly and incompatible with developing countries such as Sri Lanka. So, this study's goal is to create a compact, cost-efficient Automatic Room Light Controller System, which can be used on any existing lighting setup. This System works by a bidirectional visitor counter, which detects how many people are currently present inside the room at a given time and controls the light accordingly. A light intensity sensor is also used to detect the lighting condition of the room so that the system knows when to arm or disarm the bidirectional system. A LCD displays the visitor counter. A nRF24L0 radio module is used so that the system can control the light wirelessly. Furthermore, when testing the system, it showed an average power saving of 70%. The system can be incorporated with other devices having the potential for upgrades. So, the system can be made to operate from a Node MCU where its user can monitor the system through a mobile app. Hence, the system can be modified for large-scale applications such as cinema halls and companies.

Keywords: Smart Home, Bidirectional Room Light Controller System, Cost-efficient.

ET 003 EE

Aggregate Agro - Universal Safety System for Tractor and Rotary Slasher

K.D.N.G. Karunarathna[1#], T.G. Chandrasekara[1], C.R. Kannangara[1], J.A.D.I.A.W. Jayasundara[1], W.M.Y.D. Weerasinghe[1] and J.G.V. Priyanka[2]

[1]*CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[2]*University of Ruhuna, A2, Matara, Sri Lanka.*

[#] naveenhp1100tu@gmail.com

In the present era, accidents caused by tractors have become a major issue in the agricultural industry. According to the statistical data from INAIL_ASL Surveillance, from 2002 to 2012, 817 victims have faced accidents within the agriculture industry and 357 were tractor-based disasters. Currently, only a few implementations have taken place regarding the safety of the driver and bystanders in Sri Lanka. To overcome these kinds of fatal accidents a universal safety system can be introduced. Primary focus in this research is the tractor with the rotary slasher attachment. The objectives of the research are building an early warning obstacle detection system for the rotary slasher with a bystander early warning system, passenger safety system and SOS Emergency Contact System. User-friendly interface is provided for the driver. Developed product can be considered as universal product that can be utilized in and tractor or a rotary slasher model. The following system uses an Arduino Mega microcontroller where it consists of 8 sub-systems. These 8 sub-systems consist of sensors such as a Hall effect sensor, ultra-sonic sensor, RFID module and a GSM module. In this report, an in-depth review of the entire system will be thoroughly discussed, how it functions and the implementation of the system. With future improvements our system will ensure maximum productivity while keeping the diver and bystanders safe.

Keywords: Accident, Safety, Obstacle Detection, Tractors, Rotary Slasher

ET 004 CE

Wall Cooling System by Wasted Liquids

M.I.M. Farhan[1#], T.H.N. Pravinath[1], S.K.S.M.S.I. Senanayaka[1], K.U.K. Kumarasingha[1]

[1]*Department of Civil Engineering, Faculty of Engineering and Technology, CINEC Campus, Sri Lanka.*

[#] rabiyafarhan123456@gmail.com

Present world use air conditioning systems extensively in almost every building. The main purpose of these air conditioning systems is to provide the users with a thermally comfortable indoor environment. But this research found that using a Specific type of Wall can create the Comfort Indoor Environment. Air conditions systems in modern buildings consume an enormous amount of electrical energy and the cost of installation is also high. The main objective of this research was to make an indoor comfort environment with low cost and high quality. This system is non-artificial and non-harmful. This focuses on developing a product to enhance the thermal comfort within the indoor environment of the buildings instead of using conventional air conditioning. This method uses an 8 feet high steel GI pipe for a 10-foot-high wall, with a fixed gap of 2.75 feet between each steel pipe, filling the steel GI pipe with 14.37% pure water and 85.63% of waste engine oil. The pipe structure is not visible from the outside as it is attached to the metal structure of the pre-cast concrete wall. Also to develop this research, some experiments under the source of thermal radiation is needed. Compared to a typical precast concrete wall, the temperature of inside surface is very low after this system is applied. According to the numerical calculation, the inner surface is reduced by about 30 degrees Celsius compared to the outer surface with a temperature of 60 degrees Celsius. The system does not need to be repaired again and again, and the system remains active as long as the home is in place after this application. This is specially designed for countries with moderate environmental and climatic conditions. Using this unique way, people can create a thermally comfortable indoor environment in the building without consuming any energy.

Keywords: Wall Cooling System, Wall Cooler, Wall Temperature Reduction System

ET 005 CE

Analysing the Effect of Daily Variation of Traffic on Fixed Time Signals in Kohuwala Junction, Sri Lanka

N.M. Sajath[1#], A. Vajeeran[2]

[1]*CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[2]*Faculty of Engineering and Technology, CINEC Campus, Malabe, Sri Lanka.*

[#] saja0759@gmail.com

Traffic congestion during peak hours is a big issue in developing countries like Sri Lanka. Drivers undergo a considerable delay in their trips. This causes an increase in travel time, and high fuel usage will lead to increase in vehicle emissions and cause air pollution. There are many reasons for the vehicle delays, such as inadequate infrastructure, heavy traffic flow, drivers' behaviors, parking of heavy vehicles on main roads, ineffective intersection control, etc. Among them, ineffective intersection control is a major reason for traffic congestion in Sri Lanka. The major junctions in city centers are controlled by traffic police manually or by traffic signals. There are two major types of traffic signals in Sri Lanka: fixed cycle time traffic signals and adaptive traffic signals. Only fixed cycle time signals are in use. Daily variations in traffic will greatly affect the performance of fixed-cycle time traffic signals. This study tends to find the efficiency of fixed cycle time signals due to the daily variation of traffic. For the analysis, Kohuwala Junction was selected. Junction geometry, traffic signal times and traffic flow data for three weekdays were collected. The total junction flow during the evening peak for the three days is 5547 vehicle/hour, 5349 vehicle/hour and 4982 vehicle/hour respectively, where the third day has around 10% variation from the first day. Traffic micro simulation software PTV-VISSIM was used for the analysis and calibrated driving behavior parameters for Sri Lankan conditions were used for the modelling. The results show that the average delay of the vehicles passing the junction for the three days is 79.6 vehicle/second, 72.8 vehicle/second, and 68.0 vehicle/second for the given phase time and cycle time. Also, with the current geometry and signal time, the capacity of the junction is found to be around 6000 vehicle/hour by micro simulation models. To overcome this issue, adaptive traffic signals/vehicle-actuated traffic signals should be adopted.

Keywords: Cycle Time, Peak Hours, Phase, Delay, Que Length, Travel Time

ET 007 EE

Smart E-Kitchen Based on Internet of Things

Vihanga Ransara Siriwardana[1#], W.N. Nanduni[1], J.D.C. Dilhari[1], V.U. Munasinghe[1], K.I.N. Kumarasinghe[1], Nisal Nimanka Siriwardene[1], Hesara Chathura Basnayake[1], G.S. Samarakkody[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

vihangaransara2018@gmail.com

Internet of Things (IoT) has invaded human life in almost all possible ways. Things are getting smarter with IoT. The kitchen is one of the most important places in a house. Safety factor is the main issue that must be taken into account during the activities in the kitchen. The main objective of this project is to introduce a Smart E-Kitchen with all the features to suit the future with the change in technology. It explains design and implementation of a power saving, low cost, user-friendly, secure and technologically Smart E-Kitchen based on Internet of Things. Based on these, a system can be created, which can detect changes in temperature, humidity and fire causes, presence of toxic gases, monitor the amount of gas in the gas cylinder, change the brightness of the bulbs, etc. Once any of the phenomena mentioned in above are detected by the sensors in the system namely as MQ135, DHT11, ACS712 and MQ2, they are automatically controlled and the user receives an SMS via the Blynk app installed on the user's mobile phone which is connected to the Smart E-Kitchen. The developed system indicates that the system can work as per the desired specifications. This can be described as an all - encompassing project. New features include an exhaust fan that automatically activates when detected an event of a toxic gas or a LP gas leakage and these gases are thrown away by this fan. It can be concluded that this IoT based user friendly Smart E-Kitchen is a great help to the world where everything is busy by hand.

Keywords: Internet of Things, User-friendly, Smart, e-kitchen

ET 009 EE

Stabilization of Locking Range of Optical Injection Locked Semiconductor Laser with the Effect of Noises and Linewidth Enhancement Factor

A. S. Rupasinghe[1#], and G. S. Samarakkody[1]

[1]*CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] amilasrupasinghe@gmail.com

Optical Injection Locking (OIL) can be identified as the most widely utilized technique, which is applicable to a larger number of laser applications like, optical communication, industrial laser applications, sensor applications, bio medical applications etc. With the use of OIL, it is possible to improve the system performance of the laser applications. Locking range of the OIL can be considered as major characteristic of the OIL system where it ensures the locking status of system. Semiconductor lasers are the widely utilized laser type for the OIL. Hence, this theoretical study has been conducted to identify the noise and linewidth enhancement factor (LEF) effect towards the locking range of the OIL semiconductor laser. Mathematical model has been developed for the OIL semiconductor laser with merging the noise and LEF. With the use of mathematical model, an analysis has been conducted an analysis using a simulation software. Through the analysis it has been identified that to enhance the stability of the system it is required to use semiconductor laser, which has higher LEF and system which is operating at higher injection ratio. Through this it is possible to avoid the stability matters by neglecting the noise effects. These results will be helpful for the future applications of the OIL as it is possible to gain the optimum outcome from the system with avoiding the noise effects.

Keywords: Optical Injection Locking, Semiconductor Laser, Locking Range, Linewidth Enhancement Factor, Noises

ET 012 EE

Cost Effective Intelligent Sleep Monitoring and Warning System

H. M. I. Amanda[1#], H.M.L. Sachindra[1] and G. S. Samarakkody[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] isurihennayaka1997@gmail.com

Sleep can be regarded as a function essential to the mental and physical well-being of the humans. Irregular sleep habits or sleep deprivations may result in severe health problems. The project has developed a sleep quality monitoring system which uses ambient parameters in a cost-effective way. The system has developed with the use of Commercial Off the Shelf sensors (COS) such as pulse sensor and accelerometer to monitor the patient's sleep quality. Through this system, bio status of the patient, including heart rate and body acceleration could be measured in a way which monitored data transmitted to the cloud-based database in a real time environment for further analysis. This system consists of two principal components, the detection unit and the surveillance unit. The sensor unit collects data by means of sensors and sends it to the cloud database. After analyzing the data, the system will determine sleep quality through sleep stages and provide real-time feedback. The smartphone application which is specially designed for this system could be used to identify the sleep pattern, duration of sleep and bpm. Using these data, the physician may provide instructions for medications as needed. This system consists of a smart alert system, which detects any abnormal heart rate and sends an alert to a caregiver or a family member. This system can be further developed by adding sensors such as pulse oximeter and temperature sensor to increase the accuracy. The developed design can be considered as a cost-effective sleep monitoring system which is merged with the intelligent warning system.

Keywords: Sleep Monitoring, Intelligent Systems, Low Cost, Warning System

ET 016 EE

Soil Quality Analysis System for Smart Farming Based on Internet of Things (IoT)

A.A. Lakshitha[1#], H.M.S.L. Dissanayake[1], L.A.B. Ranasinghe[1], P.M.D.S. Pathiraja[1], M.D.V.O. Karunarathne[1], M.I.M. Rihan[1], G.S. Samarakkody[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

ashanlakshitha412@gmail.com

Sri Lanka, being an agricultural country is still practicing primitive methods in safeguarding soil quality which is an essential factor for growth of crops. The main cause for this is the lack of a reliable and cost-effective product to detect the soil quality. As a solution for this shortage, this particular system, which uses the concept of IoT is designed as a full package of ensuring soil quality. It is implemented with the aid of an electronics simulation software and the readings are obtained with the use of sensors namely DHT11 sensor to detect the temperature and humidity of the farm, moisture sensor to detect moisture of soil, pH sensor to detect the pH value of soil and the NPK sensor to detect the concentration of Nitrogen, Phosphorus and Potassium. An alerting mechanism by which the technology of Global System for Mobile communications (GSM) is used here. The obtained readings were able to display on a Liquid Crystal Display (LCD) with the use of Arduino Uno and could convey the status of the farm to the user through a Short Message Service (SMS). Although existing projects in this sector detect several features mentioned here, they do not supply all the mentioned features in this project as an entire package, which is mainly aimed at soil quality. Further this system can be upgraded by introducing solar panels as a solution for the constant power supply issue in the farmlands.

Keywords: Internet of Things, Reliable, Cost-effective, Soil quality

ET 018 EE

A Touchless and Modern Approach to Minimize the COVID-19 Pandemic in Commercial Spaces

Teena Fernando Palappa[1#], Thiran Perera[1], Kavindya Sewmini[1], Gavin Fernando[1], Gresha Samarakkody

[1] *Mechatronics Engineering, University of Wolverhampton Programme, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] teenafdop@gmail.com

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

Keywords: COVID-19, Automatic sanitizer, Thermometer, Consumer details, Touchless

ET 019 EE

LED based Indoor Visible Light Communication

C.M. Dissanayake[1#], G.S. Samarakkody[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#]34-eng-032@kdu.ac.lk

Visible Light Communication (VLC) is a method of high-speed data transmission that transmits data with modulation of the visible light spectrum that is used for illumination. This topic has been a point of contention in wireless communication field that has expanded the growth for future transformations. Within the framework of this project, a prototype has been developed to demonstrate how the indoor VLC is transmitted bidirectionally with the use of light-emitting diodes (LEDs). This prototype transmits the texts and symbols between two computers using an Arduino serial monitor. Captured text and symbols are converted into binary format and sent via the LED. The receiver on the other side has a photoresistor and the voltage change is converted into binary signals On-Off Keying (OOK). Then it is converted to texts and displayed on the serial monitor of receiving computer. Since this facilitates bidirectional transmission, it is easy to manage the same set of equipment for both sides. Illuminance and SNR Distribution of the system is simulated using MATLAB. Character Error Rate (CER), Bit Error Rate (BER) and Distance Parameters results are taken from the prototype. This LED-based VLC system is furthermore proposed for the future improvements by emerging with the technology to enhance the performance and the accuracy with regards to the standardized techniques. Since this mechanism generates numerous benefits and opportunities, it will drive the success of wireless communication in a revolutionary manner.

Keywords: Visible Light Communication, Bidirectional transmission, ON-OFF Keying, Wireless Communication, LED

ET020-MT

Design an Automated Guided Vehicle with Real Time Navigation System and Object Detection Algorithms

T.A.N. Mahill[1#], G.M.S.M. Gaspe[1], D.H. Mabadda[2], S.D. Amarathunga[2]

[1]*Department of Mechanical Engineering, General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka.*

[2] *Atlas Axillia (PVT) LTD, Sri Lanka*

[#]34-eng-032@kdu.ac.lk

This project is focused on designing an automated guided vehicle for manufacturing companies as an unbiased solution to move goods from one place to another without any guidelines. To avoid problems such as repair broken guidelines due to the use of forklifts, pallet lifters, workers, dust, and floor arrangement problems this project is very useful. Generally Automated Guided Vehicles (AGV) with indoor navigation systems are used to solve these problems. A comparative analysis was done on different navigation systems and the most accurate Indoor Global Position navigation system was chosen for the AGV. Differential AGV structure was chosen in this project due to its capability of making turns around center axis. Properties such as DC voltage to power, flexible and real time communication method was concerned when choosing the servo driver. Other devices industrial PC, battery, battery charger, sensors, etc. was chosen by considering safety features. Pymodbus, snap7, etc. python libraries used to build communication between devices used for this project. Image capturing and convolutional neural network codes are used for object identification separating from environment. Programmed codes for calculations, movements and rotate motors were successful. Communication between two PCs showed successful under range of used access point. Gathering coordinated under room condition showed successful where no resonance and noises can be found. Identifying objects showed lack results due to low amount of data. Finally, altogether showed (75-80%) successful results.

