INNOVATE SRI LANKA:
STORIES OF SUCCESSES - 2019

2nd & 3rd of April 2019
BMICH, Colombo, Sri Lanka

This publication contains information about the innovations and discoveries that originated at the University of Sri Jayewardenepura, which will be showcased at the **"Innovate Sri Lanka 2019 Exhibition"**.

The diverse research carried out by the University of Sri Jayewardenepura; Staff and Students have made an enormous impact over the decades indeed. One can explore some of the most recent avenues in the **"J'pura"** Innovations and Inventions.

This publication features some of our most significant successes in the recent years. Our Innovations have achieved, both, in transferring technology and expertise to external organizations for varied social and economic benefits across the public and private sectors.

Editorial

DR. CHITRA JAYATHILAKE
HEAD
Department of English and Linguistics – University of Sri Jayewardenepura

It indeed gives me great pleasure to pen a few celebratory words at this very special juncture of the history of the University of Sri Jayewardenepura. Our University celebrates a milestone, for, in February 2019, the University of Sri Jayewardenepura officially marked its 60 years of serving the nation. An anniversary of this nature is indeed not only an event to recognize and pay homage to our founding forefathers, but, it is also an important opportunity to look back on our history and celebrate our achievements modestly whilst taking bold steps into the future with confidence and maturity. It is indeed important to highlight the fact that what began as a seat of learning almost 145 years ago with 7 students, has today, in the 21st century transformed into a University with 7 diverse faculties, boasting over 10,000 students; the largest tertiary student body housed under one University in this island nation to date.

The range of the University today caters to the international arena, be it from the Humanities to the Sciences, encapsulating students of all races and religions in the multicultural society of modern Sri Lanka. Thus it is evident that the University of Sri Jayewardenepura has stood the true test of time, in revolutionizing its outlook constantly with inclusion and culture at its apex.

A booklet can by no means capture the entirety of the dedication, hard work and spirit of the budding researchers in their genuine and wholesome contribution to Sri Lankan society, nevertheless, in its publication one witnesses a corpus of life changing ideas shaping our very own futures. I congratulate the authors of papers and write-ups on inventions who with their dedication and hard work undertake the responsibility of their articles, respective creations and achievements thereby enabling my team to compile this document from their submissions therein. Keeping true to the mission of the Innovation, Invention and Venture Creation Centre (IIVCC) of promoting innovations, inventions and venture creations in collaboration with the industry, culminating both the public and private sectors, this two-day exhibition is indeed an apt platform for inventors and research scientists of the University of Sri Jayewardenepura to present their inventions & innovations to the industry and to the public. Innovation is by no means limited to the scientific; artistic innovation when perfected, creates novel literary avenues as witnessed by our very own Sandeshawali Kawinaluwa – a mesmerizing poetic creation.

Editing a publication of this nature, at this historical moment of the university and within a very short period of time, would not have been rewarding and possible if it were not for many individuals – especially Senior Professor Sampath Amaratunge (Vice Chancellor), Professor Shirantha Heenkenda (Co-chair of IIVCC), and Ms. Yoga Galhena (Assistant Coordinator of IIVCC exhibition) – to whom I owe a great debt.
It is thus with great pleasure that we present this compilation of the significant innovations and research by our own academics and researchers; serving as an impetus for the future generations of the University and society at large.

145 YEARS OF EXCELLENCE
60 ANNIVERSARY
1873 - 1959 - 2019

Message from the Vice Chancellor

SENIOR PROFESSOR
SAMPATH AMARATUNGA
Vice Chancellor – University of Sri Jayewardenepura

The Sixtieth Anniversary of the University of Sri Jayewardenepura falls in the year 2019. Its predecessor, Vidyodaya Pirivena at Maligakanda was founded 145 years ago. When we further investigate the lineage of the Vidyodaya School of Education, we find that its history goes back to the time when the Maha Vihara monastic college was established at Maha Megha Udyanaya in Anuradhapura that was donated to Arhat Mahinda by King Devanampiyatissa in the 3rd century BCE. As the incumbent Vice Chancellor of the University of Sri Jayewardenepura, an institution that inherits such a long and proud history, it gives me great pleasure to issue a message of greeting for the anniversary celebrations and the book launch.