Keywords: Automated Guided, Controllers, Driver, Communication, Global Position, System, Modbus

ET 022 EE

MIMO Monitoring System for Farming

M.S. Rukaiya[1#], W.G.I. Seethasagara[1], L.P.T. Madushani[1], W.D.C.L. Perera[1], J.A.D.I.A.W. Jayasundara[1], P.R.R.R. Almeda[1], Gresha S. Samarakkody[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] rukaiyasuhail0924@gmail.com

Agriculture plays a crucial role in a country's economic development. Due to industrialization, technological development, busy lifestyle, and various plant diseases it is necessary to improve crop production to feed billions of people. Implementing a smart farming system that enhances crop and resource management, quality and quantity, cost-effective agriculture, smart and farmer-friendly farming. This paper represents a real-time environment monitoring system utilizing a wireless sensor network using the MIMO system. The MIMO technology reflects the multiple inputs from different types of sensors and transfers the sensor data through multiple transmitters at the same time. It allows a larger number of users, higher data rates, lower bit error rate, and improved reliability and coverage. The monitored sensor data include soil moisture level, rainfall level, the water level, ph level, and ambient temperature were recorded and processed the sensor data through Arduino Uno board to Esp 8266 Wi-Fi, GSM, and HC05 Bluetooth module for transmitting the data signals as multiple outputs. The studies have shown that a combination of suitable parameters inside the farm will increase the amount of cultivation of farming. The developed system is capable of monitoring and updating the present conditions of the field and the relevant information will be sent to the farmer's smart device.

Keywords: smart farming, Multiple Input Multiple Output (MIMO), humidity, soil moisture level, channel reciprocity.

ET 024 EE

Duckietown: Traffic Light Detection System of a Duckiebot

H.G.S.T. Jayaweera[1#]. Praveen Ekanayake[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] sahanbitw@gmail.com

Duckietown claims to offer an open, low-cost, and customizable platform for autonomous vehicle education. In here mainly focuses on the traffic light detection system of the Duckiebot(self-driving robot). Mechanical drawing of the DuckieBot was designed to carry out a load of 1000N using a simulation software. Image processing and ANN (Artificial neural network) and CNN (Convolutional neural network) techniques were used to identify the colors in the traffic lights. The model was trained by using lots of images of traffic lights in Sri Lankan city area. The neural network can recognize and create patterns from a larger number of images. The results of the experiments reveal that insufficient contrast between lights and background, other objects with the same colors as the traffic lights, wrong lamp color, e.g., too bright, insufficient lamp sizes, especially for a long distance between the camera and the self-driving robot. With additional pictures, the neural network can recognize and create patterns from a larger number of images. By employing a stronger object detection pre-trained model, can improve object detection accuracy, which will aid trained model in properly identifying traffic lights signals. This model can be used in real-time and applied to real-world self-driving cars and at the same time. This large-scale traffic lights dataset offers a wide range of variations and allows us to train and evaluate a large deep neural network. The research presented in this study opens the path for self-driving cars to become a reality on Sri Lankan Roads.

Keywords: Traffic Light Detection System, Duckietown, Duckiebot, ANN, CNN, self-driving robot.

ET 025 MT

Duckietown: Lane Detection using Duckiebots

A.P.Iresha Udari[1#]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

kukieudari@gmail.com

Self-driving cars with Duckietown is an open-source platform that consist of cities with different types of environments made up of map tiles and other elements to build the smart town. A four-wheel electric car (Duckiebot) holds a Raspberry pi 4, Raspberry pi camera, and L298N motor driver. Similar studies suggest the approach with convolutional neural network and artificial intelligence. This platform will help to prevent major car accidents that happen due to human error and breaking of road rules. The idea of the project is to identify lane lines and curves using image processing algorithms. Initially, the basic lane line detection was carried out using algorithms to detect a line. However, the basic technique will not be able to detect lines and curves, so a proposed system was found. The new method uses colour detection to identify the lanes. Using python as the understandable coding language and OpenCV for image processing algorithms, the code was written and sent to the microcontroller. The simulation results show that the curve path is being followed clearly from the proposed system. The Pi camera that takes in raw input images of the lane is fed back to the microcontroller. The processor then gets the information of the image processing algorithms used to detect the lanes. The controller processes and sends data to the motor module to steer the robot accordingly depending on how much the curve is of the lane. This research explains a way for self-driving cars to follow the lanes without driver assistance in Sri Lanka.

Keywords: Duckietown, Duckie bot, Lanes, Detect, Image processing.

ET 029 CE

Analysis of the Characteristics of Soil-Quarry Dust Mixtures Pertinent to Shallow Ground Improvement

L.N. Dilshan Silva[1#], K.H.S.M. Sampath[2]

[1]*Department of Faculty of Engineering and Technology, CINEC Campus, Millennium Drive, IT Park, Malabe 10115, Sri Lanka.*

[2]*Department of Civil Engineering, University of Moratuwa, Moratuwa 10400, Sri Lanka.*

irekarinsy@gmail.com

Several research have been done in the past to investigate the different aspects of the compaction characteristics of soil-quarry dust mixtures, however studies pertinent to shallow foundations over weak-soils are minimum. As such, research reported in this paper illustrates that addition of quarry-dust to the weak soil is identified as a cost-effective method to improve ground properties compared to other ground improving techniques. Basic soil characterization tests (sieve analysis and Atterberg limit tests) were done initially to identify the natural soil properties such as gradation and soil parameters (liquid limit, plastic limit, plasticity index) and to classify the soil according to the USCS. As the major experimental analysis, a series of standard proctor compaction test were conducted on different mix proportions of a weak soil with different quantities of quarry dust mixed to it and identified its influence on the compaction characteristics of the improved soil, such as maximum dry density and optimum moisture content. The results of the subsequent experiments revealed that the compaction characteristics in terms of maximum dry density of soil improves proportionally with the quarry dust mix proportion, and a non-linear correlation between optimum moisture content and quarry dust mix proportion is developed based on the experimental results. Overall, the study concludes that an adequate amount of quarry dust mixed with the weak soil can cause appreciable improvement in the geotechnical and engineering properties of the existing weak soil and can be adopted as a successful ground improvement technique for certain constructions.

Keywords: Weak soil, Quarry dust, Maximum dry density, Optimum moisture content

ET 030 CE

An Alternative Method to Reduce the Construction Cost and the Reinforcement Usage of the Rigid Pavement Near the Toll Plaza in Expressways

H.A. Kasthurirathne[1#], U. Edirisooriya[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] hasineeanuththara@gmail.com

In expressways, a toll plaza structure is a conspicuous structure. Near this structure, vehicles frequently stop and accelerate within a small distance. Thus, the structure wears and tears in a comparatively high frequency than a usual bituminous pavement. Thus, the toll lane near the toll plaza structures constructs as a heavy reinforced concrete rigid pavement. In Sri Lanka, this is the method used in the expressway toll plaza structures. Due to the high cost of this method, the objective of this research is to introduce a cost-effective way with the same efficiency by comparing methods and technologies that other countries use to construct rigid pavement in toll lanes. To do that, the used design methods and the construction cost of the Colombo-Katunayake expressway at Peliyagoda and Seeduwa toll entrances are discussed in this study. Used pavement design and the proposed alternative technique are analysed using Finite Element Analysis (FEA). In this study, the usage of an ultra-thin continuous concrete pavement as an alternative to the current process and the use of fibre reinforced polymers bars as an alternative to steel bars is discussed. A cost-benefit analysis is done to the currently used method and the proposed method to estimate the economic benefits considering the construction cost for a 1,000m2 sized area. Obtained results indicated that it is economical to use an ultra-thin concrete pavement with steel fibre than the currently used method.

Keywords: Rigid pavements, Expressway, Toll plaza, Concrete pavement.

ET 031 CE

Optimizing Cement Quarry Dust Ratio in Concrete Asphalt Using for Industrial Purposes

D.H.J.M.V.R. De Silva[1#], G. Udayakumara[1]

[1]*Department of Civil Engineering, Faculty of Engineering and Technology, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] mathula.ds@gmail.com

Scarcity and the high cost of natural river sand due to government restrictions are the major problems for the construction industry. It was observed that cement quarry dust ratio is higher in quarry dust concrete mixes compared to conventional concrete mixes used for highway projects due to the effects influenced by shape, surface and content of micro fines of quarry dust. In this study, the cement quarry dust ratios were optimized to obtain the optimum strength, workability and to use quarry dust concrete using for industrial purposes. Workability, compressive strength tests were conducted on basic three quarry dust concrete grade mixes which vary quarry dust ratio percentage from 0.41 to 0.43 according to the British design approach. Workability of designed M20, M30 and M40 quarry dust concrete mixes has shown lower workability and compressive strengths on M20 0.41 and 0.42 grade quarry dust concrete mixes were higher compared to conventional concrete mixes. Cost analysis indicates that the percentage of cost reduction on optimized cement quarry dust ratio concrete mixes stands between 27% to 31% than conventional concrete mixes. It can be concluded that M20 – 0.41 and M20 – 0.42 QD concrete mixes can be used for industrial purposes as a replacement for conventional concrete mixes and using superplasticizer, M30 grade quarry dust concrete mixes and M40 – 0.41 quarry dust concrete mix can be used for industrial purposes with enhancing the workability and compressive strength than conventional concrete mixes. Further, it is concluded that optimized cement quarry dust ratio concrete mixes are cost-effective compared to conventional concrete mixes.

Keywords: Concrete, Quarry dust, Compressive strength

ET 033 CE

Studying of Ozone Depletion due to the Urban and Rural Air Pollutions.

R.P. Sachin Amarasekara[1#], N. Sugandika[1]

[1]*Department of Civil Engineering, Faculty of Engineering and Technology, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] sachin971135@gmail.com

Air pollution in Sri Lanka today poses a risk of Ozone depletion. It is mainly contributed by the harmful gases emitted by human industrial processes. One of harmful gases are Carbon dioxide. There are a number of human-industrial processes that emit this Carbon dioxide gas, one of which is the exhaust fumes from motor engine vehicles. Therefore, the focus of this study is on vehicle analysis and Carbon dioxide measurement adjustment. It can lead to conclusions about how much Carbon dioxide contributes to air pollution from vehicles as well. Yet this research analyzes how CO_2 effects the urban and rural areas. This research was conducted in 5 locations of Colombo and 5 locations of Enderamulla. It was found out that emission of CO_2 is less during early in the morning due to fewer vehicles. When vehicles are high during peak hours, CO_2 levels increase during the midday. But even at mid-day off-peak hour's temperatures, the CO_2 level is high. As number of vehicles and temperature decrease, CO_2 decreases rapidly. Therefore, temperature directly effect in increasing CO_2. In addition, Enderamulla locations show a higher percentage of CO_2 production than some Colombo areas. These results show that Carbon dioxide production is lower in areas with green environments. It can be taken as a solution to reduce the production of Carbon dioxide.

Keywords: Air pollution, Ozone depletion, Carbon Dioxide, Motor Engine vehicles

ET 035 ME

A Monitoring System to Detect Connecting-Rod Bottom-End Bolt Failure of Medium Speed, Four-Stroke, Marine Diesel Engines as a Part of the Engine Safety System.

J.L.M. Mohotti[1#], M.N.S. Perera[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] janaka.mohotti@gmail.com

In the marine engineering industry, heavy-duty, medium-speed engines that operate on the four-stroke, diesel cycle are commonly used in electrical power generators and occasionally for propulsion. Bottom-end bolts of the connecting-rods are being reported broken in these engines due to fatigue stress that arises as a result of the four-stroke timing cycle and the relatively heavy moving masses. Failure of these bolts is disastrous and may cause instant death to nearby personnel while putting the overall safety of the ship at risk. To prevent such accidents, the current practice in the industry is replacing these bolts in pre-specified running-hour intervals. However, there are incidents where the bolts have failed before the pre-specified running-hour interval due to human factor (incorrect tightening torque), manufacturing faults, and the ship's frequent exposure to weather and climatic changes (thermal stress). Therefore, a real-time monitoring system that can instantly detect the failure of these bolts needed to be introduced. In this project, an Arduino based system with a Graphical User Interface (GUI), designed with Python, has been introduced. The strain gauges attached to the bolts send the instantaneous strain readings to the system. When a bolt fails or partially fractures, visual and audible warnings are given while initiating the emergency stop function of the engine. The relative strain readings of the bolts are graphically displayed so that the watchkeeper can manually monitor the condition of each bolt while the engine is in operation. This safety system can be introduced to existing and new building ships at a relatively low cost.

Keywords: Marine diesel engine, Connecting-rod bottom-end bolts, bolt failure detection, Engine safety system, Arduino

ET036

Compatibility of Quarry Dust as Fine Aggregate for Concrete Mix Designs

I.R. Peiris[1#], Udayanga Warnakula[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

#imantharashmika123@gmail.com

Sustainable construction is the way forward with the advanced and new technology to promote and practice greener construction. The use of new artificial resources and replacing the traditional and exhausted natural resources will enhance sustainability. It is with utmost importance that natural resources are preserved for the betterment of humanity and nature. Practicing to utilize waste materials and the process of reuse can minimize the exhaustion of natural resources. This research paper discussed on concrete technology. Quarry Dust is a paradigm for sustainable materials. However, most engineers are skeptical about using Quarry dust as the only fine aggregate in concrete designs. This research intends to analyze and obtain feasible results to understand the nature of the aggregate and develop a cost-effective concrete design, with acceptable workability and compressive strengths. To achieve this, a simple and often used concrete grade of G25 designed with only Quarry dust as fine aggregate by using a pot mixture. Two designs tested for the same grade, for a given target mean strength using PCE Based Admixture. The final trial with 40% of fine aggregate from total aggregate content, gave positive results, hence providing a cost-effective design compared to natural sand. Temperature variations were not prominent but variations in moisture contents produced an impact on retention time of the concrete. Behavior under high ambient temperature and shrinkage stress proved to be limitations.

Keywords: PCE, Sulphur-Resistance, Sorptivity, Shrinkage-Stress.

ET 038 EE

Portable and Fast Metal Heating Machine

Vihindu Basitha Jayawardena[1#], Eranjith Thenuka Bennett[1], Pabasara Weijesinghe[1], Pramode Chamika Palayangoda[1]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] vihindu18jayawardena@gmail.com

Since the Industrial Revolution in the 1760s there has been a huge advancement in technology. When technology is taken into consideration it is clear that over the last 200 years the term "technology" has significantly changed, whether it's being engineering, medical, agricultural, or social. Irrespective of its field, technology is being used by human to get work done easily and efficiently. When it comes to the engineering field, a massive number of innovations and inventions are visible. When taking heating conductive materials into consideration, flammable method is common, which requires more energy and consumes a large amount of time. Therefore, induction became a proper solution for all of it. Currently, most available induction heaters in the market are a solution for the flammable method, but it also has its disadvantages too. Even though the induction heaters in the market are quick up to a certain extend it still drains a lot of energy which makes it less efficient, and its other disadvantage is being bulky which makes it basically sit in one place, the importable factor can be a huge disadvantage when it is used industrially. Our induction heater is a solution for these problems without reducing its efficiency. A low power source is used to the device to generate heat within the coil. This could be affective for the industrial site economy and will be helpful to reduce the working time due to its fast heating and its easiness to handle.

Keywords: Induction heating, Magnetic heating, Technology

ET 039 CE

Use of Concrete Waste from Industries as an Alternative Material for the Permeable Concrete Production

B.A.S.R. Manuwansha[1#], N. Sugandika[1]

[1]*Department of Civil Engineering, Faculty of Engineering and Technology, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] sachintharavinath@gmail.com

Every year, tons of demolished concrete waste items dump into the environment. With this process, massive environmental pollution occurs. Therefore, in this research, the main aim is to find a solution for this environmental pollution by recycling it. The main objective is to recycle these concrete waste materials from industries to use as an alternative material for the production of permeable concrete by maintaining the recommended compressive strength and the recommended permeability. Permeable concrete can be used for the concreting of floor areas like car parks. It provides environmental friendly way to drain storm water without flooding. For this research, 1:5 ratio of cement to aggregate was used and 14mm to 20mm size natural coarse aggregate and concrete waste were used. The control sample was prepared using 100% aggregate. With total amount of aggregate weight 5%, 10%, 20%, 30%, 40% amounts were replaced with the waste concrete after preparing 14mm to 20mm size samples. The slump test, compressive strength test and the permeability tests were conducted. The results were checked with ACI 522-06 standards. According the results of the 28 days compressive strength test, the control sample was obtained 7.423MPa strength but neither of any other sample could not reached this strength. However the sample which replaced with the 10% of waste concrete with natural coarse aggregate has obtained 88.683% strength compared to the control sample. According to the permeability results, it shows that there will not be a great impact by using concrete waste as an alternative material in permeable concrete production. The results were varied between 15.8L/m^2/s to 15.08L/m^2/s.

Keywords: Permeable concrete, Compressive strength, Permeability, Recycling

Management and Social Sciences

MS001

Service Quality and Its Impact on Passenger Satisfaction in Sri Lankan Rail Transport Service
"A Specific Frame to Colombo Fort Railway Station"

W.M.T.M. Weerasinghe[1#], D. Silva[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] thiwankamanuranga1@gmail.com

Railway transportation is a mode of transport which is safe, comfortable, fast passage and ecofriendly. The customer satisfaction is a very important determinant to measure the organizational performance and service quality in determination of the service. The aim of this study was to fill the knowledge gap of customer satisfaction and service quality in Sri Lankan railway based on the data gathered from Colombo Fort railway station. The primary data of the study was gathered via 200 online questionnaires distributed among railway transport users at the Colombo fort railway station. Among them, 34.30% represented 18 – 25 age categories. The majority 24.15% of respondents were in the income category of below LKR 10,000 and 27.05% were using it for work purposes. The highest number 32.85% of passengers were qualified with an undergraduate education while 42.03% of use daily tickets. A total of 68.1% responded as they are not satisfied with services provided, but 86.96% repeatedly use the service. The majority of them 68.60% recommended to allow private companies to operate services where a relationship between passenger satisfaction on railway service and railway privatization was identified (p value < 0.05). Also 4 factors affecting to the passenger satisfaction were identified as quality and the comfortability of the service offered, effective operations management, modernized operations based on technology and innovation and safety and accessibility (p values < 0.05). Therefore, enhancing the efficiency, effectiveness and productivity of above factors would be the solution to the issues related with railway transportation system in Sri Lanka.

Keywords: Rail transportation, Service quality, Passenger satisfaction, Public transportation

MS002

Commuters' Satisfaction Towards the Service Quality of Mobile Applications-Based Taxi Services (MABTS) in Gampaha City Limits

N.M.T. Madhushika[1#], A.A.T. Thathsarani[1]

[1]*CINEC Campus, Millennium Drive, IT Park, Malabe Sri Lanka.*

[#] thilinimudalige96@gmail.com

Every day in Sri Lanka, there is a new start up offering efficient MABTS to the commuters operating in urban and rural areas. This raises a question that is Sri Lanka going through a probable "MABTS Revolution". The study was carried out to identify the commuters' satisfaction towards the service quality of Mobile Applications Based Taxi Services in Gampaha City limits and also the relationship between factors affecting the service quality and customer satisfaction. A questionnaire was developed based on 16 factors which were identified in the literature review. The online questionnaires were used for data collection. Responses were taken by using convenience sampling technique. Statistical information was processed with MS Excel Software and SPSS version 16 and analyzed using Demographic factor analysis, Reliability Analysis, Exploratory factor analysis, correlation analysis using hypothesis and regression analysis. Through the exploratory factor analysis, four major factors were identified and they are Operational Excellence, Features of good taxi service, Customer expectation and Mode selection. Eventually, a regression formula is formulated by using coefficients to predict the dependent variable. According to regression coefficient, mode selection is the most influential factor on the commuters' satisfaction on the service quality of mobile applications-based taxi services in Gampaha city limit and operational excellence is the lowest affecting factors on dependent variable. Based on the findings of the research, the researcher forwarded some recommendations to improve the service quality of MABTS in Gampaha city limits.

Keywords: Mobile Applications Based Taxi Services (MABTS), Service Quality, Commuters' satisfaction, Gampaha city

MS003

Perception Analysis in Implementation of the Green Port Concept in Colombo Port

G.B.D. Kariyawasam[1#], R.S. Siriwardena[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] binura619@gmail.com

Due to increase in environmental pollution (levels), sustainable concepts are playing a vital role nowadays. Seaports are major economic corridors that play an important role in economic development in many countries. The green port concept is emerging as an intense solution in reducing environmental problems occurring in seaports. Therefore, most of the major ports tend to embrace this concept to make their port operations sustainable. However, there is a practical gap when comparing Colombo port with other major seaports in terms of green practices. Therefore, the main objective of this research is to analyze the perceptions of competent authorities in implementing the green port concept in Colombo port. The main mechanism of the study is based on the conceptual framework. The study population for this study is all terminal managers of Colombo port and the sample size is 77. Both primary data and secondary data have been used to carry out this study. To analyze gathered data, reliability test, demographic factor analysis, descriptive statistical analysis, cross-tabulation analysis, correlation analysis and regression analysis were used. After the analysis, the researcher discovered that air pollution level mostly impacts the environmental quality of Colombo port. Technically, Colombo port requires an Environmental Management System (EMS). Economically, port financial ability and improving operational efficiency need to be prioritized. It can be suggested that Colombo port should first install an Environmental Management System (EMS) to identify emissions and then take necessary actions to implement the green port concept.

Keywords: Seaports, The green port concept, Environmental Management System (EMS)

MS004

Sustainable Energy Management in Container Terminals

H.M.K.B. Herath[1#], L. Edrisinghe[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] bhathiyaherath@gmail.com

Today's world's trade and transportation of goods more rely on container shipping. Moreover, the increase in trade volumes and containerized cargo makes the container terminals busier. Therefore, gain efficiency in container term influences 24/7 and it makes huge consumption of energy. This study focuses on the factors that influence energy efficiency of the container terminals, mainly focusing on cost, technology, infrastructure and environmental impact on energy efficiency of the container terminals. This research questionnaire was developed to get primary data and it was based on conceptual framework and objectives. The researcher also referred secondary data to expand the ideas. 135 responses were taken using snowball sampling by distribution of the questionnaire survey and the employees of the CICT terminal considered in the study. The responses were collected online and the analysis was done by taking them to one database. This study evaluates the energy efficiency of the container terminal and finds out the way of effectively enhancing the energy efficiency through main factors such as cost, technology, infrastructure, and environment. The analysis tested validity and reliability and did regression and correlation analysis. Therefore, it was confirmed that to gain energy efficiency sustainably it is important to improve sustainable energy infrastructure and requires to switch from conventional energy to renewable energy sources as well as to purchase and modified the equipments as to meet global trends. Especially, to adapt the energy-efficient mechanisms.

Keywords: world's trade, container shipping, containerized cargo, energy efficiency

MS005

Computerized POD System for Third-Party Logistics Companies in Sri Lanka

D.V. Rupasinghe[1#]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] djdanukarupasinghe@gmail.com

The main goal of this research was to implement an electronic proof of delivery system for third-party logistics (3PL) companies in Sri Lanka. Handling of documents in any company is important since it acts as a proof. Since the third-party logistics is a leading business model in Sri Lanka, and the competition is higher among rivals, the operation acquirement became a vital factor. Therefore, the amount of workload for a single head of an office, increased for the past few years. The researcher used various methods to conclude the research successfully. The main data collection method was an online questionnaire, where the researcher used face to face approaches to collect data. Statistical information was processed with MS Excel, Statistical Package for the Social Science (SPSS), and analysed using demographic factor analysis, cross tabulation factor analysis, Chi square test, reliability analysis and correlation analysis. Data collected from 101 respondents were analysed using the exploratory factor analysis. There we twelve independent variables, divided into 3 main categories as organizational aspect, people aspect and technical aspect.

Keywords: Proof of Deliveries (POD), Third-party logistics (3PL), Operation acquirement

MS006

Impact of the Usage of ERP System on Supply Chain Management Performance of Manufacturing Companies in Sri Lanka

D.A.H. Jayakody[1#], A. Medawattage[1], J. Rajakaruna[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#]ajla1997zoey@gmail.com

Supply Chain Management (SCM) and Enterprise Resource Planning systems (ERP) are two of the effective ways to achieve competitive advantage and to improve performance of the organization. This study investigates the relationship of Supply Chain Management Performance (SCMP) as the dependent variable and ERP systems dimensions (integration, production planning, controlling, materials management and workflow management) as the independent variable. Objectives of the study is to identify the determinants to investigate the relationship and to identify the impact between ERP system dimensions and SCMP. The conceptual framework was constructed based on peer reviewed similar articles related to the study area. This study focuses on manufacturing companies in Sri Lanka that use any kind of ERP system. An online based research questionnaire was distributed and 400 respondents are considered as the sample. Convenient sampling method is used and the survey is concluded with 340 responses. A confirmatory factor analysis was done to extract 5 factors out of the 25 variables and the reliability was analysed using Cronbach's alpha and KMO test was done to measure the sample adequacy. Chi square test was done to analyse the association between independent variables and SCMP. Pearson correlation analysis was used to analyse the relationship between ERP dimensions and SCMP. P values of the association between ERP dimensions and SCMP is 0.000, significantly, there is a positive coefficient of correlation between independent variables and SCMP. Regression analysis was used to identify the impact, results of the analysis is concluded as integration, controlling, materials management and workflow management as significant and production planning is insignificant with P values of .000, .029, .000, .000 and .088 respectively. Though the production planning is insignificant, there is a positive impact on SCMP. The finding of this study supports the significant relationship between ERP system and SCM performance. This research concludes that, there is a positive and significant relationship between ERP system (integration, controlling, materials management and workflow management) and SCMP.

Keywords: Enterprise Resource Planning (ERP) system, Supply Chain Management (SCM), Supply Chain Management Performance (SCMP), Competitive advantage

MS007

Analysis on Factors Affecting Customer Satisfaction on Service of Air Cargo Transportation of United Parcel Service (UPS) in Sri Lanka

K.S. Gunawardhana[1#], T. Amarathunge[1], D. Dharmaratne[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] sadinikithma96@gmail.com

The main goal of this research was to identify the factors affecting customer satisfaction of service of air cargo transportation on United Parcel Service in Sri Lanka. Customer satisfaction survey is an effective tool to inquire what a customer really needs and expects. Therefore, identifying the independent variables affecting the customer satisfaction was one objective of this study. Suggestions for improving the service on UPS was proposed based on the results of survey and applied theories. This case was conducted using a quantitative research method. A sample was selected using purposive sampling technique and data was collected from above executive level employees since they are the people who connect with UPS and they know the problems related to the service of UPS. Online questionnaire is used for data collecting. Data collected from selected logistic companies were analysed using the exploratory factory analysis. A questionnaire was distributed among those selected companies which deliver cargo through UPS and data was collected only from Import and Export department. Statistical information was processed with SPSS and analysed using Demographic factor analysis, Cross Tabulation Analysis, Reliability Analysis, Correlation Analysis and test hypothesis. Sixteen variables were divided into three factors. Those are freight cost and documentation, shipment delivery without off-loading and damages and timely transaction. According to the results, the author has found all the factors were influenced for the service of UPS in Sri Lanka. Recommendation that are provided at the final part of the research concentrate on improving the service of air cargo transportation of UPS.

Keywords: Customer Satisfaction, Service, Air Cargo Transportation, United Parcel Service

MS008

Assessment of Factors Impacting to the Warehouse Efficiency: A Case of Sri Lankan Multinational Apparel Firm

U.I. Meegodage[1#], A.C. Kankanamge[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] uishadini@gmail.com

The main aim of this research is to identify the factors that have an impact during warehouse management to improve efficiency and effectiveness at ABC Apparel Company in Sri Lanka. Enhancing warehouse management efficacy will act as a supporting function towards logistics and will assist ABC to attain objectives pertaining to the firm's logistical supply chain system. The research objectives attempt to find solutions to improve the inventory managements, to enhance the information system usage within the warehouse to improve efficiency and to improve the layout and ergonomic structure towards enhancing the overall efficacy and thus profits for ABC Company. The research methodology encompasses a primary investigation conducted on 103 employees of the ABC Company. The simple random sampling technique was used to select the cohort. It was identified that most of the cohort were male, between the ages 21 and 30, single and had worked at ABC for less than 1 year. As per the responses pertaining to the independent and dependent variables there was a positive skewness and tall distribution pertaining to Kurtosis which indicated strong negative responses for the questions asked in the survey. This portrays that inventory management; information systems and warehouse ergonomic structure and layout are not ideal and the systems are not effectively used or effectively functioning. Therefore, recommendations were provided such as incorporating Industry 4.0 technologies to improve operational performances and to make use of commendable warehouse layout and structuring which will have a positive impact on the inventory systems as well.

Keywords: Warehouse Efficiency, Inventory Management, Information Systems, Ergonomic Structure and Layout

MS009

A Study on the Impact of COVID-19 On Sri Lankan Textile and Apparel Exports

T.W. Jayasinghe[1#], D. Dharmarthne[1]

[1]*CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] thamindujay@gmail.com

Textile and Apparel exports in Sri Lanka is one of the biggest industries in Sri Lanka, helping country's economy, employing 15 percent of its workers and Sri Lanka is one of the top countries in the world in this industry according to the population. The COVID 19 pandemic has spread to many countries across the world implementing lockdown. It has caused many situations to the consumer customs instigating a setback in the international fashion market in present Covid-19 situation. This study evaluates the pre-process and the ongoing pandemic process of textile and apparel exports in Sri Lanka. It further evaluates the effects of Covid-19 to process of textile and apparel exports in Sri Lanka and the current encounters on apparel and textile export in Sri Lanka during the COVID-19 pandemic and the current challengers of textile and solution used and finally future potential direction of Sri Lankan apparel export. Therefore, it is needed to develop Sri Lanka to global hub concepts with the help of high skilled designers using new technologies and other production terminuses.

Keywords: Sri Lankan Apparel and Exports, COVID-19, Production

MS010

An Analysis on the Impact of Reverse Logistics towards the Business Performance – A Sri Lankan Brewing Industry context

S. Wanniatchi[1#], R. Mudunkotuwa[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] sachi.wanniatchi@gmail.com

In the emerging world today, sustaining a productive Reverse Logistics (RL) process has moved to the forefront as a key accountability, mainly for the organizations that engage in retrieving packaging containers, in which inappropriate disposition causes harm to the environment. This had led to the exploration of the endless benefits gained to the business through a well-managed RL chain, addressing the brewing industry. Thereby the main objective of the study is to determine the significant impacts caused by RL of glass bottles on the business performance. The study also aimed to find out the potential challenges that influence the efficiency of RL performance and points out appropriate mechanisms that could be applied to enhance its performance. The study undertook a deductive research design focusing mainly on quantitative research design. Since it was especially noted that to interpret the research findings through quantitative survey alone could leave some considerable questions unanswered, a qualitative design was exploited additionally. A sample size of 103 from the population of employees at the two organizations in the brewing industry was selected through purposive or judgmental sampling where data was gathered via questionnaires and two interviews. Reliability, correlation, multiple regression, cross tabulation, frequency analysis, confirmatory factor analysis and independent sampling were applied in order to obtain the ultimate outcome of the study by means of SPSS data analysing tool. The primary findings of the study indicated that the impact caused to the business performance by carrying out well managed glass bottle RL operations is substantial. Hence, significant positive impacts were induced towards the Financial Performance, Materials Management, and Competitiveness of the business while for the Green environment it was negative. It was also revealed that cost of RL and sorting of the collected bottles are the crucial challenges faced, eventually three strategical mechanisms were figured out to enhance the efficiency of RL performance.