A series of programmes have been lined up to commemorate this event. It was launched on 17th February, 2019 with an all-night 'Pirith' chanting by the venerable Maha Sangha which was followed by an alms-giving at the university premises to 145 Bhikkhus. In February, an International seminar on Pali, Sanskrit, Sinhala and Tamil languages was held and simultaneously a series of educational videos pertaining to the GCE Advanced Level (new syllabus) was released to the relevant teachers and students of our school network. On the 18th of March, a blood donation campaign was held. A programme to meet eminent personalities who can be considered as 'Human libraries' in their respective fields was held on the 27th of March. In addition, a musical programme 'Gee Pedura', a variety entertainment 'Bak Maha Ulela', reunion of alumni, a seminar for young researchers and the Vidyodaya Literary Awards Festival, are planned too.The culmination of these celebrations is to be held on the 2nd and 3rd of April at the Bandaranaike Memorial International Conference Hall. On the 2nd of April an exhibition of new innovations of all Faculties and of private sector organizations and individuals will be held which will be declared open by His Excellency Maithripala Sirisena, the President of the Democratic Socialist Republic of Sri Lanka and Vidya Jyothi Dr. Bandula Wijay. Parallel to this, the Faculty of Medical Sciences of our university will be holding 'Vedasa' a medical exhibition. 'Sandheshavali Kavi Naluwa' a music and dance recital will be held at the BMICH where H.E. the President will be the Chief Guest. On this occasion, seven books will be launched to commemorate the sixtieth anniversary, namely, 'Vidudaya 60th Anniversary Commemorative Volume', 'Sri Sumangala, Sri Soratha Sahitya Praveshaya' (A New Approach to the Literary Works of Ven. Sri Sumangala and Ven. Sri Soratha), 'Vidudaya Handbook', 'Deshana Sampradana' (An Offering of Selected Convocation Addresses), 'Vidudaya Journal', 'Vidyodaya Current Research' and 'Indra Cult as Ideology'. The 60th Anniversary Commemorative Volume and all these other books have been compiled with the intent of bringing out the best in the history, educational philosophy and educational tradition of our university. This is one of those seven books.

On this memorable and historic occasion, I wish to express my sincere gratitude to the editors of this book and the editors of other books for making available to the public the fruit of their academic efforts.

145 YEARS OF EXCELLENCE
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ANNIVERSARY
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Message from the Co-Chair IIVCC

PROFESSOR SHIRANTHA HEENKENDA

CO-CHAIRPERSON

IIVCC

The University of Sri Jayewardenepura is the largest national university in terms of student population. Annually it produces a large number of graduates and its academics are specialized in diverse disciplines. Some undergraduates, graduates and academics of the university have innovative ideas which can be utilized for the development process of Sri Lanka. This, in turn, may reduce the unemployment problem in the country as well. These entrepreneurial ideas demonstrate a great potential to create a high impact on the society provided that they gain both logistic and financial support. Yet, the university students lack the ability to market themselves, their ideas and gain the required financial support.

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Having identified these challenges faced by the university students, the University Strategic Plan (2017-2021) has taken initiatives to address some of these concerns and develop innovation and creative work of the students through its strategic goal #2 i.e. Research & Development where research, publications, public engagement, creativity and innovation of the students are supported.

The vision of the Innovation, Invention and Venture Creation Council (IIVCC) of the University is to promote invention, innovation and other creative works while safeguarding the Intellectual Property Rights and commercial aspects, commercialization and venture creation. Without excellent research there will be no innovations; if excellent research findings do not culminate as positive, productive, diverse and practical outcomes, there will be no future for research. Consequently, there will be no development. Therefore, the IIVCC strives to be a facilitator between the researchers and entrepreneurs and develop a strong link between the business world and the academic world.

145 YEARS OF EXCELLENCE
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ANNIVERSARY
1873 - 1959 - 2019

Innovation, Invention and Venture Creation Council (IIVCC)

History in brief

Innovation, Invention and Venture Creation Council (IIVCC) was formulated in accordance with the vision and the mission of the University of Sri Jayewardenepura, Sri Lanka with a view to "developing globally competent citizens through education for a sustainable future". In line with the Strategic Plan of the USJ (2017-2021), in 2017 December, a concept paper was presented to the University Council with the prime intention of promoting innovations, inventions and venture creations in collaboration with relevant external parties, at the University.

IIVCC has formulated a series of activities in order to meet the objective, of encouraging creativity through invention and innovation and thereby contributing to national development. The main objectives of the IIVCC are as follows;

- To encourage innovators/inventors to do more collaboration and commercialization
- To stimulate knowledge exchange and promote follow-on innovation
- To support all aspects of start-up businesses
- To enhance the knowledge and skills of industry professionals

MISSION

To promote innovations, inventions and venture creations in collaboration with the industry, business and the public sector.

Innovation and Invention Competition and Exhibition

IIVCC is the first University Council in Sri Lanka for innovations and inventions. Following its motto – "Innovate Sri Lanka" – IIVCC aims to enhance the future of Sri Lanka through innovations and inventions: IIVCC contributes dynamically to the educational, socio-cultural, environmental and economic needs and challenges of the 21st century. In light of this, IIVCC will hold a grand-scale exhibition of innovations on 2nd and 3rd of April at BMICH, which includes over 200 stalls of innovations – 100 from the university and 100 from the industry including the start-ups.

The Invention and Innovation Competition and Exhibition (IICE) aims at providing an interdisciplinary platform for renowned intellectual key profiles, emerging innovators and Industry Professionals to work on Research projects that may yield industry related innovation. IICE will be held on 2 -3 April 2019 under the theme "Investing on Innovative Ideas for Future"!

In parallel with the exhibitions, the IIVCC organizes competitions to recognize outstanding inventions and innovations of the University of Sri Jayewardenepura. The competition is open to the staff, and undergraduate and post graduate students of the university. It culminates with an awarding scheme which aims to identify prospective and promising innovations and inventions. The awarding scheme is operated in collaboration with the interested external parities, thereby maximizing the transparency and the reliability of the awarding scheme.