Keywords: Reverse Logistics, Glass bottles, Business Performance, Reverse Logistics Challenges, Strategies and Mechanisms, Efficiency

MS011

An Optimized Redistribution Route Plan for the Outbound Logistics System of Softlogic (Pvt) Ltd in Sri Lanka

D.H. Karunamuni[1#], D.G.N.D. Jayarathna[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] dumindihashini@gmail.com

This is a case study based on Softlogic (Pvt) Ltd, and its Consumer Electronics. This analysis mainly considers company's outbound logistics and its decentralized redistribution process. Currently, Softlogic Retail operates two main warehouses in Piliyandala and Anuradhapura, covering 99 demand points across the island. But, company suffers from an extra transportation and warehouse cost in the existing system due to covered redundant distances because of excessive consumption of additional distance generated by improper utilization of the used lorries. So, the researcher wants to determine a proper redistribution route network and optimum truck allocation method for the operations. Further, a cost analysis will be conducting between existing and proposed system to check the financial optimality of the developed system. The ideal path for each cluster was determined using Djkstra's algorithm, and the optimal path was represented by a Hamiltonian graph. To find the optimum truck allocation for each path, linear programming model was developed. To determine the optimal pickup and delivery routes, a mathematical model of heuristic solution was developed. Based on this heuristic method, all demand points served by Piliyandala Warehouse were classified into 8 clusters and Anuradhapura Warehouse into 1 cluster. Using MS Excel Solver advance application, trucks were assigned to 9 clusters as the total monthly demand of the retail points are not exceeding the truck capacity. Since the optimal routes are determined with improved transportation efficiency, the total cost of transportation in the optimized network is reduced by Rs 4,222,800.00(approximately 37.87%) compared to the initial transport network.

Keywords: Vehicle Routing Problem, Heuristic method, Milk run, Linear programming, Route optimization

MS012

Effects of Lean Practices on Production Performance in MAS Sports Wear Biyagama Export Processing Zone

M.V.T.R. Wijesinghe[1#], C. Grero[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] thisararanganam97@gmail.com

Lean practice is an emerging trend of Sri Lankan manufacturing industry nowadays. Many companies use several techniques to reduce waste, cost and increase quality of their product and to increase performance in their business processes, and lean is one of those techniques as well as a concept. Also, some apparel manufacturers have been using lean tools to increase their production as well as to reduce the unnecessary waste and cost. The ultimate objective of this research is to identify the effects just in time, Total productive maintenance and Autonomation on production performance in MAS Sportswear Biyagama export processing zone. MAS Sportswear has been practicing given lean practices. In the literature review, the researcher found out 3 main independent variables which affect to production performance. The survey was questionnaire-based. Research questionnaire was sent through google forms. The target sample of this research was MAS Sportswear Biyagama export Processing zone. Sample size was 50 respondents. (Those who have broad idea about lean tools and practices). 45 responses were collected out of them (above executive level). SPSS was used for analysing the collected data. Initially, descriptive analysis was carried out for demographic analysis. Further, a reliability and validity test were done. Correlation and regression testing was done to check hypothesis and relationships of several factors. Finally in the conclusion, the researcher found that the lean practices minimize activities that do not add value to the production process. Just in time reduced their inventory cost and also their production functions carryout without bottlenecks. Also, the researcher found that from Autonomation and Total productive maintenance, The setup time, equipment maintenance and machine maintenance time are reduced due to Lean practices.

Keywords: Lean practices, Apparel, Waste

MS013

The Impact of Lean and Logistics 4.0 on Warehouse Performance in Sri Lanka

P.C. Wimalasena[1#], W.L. Rathnayake[1]

[1]*Department of Logistics and Transportation, Faculty of Management Social Science, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] punsarachamodya@gmail.com

Warehousing is now recognized as one of the most important value-added activities in supply chains. Automated intralogistics systems would be a perfect solution in the warehouse business to remove inefficiencies in traditional processes while also addressing the labour shortage issue. Thereby the key objective of the study is to identify the impact of logistics 4.0 and lean management on Sri Lankan warehouse performance. 5S, Poka-Yoke, Kanban, Andon, Kaizen Jidoka and Heijunka have been the lean practices and CPS technology in WMS Ambient intelligence, RFID, RTLS, CPS, IoT, Big Data and Data Mining have been the logistics 4.0 technologies tested in the study. The quantitative data has been gathered for the study by using a structured questionnaire, sent online. Population for the study is referred as the warehouse employees which is a part of the 514470 number of transport and storage sector employees in SL and 384 employees have been selected for the sample as per the Morgan table. the respondents were chosen based on the simple random sampling method. MS Excel and SPSS used for the data analysis and frequency analysis, reliability analysis, correlation and regression analysis were conducted. The primary findings of the study indicated that there is a positive impact of lean management practices and logistics 4.0 on warehouse performance. Thus the application of lean and logistics 4.0 are recommended to escalate customer satisfaction and brand reputation on the warehouse performance.

Keywords: Lean Management, Logistics 4.0, Smart logistics, Warehouse performance

MS014

The Effect of Logistics Service Quality on Customer Satisfaction Towards Online Purchasing During the Covid-19 Pandemic.

T.H.M. Liyanage[1#], C.D. De Silva[1]

[1] *Department of Logistics and Transportation, Faculty of Management and Social Science, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] hirushi7333@gmail.com

The main purpose of the study is to investigate the implication of logistics service quality dimensions on customer satisfaction. In addition to that it measures the satisfaction level of online grocery shopping with its logistics services factors provided with the covid-19 pandemic situation in Sri Lanka. The five dimensions of logistics service quality model information quality, order procedure, order information accuracy, order discrepancy handling and timeliness were used to measure the logistics service quality of online markets. To answer the raised research questions both primary and secondary sources of data were used. The primary data was collected through administered questionnaire. A combination of purposive and convenient sampling technique was used to obtain 360 responses from customers who had made purchasing recently during pandemic through online platform for groceries. Correlation analyses were used to investigate the relationship between dependent and independent variables. Factor analysis, regression analysis, chi-square, KMO bartlett's were some other analyses used in the study. Regarding the satisfaction level measurement, 49.7% of the respondent were measured 'good', 31.7% has rated 'excellent' and 17.2% are satisfied with the service while, 1.4% are rated as 'poor' for the online stream they use. The results indicate that there is a positive correlation between the dimensions of logistics service quality and customer satisfaction. The research shows that timeliness and order discrepancy handling play the most important role in customer satisfaction level followed by, information quality, order information accuracy and order procedure respectively. The researcher has identified the negative impacts faced by the respondents among that the most frequent negative impact faced by the respondents were poor customer service and less promotions. Therefore, the supermarkets should give focus to improve logistics service quality by giving more promotions and offers and enable 24/7 contactable customer service.

Keywords: Customer satisfaction, Covid 19 pandemic, logistics service quality, Online purchasing.

MS015

Exploring the Impact of Covid-19 on Travel Behaviour in the Colombo District of Sri Lanka.

S.D. Gunarathna[1#], V. Waidyasekara[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] sathma98@mail.com

Various measures were recommended or imposed by the governments to control the spread of COVID-19. The objective of this study is to explore the impact of COVID-19 on travel behaviour in the Colombo district of Sri Lanka. The data were collected from a questionnaire (N=533) and snow ball sampling technique was used to gather data. This research utilized descriptive analysis, correlation analysis, Mc-Nemar Bowker test, Wilcoxon rank test, Mann Whitney U test, Chi square, factor analysis and Thematic qualitative analysis to analyse data. Results explained that trip purpose, mode choice, distance travelled, and frequency of trips for the primary travel were significantly different before and during the pandemic. Further, the results indicated that social-economic factors such as age, gender, monthly income, vehicle ownership, type of job factors significantly influenced the transport behaviour changes. There was a significant shift from public transport to private transport and non-motorized modes. Furthermore, most responders believe that the level of protection from the COVID-19 pandemic can be increased by less frequent travel, less distance travel and with avoidance of public transport. The results revealed people placed a higher priority on the pandemic related concerns while choosing a mode during the pandemic as compared to the general concerns. In overall it indicated that travel behaviour changes due to COVID-19 have been significantly nfluenced by socio-economic, primary travel characteristics of travellers and their level of protection motivation. Outcomes of this study could be useful in transport planning and policymaking during pandemics based on the travel needs of people. Service providers, e.g., taxi companies and retailers, could use such information to better plan their services and operations.

Keywords: COVID-19, Travel behaviour, Travel patterns, Mode choice, Protection motivation

MS016

The Impact of the Covid-19 Pandemic on the Sri Lankan Apparel Industry – A Logistical Standpoint

N. Panamaldeniya[1#], M. Jayawardena[1], A. Shalika[1]

[1]*CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] niluminda.itml12@gmail.com

The Sri Lanka apparel industry has grown to become one of the most vital pillars in Sri Lanka reeling in some much-needed foreign income for the nation. This has made it one of the vital pillars on which, the Sri Lankan economy stands. However, being the extremely labor-intensive industry that it is, the COVID-19 virus has had a major impact on the industry, both in a logistical standpoint as well others. This study was carried out to identify the severity of the COVID 19 pandemic on the apparel logistics of Sri Lanka which is the primary objective of study. The impact on respective stakeholders involved as well as identifying the solutions implemented by them is the secondary objective. To do this, the study encompasses a primary data collection, in the form of Google forms as well as virtual interviews, while secondary data of the study incorporates publications and other literature accessible online. Using collected data, an in-depth thematic analysis with a deductive approach was carried out. To do this, transcripts were made for all interviews which were studied and re-read multiple times to identify codes and subsequent themes. These themes were directly relevant in achieving the objectives of the study. Upon the completion of the analysis a new set of factors were discovered by the author to have a high impact on Sri Lankan apparel industry logistics. These are, location of suppliers, vessel delays, lead time increases, inability to stick to plans and lack of containers and space.

Keywords: Supply Chain, Freight, Elastic Logistics, Make to order, Lead time

MS017

Solving Multi-Depot Vehicle Routing Problem for FMCG Mackie Products Via K-Mean Clusters and Heuristic

D.M.C.U. Dissanayake[1#], D.G.N.D. Jayarathna[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] chmoag20@gmail.com

This is a case study based on C. W. Mackie (Pvt.) Ltd, and its FMCG products. To conduct this analysis company's outbound logistics and its decentralized redistribute process in Colombo and Gampaha region were considered. Delivery has a great share of the total cost of sales of product. It causes high transport and warehouse cost. FMCG product is greatly influenced by distribution, thus when the distribution is not optimal, extra routing costs will occur. The main objective endeavour here is to minimize the warehouse operation, lower the administration and transportation costs by imposing constraints on the capacity and the volume. The research methodology encompassed a primary study conducted on how to optimize the distribution process. Optimal distribution problem can be solved by using Multiple Depot Vehicle Routing Problem (MDVRP) model, which was a development of Vehicle Routing Problem (VRP). To gain the optimal solution for the VRP problem new trucks have been allocated and to find best locations for the depots, K-Mean clustering methods and optimal location Gravity model have been used. Further heuristic method of clustering has been used to find optimal path between clusters. Gravity model and K-Mean clustering model were solved using MS excel solver and XLSTAT. Multi depot capacity plan, cost comparison of existing model and proposed model including transport cost and salaries and wages of employed have been set into this research. Finally, the author has compared total cost of multi depot redistribution while proving huge cost benefits/savings (21.29 % savings) than existing distribution method.

Keywords: Vehicle routing problem, Multi-depot vehicle routing problem, Redistribution process, Heuristic method, K-mean clustering, Gravity model.

MS018

Factor Analysis on Last-Mile Delivery of Pharmaceuticals During COVID-19

S.N. Yasawardhana[1#], R. Mudunkotuwa[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] shashikayasawardena@gmail.com

In Sri Lanka, when COVID-19 first wave struck, government imposed all island lockdowns. People had to stay indoors and there was no logistic procedure for the delivery of any essential item. The importance of having a Last-mile delivery system of pharmaceuticals felt by the people more than any other time during this pandemic. There is a theoretical gap regarding the last mile delivery of pharmaceuticals, as there is no research in Sri Lankan context. The objective of the study is to identify the factors affecting last mile delivery and the relationship they have with the last mile delivery of pharmaceuticals. Data were collected using the purposive sampling method from pharmaceutical retailers in Dehiwala-Mount Lavinia municipal council area and the collected data were analysed using KMO and Bartlett's test, Rotated Component Matrix, Kruskal-Wallis Test, Chi-Square, and Multinomial Logistic Regression. The researcher has fulfilled the primary objective through factors identified using the factor reduction, and secondary objective through the chi-square, cross tabulation, and multinomial logistic regression. The output from analysis stated that out of the dependent variables, "Health Guidelines Practicing" was the most influenced by the independent variables placing "Financial Impact" and "Competitive Advantage" in the second place. Through Multinomial Logistic Regression model, the factor "Customer Interest" has been identified as a vital independent factor of Last-mile delivery of Pharmaceuticals. The researcher recommends that pharmaceutical retailers should focus more on "Health Guidelines Practicing" than focusing on the "Financial Impact" and "Competitive Advantage" during covid 19, according to the outcome of the study.

Keywords: Last-Mile Delivery, Pharmaceutical Supply Chain, Covid-19, Pharmaceutical delivery, Pandemic, Essential item distribution

MS019

Analysis of Land Transportation Risk in Supply Chain Performance for the Medium Scale Fast Moving Consumer Goods (FMCG) Industry in Sri Lanka

H.N.K. Jeewantha[1#], G.H.C.S. Amarasooriya[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] harindujeewantha@yahoo.com

In the current context, the market competition no longer exists among traditional organizational function such as operations, marketing, fiancé and etc. Transportation is one of the key supply chain function which interconnects nodes of supply chain network for moving goods and services. Therefore, transportation becomes an important component to the successful implementation of the solid supply network. The intense competition in the fast moving consumer goods manufacturing industry has encouraged the players to focus on the benefits of a well-structured supply chain. The key supply chain function such as transportation is given main priority by large scale firms when they develop their supply chain strategies. Objectives of the research will be to investigate the factors associated with transport risk in FMCG industry, evaluate the influence of transport risk factors for the supply chain performance, and propose solutions to mitigate transport risk for the FMCG industry. This research presents a detailed study and an analysis carried out to determine the transportation risk in a supply chain performance for Medium Scale fast moving consumer goods (FMCG) manufacturing firms in Sri Lankan context. The literature survey points out different types of approaches and strategies which have been taken by firms in order to tackle risk. Transport risk associate factors were separately concerned for the analysis in order to measure the supply chain performance. Further analysis indicates that many of the organizations have given focus towards transportation risk.

Keywords: Transportation Risk, Supply Chain, Supply chain performance, Fast moving consumer Goods (FMCG) manufacturing

MS020

Empirical Study Accessing the Factors Effecting the Choice of Viable Pallet Alternatives in order to address the Pallet Scarcity at Port of Colombo

R.P.T.R. Pathirana[1#], L. Ediisinghe[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] tharinip97@gmail.com

Pallets play an important role in the logistics infrastructure systems, as yet a pallet shortage has been reported throughout the world's leading ports, including Colombo port. The purpose of this study was to evaluate the factors affecting the choice of viable pallet alternatives at the SLPA warehouse premises. Furthermore, it also determines practicable reasons that might have led to the pallet shortage, and what sort of a relationship is there between adequate pallet availability and warehouse efficiency. The study was based on quantitative research method adhering to a casual research design. A conceptual framework was created based on secondary data, which included statistics from various authorities and existing publications. Primary data collection was done through online questionnaire distributed via google forms. Convenience Sampling method was deployed in distributing the questionnaire among a sample size of 218. Statistical data was processed using SPSS. Reliability of the collected data was analyzed using Cronbach's Alpha, and KMO test was carried out for sample adequacy. Moreover, demographic factor analysis was carried out, and Chi- Square test shows that age, monthly Income and job experience has a relationship with that of Choice of pallets. Three factors were extracted from 10 variables using factor analysis and named using Component Score Coefficient Matrix as; Cost, Equipment Compatibility and Pallet Material. Among them, the Cost factor was found to be significant with the regression results, as per the findings variables under Cost; Durability, Reusable, Storage, Load Bearing capacity, has a strong impact on the Choice of pallet alternatives.

Keywords: Pallet Alternatives, Pallet Shortage, Warehouse efficiency

MS021

Impact of the Third-Party Logistics Performance and Customer Loyalty: Based on Sri Lanka E-Business

W.S.H. Fernando[1#], Lakshmi Ranawala[1]

[1] *Department of Logistics and Transportation, Faculty of Management and Social Science, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] sahanfernando66@gmail.com

Regardless of the business medium, this global rivalry led organizations to collaborate with third-party logistics (3PLs) as a strategic partner. Then 3PLs offer a wide range of services, including packaging, transportation, storage, inventory management, freight forwarding, and cross-docking. They are in high demand and allowed E-businesses to focus on improving their enterprises by taking full advantage of outsourcing logistic services. For example, reduction in capital investment, cost, and enhancing operational flexibility. In other words, this same tendency of businesses to reduce logistic costs by acquiring quality third-party logistic services influenced to increase the importance of 3PL's. Acknowledging the precise performance measures and measuring the ability of 3PLs to achieve those targets is critical for organizations to assess the accuracy of their business decisions, as well as for 3PLs to archive customer loyalty and improve performance for the businesses they serve to keep them as long-term customers. The quality of third-party logistic service is based on many factors such as operational service quality features, personal service quality features, and technical service quality. These service qualities are providing higher performance for customer satisfaction and customer loyalty. Moreover, "customer satisfaction in 3PLs is one of the main criteria that drive outsourcing, and the decision is based on image and trust, empathy and relationship, reliability and responsiveness, and assurance. It appears to focus on a point where it emphasizes the need for customer satisfaction for 3PLs to archive the intended market share in the rising E-business industry.

Keywords: Customer loyalty, E-business, 3RD Party Logistics

MS022

Analysis of Factors Affecting on the Performance of Ocean Freight Forwarders related to Apparel Industry in Sri Lanka due to COVID-19 Pandemic

T.Y. Umagiliya[1#], G.H.C.S. Amarasooriya[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] tharakaumagiliya@gmail.com

The researcher attempts to fulfil the research gap in the Sri Lankan context and since this is a novel pandemic, the previous researches based on this area are scarce. The ultimate goal of this study is to analyse the factors affecting on ocean freight forwarders in the apparel industry of Sri Lanka due to the COVID-19 pandemic. This study was constructed through 231 responses gathered from employees related to the field of study who participated for the online questionnaire and simple random sampling method was considered while KMO test statistic verified that sample size is adequate and data collected was tested reliable by using Cronbach's alpha. The independent variable has been recognized as the effect of COVID-19 and the dependent variable is the performance of ocean freight forwarders related to apparel industry in Sri Lanka. The findings revealed that there is a significant effect of COVID-19 on factors considered by a correlation analysis and a factor analysis was done to identify the factors. The findings support the practitioners, policymakers as well as scholars who seek new knowledge. Also, it will be beneficial for the freight forwarders to retain existing stakeholders and to attract more interested parties related to the apparel industry during the pandemic period as the apparel industry contributes largely on Gross Domestic Production of Sri Lanka. Moreover, the researcher recommends the higher management of freight forwarding companies to enhance more on the factors affecting on IT and customer service, scheduling and infrastructure components.

Keywords: Ocean Freight Forwarders, Apparel Industry, COVID-19, Factor Analysis

MS023

Critical Analysis of Hambantota International Port Group Perception on LNG as a Maritime Fuel

K.M.A. Ranchagoda[1#], N. Fernando[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] Kavinduranchagoda075@gmail.com

LNG is an appealing fuel for ships to fulfill the impending tough environmental standards established by the IMO, particularly at the level of emission control zones (ECA). The usage of LNG has a positive environmental impact and a long-term economic viability. However, a lack of bunkering facilities at shipping ports is still a key impediment to the widespread use of LNG as a marine fuel. The purpose of this study is to investigate the perception of Hambantota international Port group Sri Lanka. A mono method of quantitative approach was used to examine the perceptions of the port authority in relation to identify the determinants of bunkering choice factors and LNG as a maritime fuel for Hambantota Port of Sri Lanka. According to the study, independent variables were selected as bunker price, bunker quality, safety of bunkering, infrastructure and environmental advantage by conducting literature surveys. The study identified 25 sub-factors of determinants and according to the perceptions of the employees who are currently working in Energy Service Department of HIPG, the most important bunkering choice determinant was identified as fuel price under the bunker price variable category. Further, the lowest bunkering choice determinant factor was identified as Port Security in the safety of bunkering factors category. This study was conducted only for Hambantota Port and additional study around the other ports are encouraged.

Keywords: Liquefied natural gas, Emission control zones, Bunkering choice determinants, Exhaust gas recirculation.

MS024

Factor Influencing Container Terminal Efficiency - Port of Colombo

S.M.C.B. Senanayake[1#], A. Gunawardana[1], P. Wijerama[1], S.I. Kalupahana[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] chulaka47@gmail.com

Ports are considered as the backbone of International Trade since more than 90% of global trade is driven through sea transportation. Container Terminals provide destination facilities that allow shipping containers to change modes of transportation route to their final destination. Container Terminals play a significant role in Maritime Sector. On playing such a significance role, there are several factors which affect the Efficiency of such Container Terminals. Through this study, the researcher is trying to reveal the fact that Infrastructure, Superstructure, Port Congestion, Information Technology, Dwell Time, Turnaround Time and Port Clusters is directly influenced on the efficiency of the Container Terminal. Moreover, the research study examined these factors in depth and explained how they affect the container terminal efficiency of the port sector. The main objective of this study was to assess the factors which influence the Container Terminal's Efficiency in Port of Colombo. The study found that the automated Quay cranes in a port can increase the current efficiency and productivity while handling huge numbers in trade volumes. The target population of the study was 95 managerial employees who are engaging in container terminal operations in Jaya Container Terminal, South Asia Gateway Terminal and Colombo International Container Terminal. Since this study was based on primary data, the data was collected through the distribution of questionnaire via electronic mediums. The questionnaire was designed using Likert scale type. The sample of 80 respondents was obtained through a survey. The Statistical Package for Social Sciences (SPSS) and Microsoft Excel were used to analyze the data.

Keywords: Container terminal, Efficiency, Port of Colombo

MS025

An Investigation on the Factors Affecting to Development of Hambantota Port as a RORO Transshipment Hub

K.G. Abeysuriya[1#], N. Fernando[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

#kavindu.abeysuriya97@gmail.com

This study investigates the factors affecting to development of Hambantota Port as a RORO Transshipment Hub. The conceptual framework of this study was developed based on the prior literature analysis and 4 predictors namely port infrastructure, port location, port selection and port efficiency were utilized in current study in order to provide a better findings related to current context. This study mainly focuses on determining the influence of aforementioned variables as per the responses provided by the Operational and Commercial staff of the nine shipping agents in a nine shipping lines namely Glovis, Hoegh, MOL, NYK, K Line, ZIM, Eukro, Seals Japan and Eastern Car Liner. A questionnaire was developed and 90 responses were taken by using convenient sampling method while KMO test statistic verified that sample size is adequate and data collected was tested reliable by using Cronbach's alpha. Results suggest that all the independent variables are significantly affects to the development of Port of Hambantota as a RORO Transshipment Hub. Furthermore, the result of the multiple regression analysis in SPSS was supported to test the effect of aforementioned predictors with the dependent variable of Port of Hambantota development. Consequently, this will help the management of the Hambantota International Port to rethink of their port infrastructure and factors under port selection, port efficiency and port location in a manner of developing the port as a RORO Transshipment Hub.

Keywords: RORO Transshipment Hub, Port Infrastructure, Port Selection, Port Location, Port Efficiency

MS026

Impact of Cost of Road Traffic Congestion on Commuter's Behavior.

K.A.S. Rajapaksha[1#], A.M.C.P. Atapattu[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri lanka.*

[#] kusalamila321@gmail.com

The traffic congestion is a daily occurrence where many countries experience due to the urbanization repercussions. The traffic congestions impact negatively on various other fields causing heavy losses. However, the precise loss from traffic congestion is immeasurable as this loss is not only economical but also affects environmental and social perspectives. Therefore, this study was conducted with the aim of exploring the impact of cost of road traffic congestion on commuter's behavior. The study was conducted in the Borella Intersection in the Colombo District of Sri Lanka which an urban junction and a critical entry point to the main city from the suburbs of Colombo. The study was conducted with the aid of a questionnaire and was distributed to 300 respondents who are daily commuters of the location. The results of the research was produced as a regression analysis where the commuter's behavior is the dependent variable and the independent variables as fuel cost, time wastage, number of accidents and cost for other claims. The results suggests that fuel cost, time wastage and cost for other claims are highly influential towards the commuter's behavior. The findings are beneficial in designing the roads for sustainable mobility and can be utilized to further enhance the travel quality of the commuters focusing on the reduction of high-cost variables that have a high statistical significance towards the impact of cost of road traffic congestion on commuter's behavior.

Keywords: Commuter's Behavior, Traffic Congestions, Cost of Congestion

MS027

Analysis of Factors Affecting on-Shelf Availability of Local Fresh Milk in Ratnapura District

B.M.A.V. Bulugahapitiya[1#], C.I.S. Weerakoon[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] amanthabulugahapitiya@mail.com

This study explores the factors that influence on-shelf availability of local fresh milk in Ratnapura district of Sri Lanka. Also due to the covid pandemic, consumers behavior patterns are changed. According to the real life experiences, we all can see locally produced milk brands has lower on-shelf-availability than imported milk powder. Also, imported milk powder has lot of quality issues. This research paper would be helpful to increase consumers awareness towards local fresh milk, and also improvements of availability. Questionnaire was created to identify factors that affect OSA. Firstly questionnaire distributed among 65 consumers as a Pilot survey, then after few amendments questionnaire was distributed among consumers in Ratnapura district via online. When selecting sample size, simple random sampling technique was used. Data was collected from 211 consumers through google forms. Data was analyzed using SPSS. Various analysis methods such as, descriptive, correlation, regression, cross-tabulation and few others was used. This study shows that Brand loyalty, Marketing and quality factors are significantly influence on-shelf-availability of local fresh milk brand. Findings of this study are important to milk brand producers, investors, policymakers, marketers, relevant enterprises and government to increase availability, implement necessary product improvements and for quality enhancement in the fresh milk industry.

Keywords: On-shelf-availability, Product factors, Covid pandemic, Brand loyalty, Advertising and marketing, Price, Quality.

MS028

Impact of Lack of Seafarers in Sri Lanka

S.A. Sathar[1#], R.S. Siriwardena[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] saalim.ahamed@gmail.com

Shipping is the engine of global trade and seafarers make it possible. On the global format, the demand for seafarers outweighs the supply and it is an opportunity for a country like Sri Lanka to capitalize. Sri Lankan seafarers are highly competent and very much demanded in the International level but our supply is less than 1% to the market. Objective of the study was to evaluate the factors affecting the supply of Seafarers, identify the primary stakeholders involved in the process and the responsibility of the stakeholders to increase the overall supply. A survey was conducted with a sample size of 300 and the data were analyzed using correlation and regression analysis model, cross tabulation, and descriptive analysis. Also, shared opinions of four industry experts were collected to ascertain the factors. According to the analysis, Attractiveness, Non-Financial Benefits, Advancement of Technology, Industry Risk, and Career Knowledge are the hindering factors for the supply of Sri Lankan seafarers. The combined efforts of stakeholders is vital to improve the general perception of sea career and the Shipping Ministry should take proactive measures on this regard and importantly consider Seafarers as key workers. Addition of curriculum about the sea career to the school, and introducing a degree programme to the state universities be helpful to improve the awareness of the industry. Turning Sri Lanka into an Open Flag Registry can ensure more employment opportunities for trainees which will eventually increase the number of active seafarers in the country and make seafaring as one of the major income tools for government.

Keywords: Sri Lankan seafarers, Impact on supply, Hindering factors

MS029

A Cost-effective Decentralized Warehousing Approach and Distribution Route Plan in Western Province for Connect Community Global (Pvt) Ltd

Y. Sadaruwan[1#], N. Jayarathna[1]

[1] *CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

#yasinthasandaruwan1996@gmail.com

Connect Community Global (PVT) Ltd is a Last-mile delivery company in Sri Lanka. The existing centralized warehousing and distribution route plan of the company reduces the company performance due to unnecessary time, cost, and resources consumption and reduced supply flexibility. Therefore, a decentralized warehousing strategy is proposed covering the key demand points (Colombo, Gampaha, and Kalutara) in the Western province. This paper focused to develop a cost-effective decentralized warehousing approach and new distribution route plan for Connect Community Global (PVT). The three main objectives of this paper are to determine decentralized warehouse locations, distribution route plan, and cost comparison. To find an optimal location, Gravity model was used and also the Heuristic method was used to find the optimal path between sub-clusters. As per the findings, Kotte, Kadawatha, and Panadura are identified as the most optimum warehouse locations for Colombo, Gampaha, and Kalutara districts respectively. Therefore, the main warehouse which is situated in Battaramulla is required to shift into Kotte to ensure the efficiency of the delivery process. Three distribution route plans are established to eliminate unnecessary distances and save company resources. Finally, as per the cost comparison, the proposed decentralized warehousing system and new distribution route plan are able to cut down 48% of distance miles and save 18% of total cost in comparison to the existing centralized warehousing system. Likewise, the new decentralized warehousing strategy and new delivery route plan ensure the optimum resource usage of Connect Company.

Keywords: Decentralized Warehousing, Gravity Model, Optimum Location, Heuristic Method, Optimum Distribution Route Plan

MS030

Understanding the Evolution of Global Cruise Tourism

D.A.C. Resha De Silva[1#], R.S. Siriwardena[1]

[1] *Faculty of Management and Social Sciences, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#]mail4resha.ds@gmail.com

Cruise Tourism is the fastest growing industry in the travel and tourism sector nevertheless a niche market with high potential growth. This diverse sector consists with sound global value chain. The purpose of this study is to understand the overview of history and evolution of Cruise Tourism to the present and how the technology driven industry to an incredible extent. This research is based upon the secondary data extracted from books, peer reviewed journals, web based literary sources and internet which are taken into consideration as the literary sources and used as methodological framework of the study. The findings of the research revealed that Cruise Tourism was started with the launch of first ever Cruise ship by the King Charles IV in 1821 in Sweden. With the arrival of Queen Elizabeth in 1938 the trend of Travelling by large Cruise ships begun. The technological enhancement has driven the traditional cruising into modern cruising affecting the cruise ship designing, the level of comfort in cruise ships, level of passenger services available in and quality. Shipbuilding is changing at a rapid rate with advanced technologies which aim to solve the issues of environmental pollution. Evolution has gifted Ballast Free ship designs along with Liquefied Natural Gas surges as an alternate fuel for cruises and have utilise renewable sources of energy by replacing Solar & Wind powered cruises. The level of comfort in Cruises has been enhanced with the smart technology which the industry uses for every operation. This industry has reached modernized entertainment on-board with the augmented reality and virtual reality. This paper concludes with specific recommendations for cooperation between stakeholders and industry to enhance the sustainable approaches, minimizing the negative impacts while maximizing its potential opportunities for positive changes that evolving the industry with new technology and perhaps becoming ultimate sustainable industry.

Keywords: History of Global Cruise tourism, Evolution, Modern Cruise tourism, Development, Trends and innovations.

MS031

A Study on Level of the Awareness on Traffic Congestion: With Special Reference for Non-State Universities in Western Province, Sri Lanka

K.W.M.J.V.B. Kulathunga[1#], E.M.U.N. Ekanayake[1], E.M.K.S. Bandara[1], P.G.A.N. Gamage[1], A.K.P.P. Shamila[1], R.S. Weerarathne[1]

[1] *SLIIT Business School, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka.*

[#] jeewanthavidushan@gmail.com

Road traffic congestion has been one of the vexing problems of urban areas in Sri Lanka. Therefore, it is important to have an awareness of traffic congestion to avoid negative consequences. This study was carried out to address the gap prevailing in the Sri Lankan literature context in relation to road traffic congestion and the academic performance of undergraduates, thereby bridging the lacuna in previous studies. The main objective of this quantitative study was to determine the level of awareness on the traffic congestion of undergraduates in two major non-state universities in the Western Province, Sri Lanka. A deductive approach has been adopted in this study along with an online survey questionnaire and a convenience sampling method. Primary data were collected from a sample of 377 respondents who are undergraduates in non-state universities prone to traffic congestion in the Western Province. Descriptive statistics were used as the data analysis tool. The mean value derived (2.35) indicates a moderate/ average level of awareness of the undergraduates' regarding traffic congestion. To enhance the level of awareness of traffic congestions and minimize issues arising from the same, a proper learning platform is required.