The following cells and units are facilitated by the IIVCC

- Students' startups
- SiGs forum
- University Business Linkage Cell
- IP Policy
- World Class University Grant Project-USJ
- Instrument Center-Faculty of Applied Sciences
- English Language Incubator (ELI)
- Services for Parliamentarians of Sri Lanka

IIVCC

MEMBERS OF THE IIVCC

Senior .Prof. Sampath Amaratunga
Vice Chancellor

Prof. Shirantha Heenkenda.
Co-Chairperson
Professor in Economics, Department of Economics
Faculty of Humanities and Social Sciences.

Dr. Nilmini Liyanage
Co-Chairperson
Senior Lecturer, Department of Bio Systems Engineering
Faculty of Technology.

Dr. Lasith Gunawardena
General Secretary
Senior Lecturer
Department of Information Technology,
Faculty of Management Studies and Commerce

Dr. Thusitha B. Abeysekara
Coordinator, Legal Affairs
Senior Lecturer
Department of Commerce.
Faculty of Management Studies and Commerce.

Prof. K. Ranil de Silva
Director
World Class University Project

Dr. P.K.P. Perera
Director
University Business Linkage Cell
Senior Lecturer
Department of Forestry and Environmental Science

Mr. R.N. Weerasinghe
Director
Center for Entrepreneurship and Innovation
Senior Lecturer and Head, Department of Entrepreneurship,
Faculty of Management Studies and Commerce.

Dr. Chitra Jayathilake
Director
English Language Incubator (ELI)
Senior Lecturer, Department of English and Linguistics,
Faculty of Humanities and Social Sciences.

Faculty Representation

Prof. T.M.S.P.K. Tennakoon
Associate Professor, Department of Geography,
Faculty of Humanities and Social Sciences.

Prof. A.R. Kumarasinghe
Professor, Department of Physics,
Faculty of Applied Sciences.
Dr. Chandima Jeewandara
Senior Lecturer, Department of Family Medicine
Faculty of Medical Sciences.

Dr. Prasad Jayeweera
Senior Lecturer, Department of Computer Science,
Faculty of Applied Sciences.

Prof. Sagarika Ekanayake

Professor, Department of Biochemistry,
Faculty of Medical Sciences.

Prof. Hareendra Dissabandara
Professor and Head, Department of Finance,
Faculty of Management Studies and Commerce.

Dr. Dhanushka Udayanga
Senior Lecturer, Department of Bio-System Technology,
Faculty of Technology.

Dr. Randika Jayasinghe
Senior Lecturer and Head, Department of Engineering Technology,
Faculty of Technology.

Dr. Nishan Dharmaweera
Senior Lecturer, Department of Electrical and Electronic Engineering,
Faculty of Engineering.

Dr. Dulini Mudunkotuwa
Senior Lecturer, Department of Mechanical Engineering,
Faculty of Engineering.

Research Council Representation
Prof. M.M. Pathmalal,
Co-Chairperson,
Research Council

Dr. Pradeepa Jayawardana,
Co-Chairperson,

Innovate Sri Lanka Exhibition IIVCC Committee

Ms.Yoga Galhena
Assistant Coordinator
Innovate Sri Lanka 2019

Ms. Wasundara Premathilaka
Research Assistant
Innovate Sri Lanka 2019

W.A A Madhusanka
Research Assistant
Innovate Sri Lanka 2019

Future- plans and prospects

BUSINESS INCUBATION

Business incubators provide new businesses with office space and shared facilities, and equipment. They can be either actually or virtually located and provide in-person or off-site assistance. Entrepreneurs are provided with the necessary assistance to fill the knowledge gaps. The early operational cost may be reduced as entrepreneurs are provided with a set of shared services and facilities.

CONSULTANCY AND TRAINING

The IIVCC provides consultancy and training on,

- Business management issues
- Marketing and market research
- Legal advice
- Insurance services
- Taxes issues
- Consultation innovation and technologies
- Technical consulting services

IIVCC DATA RESERVOIR

The Data Reservoir (DR) offers a centrally-hosted and administered data storage for researchers. It collects and provides data for both cutting-edge and emerging researchers, locally and internationally based, for innovation, invention and venture creation paths. Hence, its service is mainly two-fold: to store data and to provide data. Both on-campus access and off-campus backup to secure and utilize data is available on demand.

The IIVCC is a novel venture and it looks forward to highlighting and creating a space for the academic world and industry, including the public and private sectors, to work concertedly and collaboratively. By transforming the manner in which they work, and by promoting their innovations, inventions and venture creations, the IIVCC contributes dynamically to the educational, socio-cultural, environmental and economic needs and challenges of the 21st century.

Success Stories

Scientists at the Centre for Dengue Research at the University of Sri Jayewardenepura, make a breakthrough discovery about how certain antibodies give rise to severe dengue.

The scientists at the Centre for Dengue Research of the University of Sri Jayewardenepura have found that the antibodies directed to a certain dengue protein, NS1 is likely to determine the outcome of the disease among individuals who are infected with the dengue virus. Their research findings have been published in the world renowned scientific journal, Nature Communications.