Keywords: Academic Performance, Awareness, Traffic Congestion, Undergraduates

MS032

A Study on the Impact of Employee Engagement on Turnover Intention of Graduate Trainees of ABC Limited.

R.S. Weerarathna[1#], W.S.D. Somawardana[2], W.A.P.D. Weerasinghe[3]

[1] *SLIIT Business School, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka.*

[2] *Faculty of Management & Finance, University of Colombo, Colombo, Sri Lanka.*

[3] *Cardiff Metropolitan University, United Kingdom.*

[#] ranitha.w@sliit.lk

Employee commitment, productivity and employee turnover are emerging as the most critical workforce management challenges driven by employee loyalty concerns, corporate restructuring efforts and tight competition for key talent. For many firms, employee turnover can have a significant effect on the execution of business plans and may eventually cause a decline in organizational productivity. This phenomenon is valid in current economic uncertainty following corporate downsizings, when the impact of losing critical employees increases exponentially. The main purpose of this study is to determine how employee engagement impacts on turnover intentions in ABC Limited, also the results and findings would lead to a deeper understanding of the nature and extent of employee engagement as well as turnover intention with special reference to graduate trainees of generation Y. This is a quantitative study and structured questionnaires were used to gather primary data. The researchers used complete enumeration method to collect data where all members of the population were measured. The researcher distributed the questionnaire among all the 93 graduate trainees employed at ABC Limited to collect data and regression and correlation analysis were adopted for data analysis. Moreover, the research findings demonstrated that there is a positive impact of employee engagement on turnover intention. Also, the study results showed that there are interrelationships among dependent and independent variable. This shows that employee engagement is significantly related to employees' intention to leave the organization.

Keywords: Employee Engagement, Employee Turnover, Intention to Leave

MS033

The Impact of Human Resource Management Practices on Retention of Staff Employees in Tea Plantation Sector of Sri Lanka: With Reference to XYZ Plantations PLC in Nuwara-Eliya Region

R.S. Weerarathna[1#], W.S.D. Somawardana[2], W.A.P.D. Weerasinghe[3]

[1] *SLIIT Business School, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka.*

[2]*Faculty of Management & Finance, University of Colombo, Colombo, Sri Lanka.*

[3]*Cardiff Metropolitan University, United Kingdom.*

[#] ranitha.w@sliit.lk

Currently, retention of staff employees, specially those talented, is a serious problem faced by corporate management in the tea plantation industry. The lack of awareness of the best HRM practices is a contributory factor in this regard. High worker turnover is directly responsible for heavy financial losses and adversely affects the smooth operations of the respective organization as well as the industry. In this research, the researchers intend to find out Human Resource Management (HRM) practices and its effect on employee retention: and in addition, how HRM should be applied and identify suggestions for further development. Based on the research question, to address the issue to devise a solution, five HR practices were used such as training and development, career development, compensation and benefits, performance appraisal and welfare management. Population consisted of approximately 150 employees and the sample size was 80 employees. A tested questionnaire was distributed to obtain required information used as primary data for the research. Pearson correlation method analysis was conducted to examine the association between variables and the tested hypothesis proved a moderately positive relationship exists between the independent variables and employee retention. Findings were useful to provide recommendations for further improvements of XYZ Plantations and the tea plantation industry. Moreover, the findings of this study can act as a guide HR policymaker, employees, supervisors, and future researchers in this subject area.

Keywords: Employee Retention, HRM Practices, Plantation Sector

Information Technology

IT002

Intelligent Public Garbage Dustbin Project with Console Application

Kesara Awinash Peiries[1#], Nimesh Pollwaththage[1], Dhishan Dhammearatchi[1]

[1]Department of information technology, Faculty of Engineering and Technology, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.

[#] kesaraawinash@gmail.com

The garbage collection procedure is a critical aspect for the service providers as well as for the governments. The customary method of physically checking the losses in waste receptacles is a mind boggling, unwieldy cycle which uses more human exertion, time, and cost which is not viable with the present-day advances. As per the project description indicates, project studies are involving in both smart city concepts and environmental protection. The priority has been given to environmental issues and project outcomes which mainly describe the facts regarding garbage management and its contribution based on quantitative and qualitative values. The practical issues involved in specific problem have been carried out by me as the researcher of the project. In summary, in proper garbage collection and inefficient collection procedure, ways of the knowing garbage levels and issues such as unavailability of monitoring technologies and need of centralized panel for responsible authority members. Those previously mentioned issues were the major concerns that project field required and which, were not being carried out before. To conquer every one of these issues, as the researcher of this project, I am proposing the possibility and the need of a brilliant trash assortment and the board system, which assists with keeping a perfect environment by using IoT, programming solutions. Implementation of this project includes, automatic user detection, live bin monitoring, time-based alert systems, mobile alerts, mobile monitoring, online dashboard support with center control panel, live locations, dislocation alert, alarms, LED display output, sound outputs and many more centralized functionalities.

Keywords: IOT garbage system, Sensor-based dustbin, GPS location system, Arduino, Magic bit

IT003

Nursery Plant Monitoring and Controlling System

Wathmi Sureshika[1#]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] wathmisureshi2001@gmail.com

In farming, watering plants are the most important cultural and labor-intensive task. Despite any such weather conditions, it is crucial to control the amount of water obtained by each plant. Therefore, the concept of an automatic plant watering system would be effective, in suppling water adequately. Knowing the time and quantity of water needed are two important aspects of the watering process. This scheme can be used to benefit the user by reducing the workload of having to provide water to plants manually. Multiple versions of automated watering systems can be implemented, such as a sprinkler system, tube, nozzles, etc. This system uses an Arduino UNO board and soil moisture sensor. It is programmed in such a way that it will sense the moisture level of the plants and supply the water if required. This type of system is often used for general plant care, as part of maintaining small and large gardens. This system automation is designed to be assistive for nursery systems. This system has a vision that through this prototype people will thrive having plants without facing challenges related to absence or forgetfulness. The main application of the system is for the agricultural sector because of the loss of yield due to improper irrigation which is quite significant. An automated system will deliver the optimum amount of water depending upon the soil moisture content. The soil moisture content can be remotely monitored, which eliminates the possibility of over-irrigation or under irrigation. Furthermore, this reduces the wastage of water, the manual labor cost and saves farmers from some of the tedious fieldwork. In the commercial and domestic sectors, namely offices, workspaces, and homes where there are indoor plants and lawns, the need for an automated system is abundant. The system would be cheaper and more effective in the maintenance of plants and lawns as compared to its human counterpart. After careful consideration of all development methodologies, it is thought that this project will be better suited with the evolutionary prototype methodology. It provides a strong foundation for the system to progress upon and is easy to understand. The farmers, agriculturists, and nurseries will be highly benefited from the system because it is cost-effective, easy to operate, and user friendly. After performing the various different types of testing cases it was successfully developed as expected on aims and objectives.

Keywords: Automatic Plant Watering System, Arduino UNO board, Moisture sensor, IoT, Sensor based irrigation

IT005

IoT Based System to Encounter Elephant Trespassing into Developed Areas

N. Janaka Loyala Pinto[1#], Dhishan Dhammearatchi[1]

[1] *Department of Information Technology, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] janakaloyalapinto@gmail.com

Human and Elephant conflict is one of the biggest conflicts humans has against the world of animals. This is one of the tragic conflicts that has occurred between humans and elephants for get quench the hunger of both parties and to find a land to live. The solution has been for this conflict is to mitigate elephants into protected areas and prevent them from reaching into developed areas. An elephant is an intelligent animal with good habituation hence different types of fences have used to prevent elephant from reaching into develop areas but most of them has failed over the time. The purpose of this study to introduced a method that both elephants and humans can coexist peacefully by developing a IoT based system to detect elephants who approach near the fence and inform it to the villagers and authorities. Furthermore, this IoT unit is powered by Object detection to identify elephants when they come near the electric fence. To complete this study researcher uses observations and interview methods. As the end results researcher hopes that this study will help to minimize humans' and elephants' death rates that happen due to this conflict. The electricity is required to run the operation of this system and it consistently active.

Keywords: IOT, Object detection, Warning system, HEC.

IT007

Centralized System for Sharing Computation Power Over Internet

L.D. Hasala Dananjaya[1#], M.V.M. Jayathilake[2]

[1]*CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[2]*Sri Lanka Institute of Advanced Technological Education, Sri Lanka.*

[#] hasala.dananjaya7@gmail.com

The need of a device to process large scale of data in less time was a necessity. Report generations in weather prediction and medical invention projects are examples for instances which have more calculations. Some organizations based in developing countries and some solo individuals do not have enough computers to carry out such tasks. They do not have enough funds to purchase or to maintain such devices. There are some platforms to help those kinds of situations, but the common problem is, the most popular networks are framed to specific categories and some platforms are not open to everyone. Removing that gap and fulfil the cons of existing crowdsource networks is the main aim of this project. In this study online surveys any expert survey is used to identify issues in the existing systems. According to survey results, this project develops a new computing power crowdsourcing platform adding new features such as high usability and high project support. The survey results show most of the computer users are not using their computer processing power for hundred present every time. Using those unused computing power to do valuable projects is the goal of this platform. Users can create and contribute. This system provides a RESTful API (Application Program Interface) to communicate with the main server. RESTful API gives a powerful background to develop IoT based projects such as weather report projects. This platform has assigned tasks to the targeted device automatically. This ability support for performing near real time data processing.

Keywords: Distributed Computing, Computer processing power, Crowdsourcing

IT008

Wi-Fi Base Fingerprint Attendance System Using Arduino with Live Location Tracking

M.P.G. Isuru Prabodha[1#], Dhishan Dhammearatchi[1]

[1]*Department of Information Technology, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#]mpgisuru@mail.com

Over the years, a manual attendance procedure has been used, which is not only time-intensive but often produces inaccurate data. Organizations can profit from an automated time and attendance tracking system in a variety of ways. This eliminates the requirement for a manual attendance monitoring system based on pen and paper. The researcher proposed a smart location-based time and attendance monitoring system as a result of this thinking. Student attendance during lecture hours has a direct impact on academic performance. There are both manual and automatic attendance tracking methods to guarantee that students do not miss any classes. However, most automated methods have limitations in terms of practical application, such as large monetary costs and the necessity to install specialized gear. This project has introduced an IoT-based Fingerprint Attendance System, developing a portable hand-held attendance marking system and monitoring the location of the student using the mobile-based application are the main aim of this project. User registration is handled through the application and the punched fingerprint of the existing users are collected to the database. After that an updated packet will be sent to the user's mobile application collecting the location information and updating the database.

Keywords: Attendance, Fingerprint, Location tracking

IT009

Application for Monitoring Network Performances for End-Users

M.K.K. Sandamali[1#], Dhishan Dhammearatchi[1]

[1]*Department of Information Technology, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#]mkksandamaligmail.com

Application for monitoring network performances for end-users is an application introduced to the endpoint users in the enterprise network. This is a desktop java based application that indirectly helps to reduce unnecessary disturbances of staff members in any system failure. Users are able to check whether the issue occurred from the system side or their own PC. Through this application, the user can inform about the issue to the right person without any telephone call. It is very helpful for administrators in heavy work loaded and busy times. Also, users can reduce the wasting time on the telephone in busy times. If the issue is in their own PC, they can recover or inform the relevant right person to handle that failure. Informing is done by the application itself. It uploads status to the database after submited by user and it can be seen both by the admin and the user. If the internal communication has been disconnected, it is possible to send the relevant result by scanning the given QR code by entering the relevant branch code and name via the internet of own mobile using IoT. This Application basically used windows command (.bat) files with ping commands. After running these commands from the backend, it shows the level of connectivity and any power failure, It is very useful because the functioning of the system can be detected accurately. Before implementation, the user should be thorough with the network rules and should be able to identify the limits of end-users in the network about accessing sensitive data. As a monitoring solution for users, this will be able to reach the user efficiently and minimize time-consuming both administrators and endpoint users. Error identification, error informing and error corrections will be fast and a quality service will be provided to the consumer finally.

Keywords: Network monitoring, QR scanning, End point performance monitoring

IT010

Speech-to-Text Recognition-Based Cognitive Stimulation for Dementia Patients

J. K. D. R. Jayasekara[1#], M. V. M. Jayathilake[2], and S. V. S. Gunasekara[1]

[1]*Department of IT, Faculty of Engineering & Technology, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[2]*Sri Lanka Institute of Advanced Technological Education, Sri Lanka.*

[#] jkdrj02@gmail.com

Dementia is a term used to describe loss of brain functioning, logical reasoning and a decline in major cognitive skills. Although elderly people usually have a higher risk of being diagnosed with dementia, the disease can occur in multiple varieties and at all ages. This research is aimed to develop the prototype of a mobile application with a voice-based dementia screening tool. The objectives of the study were to conduct a comparison of the best automatic speech recognition (ASR) system and evaluate each system's ability to transcribe speech by calculating the Word Error Rate (WER). The four systems utilized in the comparison were Mozilla DeepSpeech, CMU Sphinx, Google Cloud Speech-to-Text, and Silero Models. Six phrases were picked out and captured in seven distinct accents as .wav audio files. Each phrase was recorded in British, Indian, French, Portuguese, Indonesian and Sri Lankan accents. The words in each phrase were selected meticulously by including homophones and words with contradictory pronunciations. In order to identify the most efficient ASR system, the mean WER was determined individually for each system. The mean WERs obtained for each system were 1.02, 0.81, 0.59 and 0.73 for CMU Sphinx, DeepSpeech, Google Cloud Speech-to-Text and Silero Models respectively. As the findings revealed, the lowest mean error rate of 0.59 was for the Google Cloud voice recognition system. It was the only system which could transcribe speech as complete sentences with proper punctuation and capitalization. Through the outcomes of this research, a prototype of a voice-based dementia screening test was developed in the form of a mobile application.

Keywords: Google Cloud Speech-to-Text, Dementia, Speech Recognition

IT011

A Machine Learning Approach for Detecting Breast Tumour Type

Deeshan Fernando[1#], S.V.S. Gunasekara[1], H.K. Salinda Premadasa[2]

[1]*Department of Information Technology, Faculty of Engineering Technology, CINEC Campus, Sri Lanka.*

[2]*Centre for Computer Studies, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka.*

[#] deeshanpersis@gmail.com

The death percentage of women is rapidly increasing in the world due to breast cancer. By reviewing the past ten years of medical reports, it is clear that breast cancer has become a major reason that contributes to the mortality of women. Currently, doctors use mammography, ultra-sound, Fine Needle Aspiration (FNA), and surgical biopsy tests in order to identify breast cancer. However, a surgical biopsy is the only test, which gives the most accurate results but there are some side effects too. The diagnosis efficiency of FNAs may reduce due to human errors like inter-operation and intra-operation differences, fatigue, and the experience of the doctor. By depending on the wrong diagnoses of FNAs, doctors may suggest to do a surgical biopsy so that patient must bear the costs of surgeries. Here we propose a machine learning solution with an extended K- Nearest Neighbour (KNN) algorithm which can input FNA test data. It identifies whether the type of breast cancer is malignant or benign. With this proposed mechanism, doctors can decide whether the patient can be cured using drugs or if the needs to go for a surgery. Here, we used 699 FNA test data collected from Wisconsin Medical University USA and obtained 99% accuracy when the K value equals 15. Hence, it is concluded that the proposed mechanism can be used to predict the breast cancer tumor type and it helps in early detection of breast tumor type as well as in the speeding up the response to breast cancer treatment.

Keywords: Breast Cancer Detection, KNN, Machine Learning.

IT013

Virtual Baby Sitter: Android and IoT based Baby Monitoring System

L.C.S. Lokuliyanage[1#], V.M. Jayathilake[2], and S.V.S Gunasekara[1]

[1] *Department of Information Technology, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[2] *Sri Lanka Institute of Advanced Technological Education, Sri Lanka.*

[#] chamod.sankalpa1998@gmail.com

Parents cannot keep track of their infant the whole time during the day because of office work. They struggle with their jobs as well as their household work. Parents may save their time utilizing the suggested system and it is also very helpful to monitor infant behaviors. To find an answer to this question, this study proposes an IoT-based system that has the following objectives: developing a system capable of transferring real-time audio and video transfer; connecting with the child remotely; and managing reminders. Using the system, the infant can also be monitored using a Webcam. It takes a photos of the baby and sends to the parents. Further, a message is sent to the parents or caretaker whenever the baby screams or moves out of the cradle. This allows the mother to spare time for another task and at the same time make a baby feel comfortable. Face recognition has been used to detect the baby from other toy faces. The literature survey, identifies three common algorithms used to detect a face namely: SURF Cascade, fast cascade face detection with pyramid network, and Haar cascade classifier. This study uses Haar cascade classifier because it is an efficient algorithm in a static environment. With the Raspberry pi, the Arduino UNO detects the child's face and turns the camera toward the child. Also, if the parent's mobile application is unable to detect the child, an emergency notification will be sent. This device uses a Raspberry pi night vision fisheye camera so that the device can be captured anywhere, even at night. It also uses a microphone and speakers to talk to the child. The device may be used to reduce the workload of parents and nurses respectively at their homes and hospitals.

Keywords: Raspberry pi, Arduino UNO, Face detection.

IT015

Integrated Solution for Smart Parking Management System

K.M.D.U.I. Jayathilaka[1#], Dhishan Dhammearatchi[1], Rajeewa Perera[1]

[1] *Department of Information Technology, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.*

[#] upul.ishantha.jayathilaka@gmail.com

In this study complex times, people tend to use their own vehicles rather than using public transport to overcome difficulties they face in their everyday busy schedule. As a result, there are traffic jams and more road accidents than before. It is not an easy task to find a free parking slot in big cities, and so people wander around wasting fuel and time. Improper parking causes road accidents and traffic congestions. As a solution, a smart parking system has been developed to overcome the problems involved in the traditional parking system and to give the user a more reliable user-friendly experience. This project has introduced an IoT-based smart parking system. The implemented parking system has real-time monitoring of the availability of parking through a web-based application. Inside the parking, the availability of parking slots is indicated with colours using lights for users to identify. QR scanners have been used in the system for user authentication. It is highly reliable and easy for customers in many ways. Customers can do payments through a smart wallet. A fire alarm system has been developed to notify customers in an emergency. The paper concludes with a discussion on the effectiveness of the new system, working status, and recommendations.

Keywords: Internet of things, Real-time monitoring, Cloud computing, Smart wallet

IT017

Arduino Based Railway Obstacles Identification System

W.A. Harsha Sulochana[1#], M. V. M. Jayathilake[2], Dharani Abeysinghe[1]

[1]*Department of Information Technology, Faculty of Engineering, CINEC Campus (Pvt) Ltd, Malabe, Sri Lanka.*

[2]*Sri Lanka Institute of Advanced Technological Education, Sri Lanka.*

harsha.uni2020@yahoo.com

In Sri Lanka, there are many fatal accidents due to the lack of advancements in the railway system. Hence this study attempts to provide a detailed awareness on the significance of an obstacle identification system for the Sri Lankan railway. The study discusses the problems, current approaches, benefits, and drawbacks of novel approaches in obstacle identification. Further, it provides an awareness on the benefits of the proposed system for the Sri Lankan railway. The proposed prototype mainly concentrates on detecting the obstacles on railway tracks and aids to minimize human and animal errors causing railway accidents by alarming. With a proper background study, the proposed prototype is processed by the Arduino system, Typically, Arduino UNO is used in order to create an alert when an object is detected. Also, it carries a message to the loco pilot and the control unit simultaneously. The prototype also uses the Sim808(GPS and GSM) module, ultrasonic sensor, PIR sensor, LCD display, and buzzers in the operation. When adapting this prototype into an authentic situation, LIDAR can be used instead of an ultrasonic sensor to detect a faraway obstacle and a loudspeaker can be used instead of buzzers to create awareness. Also, the comparator output of Arduino UNO can be verified and an E-mail can be sent in a real-time situation. Hence with the proposed method, both the functions of obstacle identification and creating awareness will be performed. This will be gifted to the country just by adopting a few changes to ensure very high levels of security and efficiency in the railway system making passengers experience quality railway transportation.

Keywords: Arduino Microcontroller, Ultrasonic sensor, PIR sensor

IT018

Secure Based Railway Crossing and Controller Room Management System Using IoT

Tharindu Darshana Liyanage[1#], M. V. M. Jayathilake[2], Dharani Abeysinghe[1]

[1]*Department of Information Technology, Faculty of Engineering, CINEC Campus (Pvt) Ltd, Malabe, Sri Lanka.*

[2]*Sri Lanka Institute of Advanced Technological Education, Sri Lanka.*

[#] tharinduliyanage@hotmail.com

Majority of the people use the train as the transport medium because of its cost efficiency. But there are so many crossing gates that are operated manually. Railway gates are used to minimize accidents. The major goal of this project is to automate all railway gates and save human lives. The project uses ESP32 and an infrared sensor. The IR sensor uses the IR transmitter to provide train arrival information to the IR receiver, which then passes it on to the microcontroller. The servo motor is used by ESP32 to close and open the gate. An android app will be attached to this system and that app will help to control all the gates remotely, creating a prototype for microcontroller to control a railway gate. The contact sensor makes the warning signal and the entry will be closed subsequently. The system will be connected to a cloud database via a Wi-Fi connection to store all the necessary data for the system. This database connects with the android app which has separate logins for each user to view the status of the system. The android app is built using the MIT app inventor platform. All the systems have been generated as per the regulations of the relevant automated systems. All parts are high quality and cost effective. The prototype was built and tested for its accuracy and thus determined the accuracy and functionality of the system. The developed system is simple, it has fast operational speed and good accuracy and functions in harsh environments without an issue.

Keywords: IOT, ESP-32 Microcontrollers, Android, IR sensor, Servo Motors,

IT019

Digitalized Journal with Hybrid Sentiment Classification Approach.

Binura Gunasekara[1#], S.V.S. Gunasekara[1]

[1] *Department of Information Technology, Faculty of Engineering, CINEC Campus (Pvt) Ltd, Malabe, Sri Lanka.*

binuragunasekara@gmail.com

One of the primary concerns in today's society is the stress caused by challenges of lifestyle and expectations in day-to-day work that results in experiencing numerous problems in mental health. People prefer relieving stress using different ways, such as medication, exercise, meditation, and even psychotherapy. Writing a diary is one of the most efficient ways of dealing with stress; it is helpful not just for mental health but also for physical health that can lead to self-growth. Technology can decipher the features of text we use to express our thoughts, but can it help to overcome the challenges that lie within ourselves? Sentiment analysis, that is the negative or positive polarity of a text and an emotion lexicon is utilized to create a self-monitoring system to answer this question. The proposed system is a hybrid approach to analyzing the sentiment and emotion of texts. A comparison of two rule-based models, Vader and TextBlob is evaluated on the accuracy of 0.1 polarity measurement score and other useful text extraction features of the model which resulted that TextBlob is substantially suitable. As NRCLex is the finest lexicon available for emotional wording, it is utilized to identify the text's emotional state. This model obtains the polarity score of a text by categorizing the emotion according to Plutchik's Wheel of emotions. The suggested mobile application allows to write freely and save so the analysis can determine the emotions and sentiments word-by-word of the saved text. The conclusion on stress and emotions are provided, so that the person may comprehend how they feel.

Keywords: Lexicon, Emotion, Sentiment analysis

IT020

Human Activity Recognition using BiLSTM Recurrent Neural Networks on Smartphones

D. Varsha Samadhi Kalubowila[1#], Ruwan Fernando[2]

[1]*Faculty of Health, Education and Life Sciences, Birmingham City University, United Kingdom.*

[2] *Engineering Faculty, International College of Business and Technology, Colombo, Sri Lanka.*

[#] varshkalubowila@gmail.com

Human activity recognition plays a significant role in human-to-human interaction and interpersonal relations. Human activity recognition is a broad area of research related to the identification of a specific human movement or action based on sensor data. Detection of events accurately is important as it can be used in a variety of assistive devices. To enhance the study in the field of human interaction, this research has classified human activity recognition using Deep Learning. The research presents a novel method of detecting human activity recognition during the user's gait cycle with the aid of a Bidirectional Long-Short Term Memory (BiLSTM) Recurrent Neural Network (RNN) model approach. In this study, the popular WISDM dataset for activity recognition was used. It consisted of triaxial data samples from 36 volunteers who were instructed to perform mainly six activities: walk, jog, climb stairs, walk down stairs, sit and stand. The collected data is pre-processed using feature engineering. The pre-processed data is then trained using neural network architecture, Bidirectional LSTM model. The model was exported and then used in an Android app which is able to track the daily activity of individuals. Results indicated that the performance of the modified model accuracy reached 84.5% and the loss hovered at around 0.2. In addition, these actions can be quickly recognized as each example is generated only from 20 seconds of data. The proposed new approach using bidirectional LSTM had a finer performance with respect to the existing models with comparatively higher accuracy.

Keywords: Human Activity Recognition, LSTM, Deep Learning

IT021

Cost Effective Diabetic Retinopathy Detection Module using the Mobile Phone

Naween Dissanayake[1#], Ruwan Fernando[2]

[1]*Faculty of Health, Education and Life Sciences, Birmingham City University, United Kingdom.*

[2] *Engineering Faculty, International College of Business and Technology, Colombo, Sri Lanka.*

[#] nawirmv78@gmail.com

Diabetic retinopathy (DR) is the most common complication for those who have had diabetes for 10 years or more, and can be serious enough to cause permanent vision loss if not treated on time. The challenge is early diagnosis, which is very essential for treatment to be successful. It diagnosed accurately, approximately 90% of DR patients can be saved from blindness. The most common methods employed by ophthalmologists in order to diagnose the disease or extract features were done manually from examining the patient's retina, which is high in risk and time-consuming. This paper presents a cost-effective smartphone diagnosis method of DR using deep convolutional neural network (CNN) with the aid of deep learning techniques thereby classifying retinal images into 5 stages as mid, severe, moderate, proliferative, and normal based on the severity of DR. The training data set has been taken from the Kaggle website and consists of more than 60,000 retinal images. Then the images are trained using a CNN algorithm and to give predictions. The CNN algorithm can identify the abnormalities of fundus images such as microaneurysms, exudates, neovascularization, and cotton wool. The model has an accuracy of 82%. The user can then use a mobile phone to take fundus images with a 20D condenser lens in order to get predictions. The research shows five types of DR screening that can be approached with the help of CNN. This method can be used by ophthalmologists, physicians as well as healthcare professionals to diagnose Diabetic retinopathy.

Keywords: Retinal Image Preprocessing, Convolutional neural network (CNN), Diabetic retinopathy

IT022

Automation of the CPSTL Laboratory Operations via the SAP ERP System.

W V Gunasekara[1#]

[1] *Ceylon petroleum Storage Terminals Ltd, Sri Lanka.*

[#] varunag@cpstl.lk

Ceylon Petroleum Storage Terminals Limited (CPSTL) Laboratory is the most sophisticated oil and gas laboratory in the country and with a reputation for its technical expertise and efficiency. Although the laboratory tests comply with industry's best practices and standards, the reports management was at a primitive stage. Communications were done on telephone, fax and the reports were generated manually via PCs. Streamlining and process re-engineering of the CPSTL Laboratory Report Management (LRMS) was initiated in March 2018, with the implementation of the 'CPSTL Tanker Programme' initiatives. The tanker schedules and laycan was automated and this provided the basis for laboratory sampling and testing. Provisions were made to store, distribute and manage the 'Load Port Laboratory Certificates'. The automation process commenced with the imported product tests. Test results were uploaded to the system and evaluated against the uploaded specifications. Test results were circulated among stakeholders via emails, text messages. This facilitated fast and effective communication for tanker operations, as they could schedule and streamline their operations. After the implementation, the laboratory tests for 'Shore Tanks' were carried out. Although, it's not the initial phase, laboratory sample management was implemented afterwards. This facilitated the system-based analysis of the samples received. Further developments are done to evaluate the performance of the analysts. The next potential benefit will be to analyse and evaluate the supplier against their history. The laboratory certificates history data will be evaluated against the respective specifications. Supplier evaluation will facilitate the decision making with respect to the history of petroleum product procurement. A future area of analysis is to generate reports on Sulphur emissions. CPSTL LRMS reports are in accordance with the ASTM standards as the ERP system is embedded with the ASTM QuantityWare application. The next goal will be to extend the process to the CPC Refinery Laboratory, to automate the laboratory reports with respect to the imported crude oil. CSPTL plans on extending its services to their third-party customers as well. The customer relationship management could be further enhanced via a dedicated business-to-business (B2B) mobile application.

Keywords: Petroleum laboratory reports, Automation, Supplier evaluation

Humanities and Education

HM 001

Problematic Backgrounds Causing Female Musicians to Cease Pursuing Music as a Career in Sri Lanka: A Study Centered around Sri Lankan Female Instrumentalists.

Sanduni Vishaka Amarakoon[1#]

[1] *Department of English, Faculty of Humanities and Education, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] svamarakoon9@gmail.com

In every sector, starting from land to space, both the genders have contributed by the present day. However, it can be seen that due to each nation's unique set of cultural, religious attitudes, women are subject to certain restrictions that vary across the globe. This study was done to explore such issues faced by women in Sri Lanka who are instrumentalists in the field of music. This research focuses on why there is a lesser number of female instrumentalists than singers in the upcoming music industry of Sri Lanka, even though there are many talented female instrumentalists. In addition, this research investigates why the contribution of female instrumentalists is comparatively less than males. The purpose of this study was to analyze the responses of the participants regarding the difficulties they had to face when taking part in musically related occasions. The objective is to encourage such females through a series of programs so that the Sri Lankan music Industry can benefit from diversity. Another objective is to educate the Sri Lankan society with the importance of an empowered woman. The participants were selected using convenience sampling. To collect primary data, a questionnaire was distributed among 17 female musicians that play at least one musical instrument. The questionnaire included open ended and closed ended questions. The responses were related to male-dominance, matrimonial responsibilities, financial insecurity of a musical career, societal attitude, the acceptance and support received from society. It could be verified that due to the above mentioned factors, female musical instrumentalists tend to deviate from pursuing music as a career, resulting in few female contributors with potential, entering the music field in Sri Lanka.

Keywords: Attitudes, Female-instrumentalists, Gender roles, Musician, Music field.

HM002

Literary Significance in the Music of Taylor Swift: An Analysis on the Use of Alienation as a Narrative Technique in the Albums: Folklore (2020) and Evermore (2020).

W. Arosha Indika Rodrigo[1#]

[1] *CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] aroshaindika@gmail.com

The application of literary techniques in the field of music can be regarded as an area which is not much observed with a literary perspective. Since the appreciation of the presence of literary techniques regarding the poetic languages is conducted by poets; the scholars who engage in analyzing them have mostly been limited to a certain genre: poetry. The objective of this research is to find out how the singer/ lyricist Taylor Swift, who belongs to the contemporary postmodern era, has used/depicted the literary technique: alienation in her first folk albums: Folklore (2020) and its sister album Evermore (2020). This research analyzes how the Swift has exploited this technique in a poetic and rhythmic language which can be identified as a language rich in intricacy yet presented in an exquisite and elegant manner. The analysis extends to an evaluation on how successful she has been, in the use of alienation regarding its different facets such as isolation and loss of identity. This research is a qualitative study and the methodology includes content analysis and observation of the songs in the selected two albums with a literary perspective. And, other instrumental and supplementary sources will be used. This research contributes to the field of literature regarding the importance in extending literary appreciation towards musical songs as it is done in poetry and stresses the significance in appreciating and justifying the literary value in music.