The research team led by Prof. Neelika Malavige has discovered that the antibody response to the dengue NS1 protein was quite different in those who develop mild clinical disease when compared to those who develop severe dengue (dengue hemorrhagic fever). Further elaborating on their research findings, Prof, Malavige stated that their results are likely to pave the way for further understanding as to why only some individuals develop very severe disease, while others have very mild or asymptomatic disease when infected with the same dengue virus. She said that these cutting edge research experiments were the work of two of the scientists in her group, Ms. Deshni Jayathilaka, who is a PhD student and Mr. Laksiri Gomes, who is a senior scientific researcher. 'I am very happy to say that all the experiments were carried out within the confines of our laboratory at the University of Sri Jayewardenepura.' Since the assays to measure

these types of antibodies did not exist, Deshni and Laksiri had to develop all assays from scratch in order to carry out our experiments. The other members of the team were Dr. Chandima Jeewandara, Dr. Danushka Herath, Dr. Geethal Jayaratne, Dr. Samitha Fernando and Dr. Pathum Perera from the Centre for Dengue Research, Dr. Ananda Wijewickrama from the National Institute of Infectious Diseases and Prof. Graham Ogg and Dr. Clare Hardman from University of Oxford, UK.

The team's discovery that the differences in the antibody response to the dengue protein NS1, is linked with development of severe dengue, would be important in dengue vaccine development and in measuring their efficacy. The ideal dengue vaccine should be able to induce protective type of antibodies to the dengue NS1, such as those seen in patients who developed milder disease. Prof. Malavige further stated that there is a lot more work to be done in order to fully understand how different types of NS1 antibodies are generated and the mechanisms by which they cause severe dengue.

This research was supported by the funding of the Centre for Dengue Research, National Science Foundation and the National Research Council of Sri Lanka. 'At a time when there is a lot of criticism being levelled against Universities in Sri Lanka, we are happy to prove that we have the facilities and the capacity to carry out scientific research of global importance, provided adequate funds are made available', said Prof. Malavige. She further stated that the Vice Chancellor of the University of Sri Jayewardenepura, Prof. Sampath Amaratunga and the Dean of the Faculty of Medical Sciences, Prof. Surangi Yasawardena, strongly supported their research activities and had a long-term vision to improve the quality and quantity of the research output by the University. She went on to say that, although there was a lot more work to be done, they were unable to carry out any further research activities in this area, as the National Science Foundation was unable to provide them with the required funds for this year due to financial constraints exercised by the treasury.

BMJ AWARDS
SOUTH ASIA 2018

DR. BAWANTHA GAMAGE
Department of Surgery

Awards: BMJ Award South Asia 2018 – Best Surgical Team of the Year

The BMJ South Asia 2018 recognizes excellence in health care by felicitating individuals and teams that have demonstrated exemplary commitment to the practice of Medicine and Surgery in the south Asian region.

In 2018 more than 1500 nominations had been received from 9 countries and 435 semifinalists were shortlisted before selecting the finalists for the 10 awards in different categories. The only award in the field of surgery is to the Best Surgical Team of the year.

Dr Bawantha Gamage, Senior Lecturer from the Department of Surgery of the Faculty of Medical Sciences, University of Sri Jayewardenepura has won the best surgical Team of the year 2018 award for his commitment

and dedication in implementing the modified Enhanced Recovery After Surgery (mERAS) protocol in managing patients with colorectal cancer in Sri Lanka. His Other team members are Dr Malith Nandasena, probationary Lecturer in the Department of Surgery and Dr Chamila Lakmal , Surgical registrar in training who worked in the University Surgical unit at the Colombo South Teaching Hospital.

He was selected for the award after competing with two Indian Surgical Teams in the final presentation for 20 minutes in front of a four membered jury comprising the members of the editorial board of the BMJ. This is the first time a Sri Lankan Surgeon and the team has won this prestigious award "Surgical team of the year" in the history of BMJ awards South Asia.

Being a member of the first batch of medical students that entered in to the Faculty of Medical Sciences in the University of Sri Jayewardenepura, Dr.Bawantha Gamage currently working as a consultant surgeon and the Head of the department of Surgery of the faculty of medical sciences says "this is the best tribute one can give to the University at the 25th celebrations of the faculty of medical sciences as a member of the pioneer batch" and to the University of Sri Jayewardenepura at its 60th anniversary Celebrations.

ONGOING RESEARCH:

TRIGGER Trial

In the process of Starting– Magnetic Resonance Tumour Regression Grade as a Novel Biomarker to Stratify Management of good and poor responders to Chemo radiotherapy: A rectal cancer multi center randomized clinical trial (TRIGGER Trial) with the Royal Marsden Hospital UK. This will be an international centre. The trial agreement has been singed and in the process of finalizing the patient recruitment process.