Keywords: Alienation, Storytelling, Folklore, Evermore, Taylor Swift

HM004

COVID-19 and Learner Autonomy of ESL Students in Sri Lanka: Autodidacticism and Learner Adaptability

Dinithi Supunika Jayasekara[1#]

[1] *Faculty of Humanities and Education, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] jkdsjayasekara@gmail.com

Due to the spread of COVID-19, an online education system was incorporated into the national school curriculum of Sri Lanka. The main objective of this research was to determine whether the online education mode has promoted ESL learner autonomy in schooling students aged 15-19. The methodology consisted of a quantitative analysis where a randomly selected sample population of 150 students from grades 10 to 13 in government schools in the districts; Gampaha, Colombo, Badulla, Rathnapura, Kurunegala, Nuwara Eliya, Kandy, Ampara, Galle and Matara were interviewed via a bilingually designed Google questionnaire used as the research instrument. The sociolinguistic background check on the sample population indicated that 97% of the learners' most preferred language within the domains, friends and family, was their vernacular. The graphical representations obtained from the descriptive analysis stipulated that traditional learner methods such as extra classes and past paper practice were preferred in comparison to online learning resources. The most popular online resource was Google's free service, 'Google Translate', used by 80% of the student population. A reluctancy to read was observed since less than 45% of the respondents read English material during a week. A majority of the student population identified 1 to 2 hours as the average amount of free time per day. The findings from the study concluded that although ESL schooling students are presently exposed to online learning resources which promote autodidacticism, they barely have the time or the direction to adapt them into their learner autonomy.

Keywords: COVID-19, Learner autonomy, Online education

HM005

Is Sirimal an Incarnation of Pip?: Evaluating the Parallels between the Protagonists in Martin Wickramasinghe's "Karuwala Gedara" and Charles Dickens' "Great Expectations"

Sonali S. Perera[1#]

[1] *Faculty of Humanities and Education, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] ssathsarap@gmail.com

Martin Wickramasinghe being an erudite in English, displays his cognizant of English literary classics through constant references to English writers such as William Shakespeare, Jonathan Swift, and Daniel Defoe in his Sinhala and English writings. Most of his writings carry traces of famous writings and therefore, it can be conjectured that Wickramasinghe has been influenced by the English classics greatly and therefore, has made similar adaptations to his writings. His novel, Karuwala Gedara (1963) exhibits unequivocal resemblances to Charles Dickens' Great Expectations (1861). Both works follow a common plot-line: the protagonists' steady entry into the urban genteel society, leaving behind his precursory agrestic life to the past. Therefore, in the quest to delineate the parallels between the two novels, this study aims at analyzing the depiction of Sirimal Karuwalagedara as analogous to that of Phillip Pirrip. The data gathered through comparative and intensive reading of the two novels are subjected to qualitative analysis. The study presents the parallels of the protagonists under 3 dimensions: the inherent character traits, the surrounding circumstances and the relationships shared by them with the supporting characters. The findings suggest that the two protagonists developed by Wickramasinghe and Dickens, characterized by their high aspirations to belong to the genteel society in Colombo and London, the sense of abhorrence developed towards the former country life and purposeful seclusion from the erstwhile acquaintances triggered by an aspect of romance developed with a female character from the nobility, display resemblance to each other when viewed in all three dimensions.

Keywords: Parallels, protagonists, character portrayal, novels, Inherent traits, Circumstances

HM006

A Conversational Analysis of the Sinhala teledrama; "Sudu Adagena Kalu Awidin" - using Grice's Cooperative Principle.

Amavi Roosarani[1#]

[1] *Faculty of Humanities and Education, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] amaviroosarani@gmail.com

Most social interactions or relationships are governed by universal rules that humans instinctively follow. "Language" thus being one of the most important aspects in social relations, is also governed by many social conventions and rules. Hence, when engaging in conversations, people follow several conventional rules to prevent meaningless, inappropriate, or false discourse. Under pragmatics studies and under discourse analysis, many linguists try to analyze so-called rules in different conversations. This study aims at analyzing the conversations in the Sinhala teledrama "Sudu Adagena Kalu Awidin" by Sunil Costa utilizing a mixed methods approach to identify the violations of conversational rules and to explore the way in which these violations create absurdity. The theory used to analyze the conversations was H.P. Grice's "The Cooperative Principle". A total number of 15 conversations from the teledrama were chosen for the analysis based on the observance of violation of Grice's maxims. The conversational analysis revealed that characters in the teledrama violate Grice's maxims when engaging in different conversations. The violations of all four Grice's maxims could be identified in different instances. The qualitative analysis of the study was used to discuss and explore the theory of absurdism and how it is utilized in literary works. Moreover, the analysis provided evidence for the way in which these violations of conversational rules create absurdity. The study concluded that by purposefully violating the conversational rules and breaking the established logic in conventional conversations, this teledrama creates absurdity.

Keywords: Conversational Analysis, Cooperative Principle, Absurd Literature

HM007

Dual-Readership in Ambivalent Texts of Children's Picture Books

Radha Madurangi Wimalawansa[1#]

[1] *Department of English, Faculty of Humanities and Education, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] radha.wimalwansa@gmail.com

Though children's literature is written for children, it often appeals to the adult reader as well. Out of the many factors that contribute to the dual-readership of children's literature, ambivalence of children's texts can be considered as one key factor. Ambivalent texts are compositions that can be interpreted at two different textual levels. Accordingly, the ambivalence in children's literature enables both the child and the adult readerships to realize the story in two different ways. Even the simplest picture books published for children will thus resonate with the adult reader at a much deeper level in comparison to the child. This paper aims to further validate the presence of dual readership influenced by the ambivalence present in children's literature. Textual analyses of five English picture books are conducted to exemplify the manner in which the same text can be interpreted by the two readerships at two different levels. The results validate the presence of dual-readership in children' literature, attributing it to the ambivalence of the texts.

Keywords: Children's Literature, Ambivalence, Dual-Readership, Picture Books

HM008

Dominant Use of Sensory Imagery in the Selected Poems of John Keats, which are Influenced by Mythology

R. P. Nimasha Iwanthika[1#]

[1] *Faculty of Humanities and Education, CINEC Campus, Millennium Drive, IT Park Malabe, Sri Lanka.*

[#] nimashaiw8@gmail.com

John Keats is one of the short lived, second generation Romantic poets, who left a deep mark on English Literature. His poetry is dominated with detailed and elaborated sensory imagery than any other Romantic. One of his outstanding features is his use of sensory imagery. No poet has accumulated the five human senses (sight, hearing, taste, smell and touch) to the same extent as John Keats. On the other hand, Keats was unmistakably a representative of Greek thought, in a sense, in which those other second-generation Romantic poets were not. He was possessed by the characters of the mythology and mythical thought influenced and enhanced his use of techniques such as imagery. Therefore, this study aims at exploring how selected sensory imagery associated with mythology is used in selected poems of John Keats. Fifteen poems of Keats were chosen to identify the sensory imagery and use of mythology out of which eight poems are chosen through stratified, purposive sampling under the variables five selected sensory imagery and mythology. In the process, fulfilment of the variable mythology was a must. It is found out that Keats adapts images from myths as a source of inspiration and as a result, he is able to touch few or all senses out of the five. Further, with the detailed analysis of both sensory imagery and mythology in this study, it is concluded that both are mutually interdependent, in which one cannot survive alone effectively without the other.

Keywords: Sensory imagery, Mythology, Dominant, John Keats

Maritime Sciences and Marine Engineering

MRTS001

Case Study: The Loss of MV Derbyshire and Constructional Changes to Bulk Carriers

S.T.B. Somaratne[1#], A.H. Rumesh Hirusha[1], U.M.K.A. Wijesekera[1], N.A Rathnaweera[1], G.M.R.V. Marasinghe[1], K.M.G. Yasiru Sajith[1], L.R. Vidusha[1], D.C. Wanniarachchi[1], K.S.K. Gunawardana[1], K. Pathirana[1].

[1]Department of Navigation, Faculty of Maritime Sciences, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.

[#] stbsomaratne@gmail.com

MV Derbyshire, the bulk carrier transporting iron ore from Canada to Japan was lost during the typhoon orchid on the 10th of September 1980. All 42 seafarers and 2 passengers on board went down with the ship in less than 3 minutes without permitting time to activate distress alerts. MV Derbyshire is known to be the largest British bulk carrier ever lost and has been the entity of several investigations and discussions with reference to bulk carrier trade & safety. Each year nearly 10 bulk carrier fatalities are known to occur causing injury and loss of lives, in addition to the huge loads of valuable cargoes. Moreover, these maritime accidents have caused huge threats to the marine environment. The objective of this study is to discuss the factors contributing to the loss of MV Derbyshire and how it has led to the major design, constructional and regulatory changes that came to force with the aim to improve bulk carriers' safety. The study is focused on secondary data collected from marine journals and researches on a numerus number of bulk carrier incidents. Furthermore, the area of safety of bulk carrier's has triggered many debates in the maritime community during the past decades. The readers should bear in mind the complexity of vessel's systems and the expectations of irregular environmental conditions in which they operate, and understand that the loss of a vessel is typically the result under numerous factors based on such as human error, technical failure, act of god and terrorism.

Keywords: Bulk carrier, Typhoon, Bulk head, Hatch covers, Constructional changes

MRTS002

Case Study: Grounding of MT Exxon Valdez and New Developments to Tankers

K.A.M.G.W. Kulathilaka[1#], M.D.S. Fernando[1], A.M.N.C. Arampath[1], D.S. Jayaweera[1], W.C.L. Fernando[1], D.I. Hewawasam[1], M.R.S.D. Kularathne[1], J.D.K.S.K. Gunasekara[1], S. Anuvaragan[1], N.N. Punchihetti[1]

[1]Department of Navigation, Faculty of Maritime Sciences, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.

[#] wethminkulathilaka@gmail.com

The 1989 Exxon Valdez' Oil Spill (EVOS) disaster was one of the greatest manmade environmental disasters in the history erstwhile to the Deepwater Horizon oil leak in Gulf of Mexico. On the day of 24th March 1989, shortly after midnight, the two hundred thousand DWT USA registered motor tanker Exxon Valdez struck the Bligh reef in Prince William Sound (PWS) of Alaska resulting in a spill of over 37,000 metric tons of cargo of crude oil leading to a huge ecological damage in the North American waters. Moreover, in less than 5 hours it eventually covered about 3000 square miles of the ocean and over 350 miles of adjacent coastline. Neither the state of Alaska nor the federal government was prepared to face, handle and control a maritime damage resulting from spill of this magnitude. It was evident that there is a need for improvement in responding to such maritime disasters after dealing with the Exxon Valdez incident was found inefficient and feeble. This paper reviews the stranding of MT Exxon Valdez and new developments as well as contingency plans imposed to decrease the probability of such oil spills in the future. This study is focused on secondary data collected from marine journals and researches done on oil spills. With the introduction of double hull design and numerous other remedial actions put in place, we can see a downward trend of oil spill disasters in the marine environment. Though incidents related to oil or cargo spillages still keep taking place which may have caused by mechanical or structural failure, human error, inadequate or and inappropriate design.

Keywords: Exxon Valdez Oil Spill (EVOS), Double hull, OPA 90, Marpol

MRTS003

Case Study: Sinking of MS Estonia and Improvements in Passengers' and Ro-Ro Vessels' Safety Mechanisms.

T.M.P.R. Ratnayake[1#], D.M.D.S. Wathsanu[1], K.S.H. Gunasekara[1], C.C. Palliyaguruge[1], A.T. Gunarathne[1], W.V.K. Dulran[1], S.B.Y.M.K.R. Siwarathne[1], N.M.P. Vithana[1], U.A. Samarakoon[1], G.W.K.T. Wijesinghe[1].

[1] Department of Navigation, Faculty of Maritime Sciences, CINEC Campus, Millennium Drive, IT Park, Malabe, Sri Lanka.

[#]prashan.randike@gmail.com,

On the 28th September 1994, incident of an Estonian-flagged, the ro-ro passenger ship MS Estonia faced a sudden tragedy due to bow door failure whilst at sea on her route from Tallinn to Stockholm. Only a number of 138 passengers out of 989 were fortunate enough to survive the fatality of the MS Estonia. This incident is an eye-opener for improvement on the safety of the passengers, cargo and the effective safety procedures on ships to prevent such undesired occurrences in the future. The key objective of this study is to elaborate on the ideas of safety improvements on Ro-Ro vessels with special emphasis on the facts that led the journey of MS Estonia to a catastrophe. Furthermore, concentrated information gathered from journals and relevant websites provide a base for this study. The authors of this study have considered that it is worthy to review under several significant facts gathered during the process of analysing in particular, the safety of the passengers on a maritime passage, vessel's safety arrangements and mechanisms place on board. It is expected that the readers perceive in them some awareness of these complexities of ship arrangements, design, and the highly irregular and unpredictable environmental conditions in which any vessel would operate, and realize that the contingency of a vessel is typically the result of numerous factors, inclusive of environmental, structural, operational conditions and the owner's stringent supervision on the aspect of safety management.

Key words: Ro-Ro, Passengers, Safety, Bow visor, SOLAS

Pre-Symposium Webinar Series

Writing a Successful Research Abstract
Dr. A.M.C.P. Atapattu
Head - Department of Business Economics, Faculty of Management and Finance, University of Colombo
29th of July 2021

Towards a Successful Career; Building Your Profile
Mr. Sameera Jayawardane
Career adviser -Career Guidance Unit, University of Sri Jayewardenepura
9th of August 2021

Women in Science
Ms. Kavindi De Silva
Global Events Lead - Space Hero Ltd
External Relations Coordinator - International Space University: Space Studies Program, Granada
9th of September 2021

Inculcating Entrepreneurial Mindset Among Students
Mr. Vidura Jay
The Founder and CEO of Highlife International LLC, Los Angeles, California
26th of October 2021

Editorial Support

Mr. Lasantha Basnayake
Associate Dean, Faculty of Humanities and Education

Ms. Radha Wimalawansa
Lecturer, Faculty of Humanities and Education

Ms. R. P. Nimasha Iwanthika
Lecturer, Faculty of Humanities and Education

Mr. Arosha Rodrigo
Lecturer, Faculty of Humanities and Education

Ms. Thamali Gunasekara
Visiting Lecturer, Faculty of Humanities and Education

Ms. Amavi Roosarani
Visiting Lecturer, Faculty of Humanities and Education

Support Coordination

Mrs. Nimshi Loran Fernando
Coordinator Research Office & Academic Development Committee,
CINEC Campus, Malabe

Network and Web support

Mr. Chandima De Silva
Associate Dean and Manager - ICT & Services Department,
CINEC Campus, Malabe

Mr. Sudesh Perera
Senior Executive (LMS/WEB Administration)
CINEC Campus, Malabe

Mr. Gajhanan Vettivel – Senior System Administrator
Mr. Lasantha Sandanuwan - System Administrator
Mr. Amila Udayanga - IT Technician
Mr. Dakshina Weerasiri - Trainee IT Assistant
Mr. Lakmal Perera – IT Assistant

Graphic Designing

Mr. Pubudu Rathnasiri
Junior Executive Graphic Designer

Volunteer Support

Dilshan Kangara	Graphic designing artworks
Devin Wickramarathne	Graphic designing and video editing
Bhashitha Pannila	Graphic designing and video editing
Pabasara Welgama	Graphic designing artworks
Demidu Bookoladeniya	Graphic designing artworks
Shamanga Sooriyaarachchi	Compering
Peshila Rathnayake	Compering

Main Sponsor

IMS Holdings (Pvt) Ltd

CMD (Pvt) Ltd

Analytical Instruments (pvt) Ltd

Gigapro Technology (pvt) Ltd