Determining the role of gut microbiome in the etiology of colorectal cancer

The association of the gut microbiota in colorectal cancer is emerging. Current study is the first study to identify gut microbiota patterns in a South Asian cohort. The relative abundance of 45 types of gut microbiota was determined in stool samples in patients with CRC (n=24), Diabetes mellitus (DM) (n=20) and healthy controls (n=44), using a qPCR array. They observed distinct microbiota patterns in CRC and DM patients compared to healthy individuals. Bacteroides fragilis was equally highly expressed in patients with DM and CRC, suggesting a possible association of B. fragilis specifically with CRC which warrants the further investigation.

NGS sequencing of the gut microbiome to determine microbiome patterns that associate with colonic carcinoma.

They believe since their preliminary data shows that the vast differences in the gut microbiota in healthy and in patients with CRC, it would be now important to further study the changes in the microbiome in those with premalignant conditions of the gut and also in those with metabolic disease. 16S NGS sequencing would allow us to determine the relative abundance of over 20,000 microbes. DNA extraction was done from all stool and gut tissue samples and they are planning to send DNA elutes within next month for Next generation sequencing. They believe this approach will enable then to study the association of diet, metabolic disease and the gut microbiome in the Sri Lankan population.

Collaboration with International Universities:

Gothenburg University - Sweden

He established a direct link with the Gothenburg University Sweden in 2016. Department of Surgery has been selected by the University of Gothenburg to send their final year medical students for their final year research project under his supervision. He has been appointed as the supervisor from the inception and He was able to get the MOU singed between our faculty and the Gothenburg University, Sweden.

Since its inception in 2016, eight students have completed their research projects.

James Cook University - Australia

He also managed to establish a link with James Cook University Australia in 2016. Since then selected students who are in their final year do 4 weeks of surgery final year appointment with us at CSTH. He has been appointed as their supervisor by the JCU since the inception of the programme.

Orations Delivered

Sir A.M.De Silva oration 2018

He was selected to deliver Sir A.M.De Silva oration at the joint academic sessions of the College of surgeons of Sri Lanka and the Royal College of Edinburgh.

Topic: Enhance Recovery After Colorectal surgery – Are we ready to shift the Paradigm

Prof.Senaka Bibile memorial oration 2018.

He delivered 2018 Senaka Bibile memorial oration as the first surgeon in the country to get this opportunity.

Topic: Challenges faced by the Clinicians in Rational prescribing.

Association of Minimal Access Surgeons of India (AMASI) Oration 2018

He was selected to deliver the AMASI oration 2018 at the Annual Academic session of association of surgeon of India – ASICON 2018.

Topic: "Laparoscopy" Is it a panacea for all abdominal surgeries.

THREE USJP MANAGEMENT UNDERGRADUATES WIN **RB GLOBAL CHALLENGE 2018**

Ms Virgin Fernando of the Department of Business Economics, Mr. Madusha de Silva of the Department of Finance, and Mr. Umendra Abeynayeke of the Department of Commerce, of the Faculty of Management Studies and Commerce representing Sri Lanka marked their victory at the RB Global Challenge 2018 held in the United Kingdom on 28th and 29th November 2018.

RB Global Challenge is a global competition organized by Reckitt Benckiser where the young students all around the world have to present their own self-sustaining projects with the purpose of creating a greater social impact while addressing the current social issues in their respective countries.

This year, there were 19 participant countries representing 80% of the total population of the world including the USA, Canada, India, China, Bangladesh, Brazil, South Africa, Singapore, Malaysia, Pakistan, Hong Kong, Nigeria, Lebanon, Egypt and Sri Lanka. This is the first time ever that a Team from Sri Lanka participated in this competition. The winners will take part in the One Young World 2019 which will also be held in London in October 2019 where youth around the world get together with the world leaders.

DULAN DIAS WINS GOLD AWARD FOR THE **TERTIARY STUDENT PROJECT AT APICTA 2018**

From Right: Dr. T. G. I. Fernando, Prof. Sampath Amaratunge, Mr. Dilan Dias and Mr. Kirupaharan Piriyankan (NBQSA – 2018- Tertiary Student Project (Technology)

The University of Sri Jayewardenepura won the Silver and Bronze award for the Tertiary Student Projects (Technology) Category at the National Best Quality ICT (NBQSA) Awards held on 19th October 2018 at Hotel Galadari, Colombo. NBQSA, provides recognition to outstanding achievements of individuals and organizations in Sri Lanka who have developed high-quality ICT products; Provides a window to gain International Recognition of Local ICT products; Improves the Quality of Local Products & Services to meet International Standards and Identifies young talent and provide them an opportunity to develop their skills in ICT. The British Computer Society Sri Lanka Section organizes the National Best Quality ICT Awards (NBQSA) since 1998 and nominates the national participants for the Asia Pacific ICT Awards (APICTA) since 2003.

Mr. Dulan Dias won the Silver award for "Komposer – Automated Musical Note Generation based on Lyrics with Recurrent Neural Networks" while Mr. Priyankan Kirupaharan won the bronze award for " Mobile Application to Identify Fish Species". Both students are from the Department of Computer Science, and both projects were supervised by Dr. T.G.I. Fernando, Senior Lecturer, Department of Computer Science, Faculty of Applied Sciences.

Mr. Dulan Dias was able to bring glory to the Country and University by winning the Gold Medal of the Tertiary Category at the APICTA (Asia Pacific ICT Awards) 2018 event held in China. Dulan was one of the three nominees from Sri Lanka under the tertiary category but managed to win over the tough competition from the 17 member economies of APICTA which include China, Australia, Singapore, and Hong Kong.

This was only the third time that Sri Lanka had won Gold at this prestigious international competition. Prior to his travel to China to represent Sri Lanka, Dulan received financial assistance totaling LKR 150,000 for his travel sponsored by the Vice-Chancellor, Senior Prof. Sampath Amaratunga on the recommendation of the Invention, Innovation and Venture Creation Council of the University.

From Right: Dr. A. H. L. Nilmini (Co-Chairperson-IIVCC) and Mr. Dulan Dias

PRESIDENTIAL AWARDS 2018, IN THE CATEGORY OF APPLIED SCIENCE AND TECHNOLOGY FOR THE PATENT, **NANO REINFORCED ADHESIVES.**

Holding four patents and three of them are already commercialized with leading industries in Sri Lanka.

In addition, winning the second place at the Presidential awards 2018, in the category of Applied Science and Technology for the patent, Nano reinforced adhesives.

Title: Manufacture of porous polymer profile (Tubular, Square) by extrusion-sintering process (soaker hose for drip irrigation) - Joint patent by Samson International Ltd. and RRISL (2003), H.N.K.K. Chandralal, A.H.L.R. Nilmini, W.M.G. Seneviratne, S.M.A. Samarakoon

Commercialization: DSI Group

Title: Novel dispersing agent with high retention of carbon black for manufacture of latex-carbon black master batches (2003), D.P.

Dissanayake, A.H.L.R. Nilmini, M.D.Y. Milani, O.U.N.H. Fernando

Title: Nano reinforced adhesives (2012), A.H.L.R. Nilmini

Commercialization: ATG Ceylon (Pvt) Ltd

Title: Development of tyre paint for solid tyres (2015), A.H.L.R. Nilmini

Commercialization: Camsoloadstar (Pvt) Ltd

AWARD

The Award for NBQSA 2018

National Best Quality Software Awards (NBQSA) is an annual awards ceremony that is held in Sri Lanka at a National-level in order to appreciate and recognize innovations and inventions in the field of Computing and Information Technology from school-level, undergraduate-level to commercial-level. NBQSA 2018 was quite special to the University of Sri Jayewardenepura, since this year, for the very first time, the University of Sri Jayewardenepura was able to secure two awards in the "Tertiary Undergraduate Project" category with the Silver Award won by Mr. Dulan S. Dias for his research project titled "Komposer" which was an artificial intelligence programme that can generate musical melodies when it is provided with lyrics for a song, using state-of-the-art technologies, and the Bronze Award was won by Mr. Priyanakan Kirupaharan for his research project on identifying fish species using a mobile application. Both Mr. Dulan S. Dias and Mr. Priyankan Kirupaharan were supervised by Dr. T. G. I. Fernando of the Department of Computer Science, University of Sri Jayewardenepura. With this win, Mr. Dulan S. Dias was also nominated to represent Sri Lanka at Asia-Pacific ICT Alliance (APICTA) Awards 2018 held in Guangzhou, China.

SUCCESS STORIES

Inventions and Innovations

Research carried out by the university of Sri Jayewardenepura staff and students has made an enormous impact over the decades. You can explore some of the recent examples in the Japura Innovations and Inventions. These pages feature some of our significant successes in recent years. Our Innovations have excelled in transferring both technology and expertise to external organizations for social and economic benefit.

WINE PREPARED USING **WILD GRAPE BERRIES**

Ampelocissus indica (L.) planch; a wild grape species native to Asia for a value added product

The fruit of wild grape grown in Southern province of Sri Lanka.

Wine prepared using wild grape berries

Inventors

1. **Champa D. Jayaweera**, PI, Dept. of Chemistry, University of Sri Jayewardenepura
2. **W.L. Fernando,** Dept. of Chemistry, University of Sri Jayewardenepura.

This study demonstrates that the wild grape species Ampelocissus indica (L.) planch found in Sri Lanka, has a higher antioxidant activity than European grape species and hence a good source of nutritional antioxidants.

This can be utilized as a novel resource for a value added product with a good nutritional value.

Ampelocissus indica (L.) planch is a wild grape, native to Asia that has not yet been adequately recognized by researchers. This species is abundant in the Southern Province of Sri Lanka. As a value added product, wine samples were prepared using fruit of wild grapes and a few wine quality parameters were analyzed proposed by Jean L. Jacobson. Acid level/ titrable acidity, pH level, Specific gravity and Alcohol content (v/v) of wine samples prepared from wild grape berries were 0.72 g L-1, 3.12, 0.9823 and 13.85 % respectively. It shows that the qualities of wine samples prepared from wild grapes are comparable within the standard quality parameter limits as well as with the normal European grape wine sample qualities. This data is informative to future studies on Ampelocissus indica (L.) planch berry as a raw material for many value added products and has a higher utilization value and a potential for further development.

PRODUCTION OF NITRILE RUBBER PAVER (BRICK) FROM **WASTE NITRILE BUTADIENE RUBBER (NBR)**

Patents Dr Rajitha Gunaratne (Bsc.MSc. PhD.) Faculty of Technology University of Sri Jayewardenepura 19709 - Production of Nitrile Rubber Paver (Brick) from waste Nitrile Butadiene rubber (NBR) and Waste Nylon without gamma irradiation 197 I 0 - Production of Nitrile Rubber Paver (Brick) from waste Nitrile Butadiene rubber (NBR) and Waste Nylon with gamma irradiation I 97 I I - Production of Nitrile Rubber Paver (Brick) from only waste Nitrile Butadiene rubber (NBR).

They have developed a new rubber paver with crushed Nitrile Butadiene Rubber (NBR). These NBR was collected from waste material from the glove manufacturing process as waste NBR. NBR is collected through coagulation process. To improve their crosslinking properties a gamma irradiation process took place for above material. From this a light weight rubber paver can be manufactured. (Dimensions: length- 195 ± 5 mm, width- 95± 5 mm, height- 50± 5 mm.).

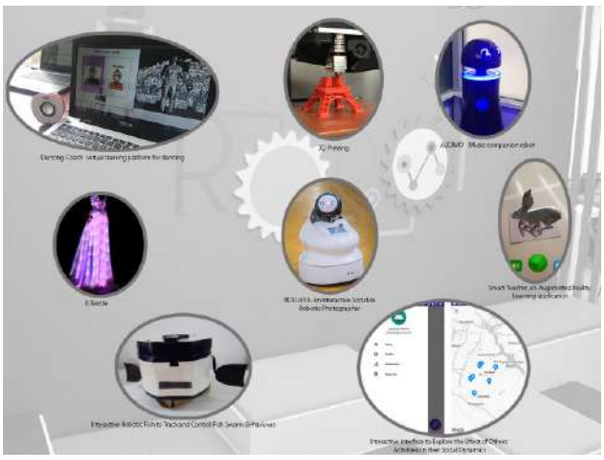
This paver can be used for the indoor and outdoor applications. This paver can be made in cuboid shape or any other suitable shape using relevant mold with smooth surface and anti-slip property. Further this process can be considered as a good environmental safe way of disposing/ re using waste rubber. Industrial applicability. No protein allergic effect to any human beings like products made from Natural rubber. Durable, comfortable and anti-slip, Light weight and easily installed, Good replacements for Concrete pavers, Good for child-nurseries, gyms and schools Also suitable for hospital's orthopedic units, elders' homes and disabled peoples walking areas. 19826 - A method of preparing an emulsion by using Cinnamon leaf oil and incorporating the emulsion into gloves 19827 - Replacing a synthetic antioxidant used in the glove industry by preparing a natural antioxidant emulsion from Ceylon Cinnamon We have developed a natural anti-oxidant to replace synthetic antioxidant use in the industry.

RECENT INNOVATION BY THE DEPARTMENT OF COMPUTER SCIENCE, **FACULTY OF APPLIED SCIENCES**

This research study "Gender Classification and Finding Effect of Gana based on personal names with Recurrent Neural Network" was done by Thisuri C. Lekamge under the supervision of Dr. T.G.I. Fernando.

As a result of this, They finally developed the web application, "EXYONA".

INNOVATION CENTRE FOR **ROBOTICS INTELLIGENT SYSTEMS (RIS)1**



The Innovation Centre for Robotics Intelligent Systems established in the University of Sri Jayewardenepura is the first ever robotics center in Sri Lanka which is capable of exploring solutions in a human-centric environment while conducting competitive research outcomes with worldwide high ranking universities. The center is facilitated with the latest devices and equipment which are capable of capturing a variety of complex human behaviors, including voice, facial, motion, brain signals, finger motions, tactile information and gestures. Dr. Ravindra De Silva, Senior Lecturer at the Department of Computer Science, constantly guides and motivates the undergraduates of University of Sri Jayewardenepura in numerous research projects connected with human robotics and social robotic interaction.

The robot VIDUJAYA is an approach which is based on concepts of Social Robotics and Human Robotic Interaction (HRI), employed to capture natural photographs of children, by interacting with them. This robot is capable of changing its interactive pattern by considering the child's activities, reaction and behaviors in real time.

Spending time watching fish is a great way to spend your free time not just because it is entertaining but

also because it can relieve stress. A study was done at RIS, to design a robotic fish with Ostraciiform tail undulation with futuristic and minimalistic design to enhance human interaction with Fish by mimicking their behavior and fish swarm patterns.

When it comes to aesthetics and entertainment, students at RIS show extraordinary creativity. Dancing Coach and Audimo are two of the best examples of the applications of Human Computer Interaction in these fields. Dancing Coach is a virtual training platform for dancing which captures the motion of the user using motion tracking, saves the motion and compares it with predefined motions and analyzes it. AUDIMO is a music companion robot that can enhance the engagement of the audience by selecting the perfect song to the current situation based on the behavior of the audience.

In the wake of significant concern and frustration surrounding our current education system, forms of alternative education continue to thrive and abound. Smart Teacher, an Augmented Reality Learning application designed for Kids is one of such. This application provides an interactive way in which students can learn things with the aid of both visual and hearing stimuli.

Most recently we have created an Interactive Interface to Explore the Effect of Others Activities on their Social Dynamics that can refer to the behavior of groups that results from the interactions of individual group members as well to the study of the relationship between individual interactions and group level behaviors.

The undergraduates of the University of Sri Jayewardenepura developed an Intelligent Agent to Negotiate on Goal Oriented Conversations. It can learn different negotiation strategies in order to maximize the goals, and also provide the customers with an interesting offer which maximize the profit of the organization. This intelligent agent was trained to predict the opponent's moves and also to use mathematical formulae such as price multipliers to predict the most optimal decision to maximize the profit of the organization.

E-Textile is widely used all around the world in sportswear, innovative fashion, etc to make life easier, better and colorful. Even though this has been a huge topic and an area for innovation around the world, Sri Lanka hasn't had much contribution to this field. Finding this field as an area of growth for innovative products in Sri Lanka, RIS has taken an initiative to aid innovation in E-textile. Here at RIS students can give life to the ideas they have.

AUTOMATED SOIL **SAMPLING ROBOT (ASC-BOT 1.0)**

ASC-Bot 1.0, is a preliminary designed automated user-friendly buggy in the porous of collecting soil in unsafe and hard to access locations, such as in high-risk landslide areas. Additionally, this can be used in defense applications such as in landmine detection and disarming.

There are many soil sample collectors on the market. Currently, the available Soil sampling devices function manually, are bulky, expensive and exist with other limitations. The Automated Soil sample collector, the ASC-Bot 1.0, described here is small in size, lightweight, actuated by a microcontroller, and thus automated functioning. Additionally, it is low-cost and easily constructed. The sampler exists with an auger to drill through the soil and a sample container to collect and store the soil. The ASC-Bot consists of an RF remote controller and a GPS cracker which ables it to function remotely. Additionally, it is enabled with an automated path-finding and sample collection function (Auto-mode). The automated path-finding function was developed by combining the GPS and an obstacle detection system with 05 ultra-sonic sensors and an impact detection mechanism. The auger unit has sensors to detect drill depth and obstructions or clogging. This Auto-Mode enables it to move between two given locations on its own, and collect the samples. ASC-Bot is able to react to signal lost, automatically switch between manual (remote-control) to auto mode function to complete the task.

Group Members:

- A. A. N. V. S. Amarasinghe (Group Leader/ Corresponding Author)
- L. S. Lakmali
- T. D. Wanasinghe
- M. G. D. M. Jayatathna
- D. M. N. K. Dissanayaka

GLUTEN-FREE CUP-CAKES FROM SELECTED **TRADITIONAL YAMS OF SRI LANKA**

D.L.S. Kalhari, G.D.M. Gunasekara, I. Wijesekara, I. Wickramasinghe

Recently, there is a leading trend in the bakery industry to develop gluten-free bakery foods. In the present study, gluten-free cup-cakes were developed from selected traditional yams (Dioscorea spp.) including "Mahaangili ala" and "Raja ala" flours for the first time in Sri Lanka. Three different plant-derived food gums such as pectin, guar, and xanthan gums were used to improve the texture of cup-cakes and the control was developed with wheat flour only. The developed cup-cakes have been tested, compared, and proven for acceptable physico-chemical and sensory qualities. The cup-cakes processed from traditional flours, is commercially viable and these contain no added synthetic food additives like colours, preservatives, and flavours. Collectively, this study suggests that "Maha angili ala" and "Raja ala" flours could be potential sources to develop gluten-free cup-cakes in the bakery industry.

"Maha angili ala" ***Dioscorea alata***

Gluten-free Cup-Cakes

STYLEME: VIRTUAL DRESSING ROOM

There is a constant battle among the fashion industry and clothing shops to introduce new fashion to the community, however, in practice, an average citizen would have limited time to spend on a particular shop with the busy schedule of today life. As an attractive solution, the concept of virtual dressing provides customers to simply choose the clothing they wish to buy and virtually put it on to see if it fits. The virtual dressing concept essentially measures ones physical parameters using a depth sensor and sketches the basic skeleton. Then it chooses the correct clothing size and offers customers a variety of fashion available. So, the customer can virtually dress them.

The StyleMe: Virtual Dressing Room is an augmented reality virtual dressing room for real-time 3D clothes simulation. Microsoft Kinect V2 RGB-D sensor was used as the depth sensor for non-contact customer body parameter measurements including 3D measurements such as perimeters of chest, waist, hip, thigh, and knee. The developed VDR system measures relevant body parameters for dressing and identify the gender according to the customer's face features. Then the dresses are filtered according to the gender-based cloth size category in the retailer shop. In order to visualize and overlay the filtered 3D cloths on the customer in real time, Unity3D game engine was incorporated. The developed system gives a realistic fitting experience to customer by successfully appending the physics animation to the dress according the movements made by the user. The concept of a virtual dressing room is not practiced in leading clothing stores in Sri Lanka. Therefore, the outcome of this work will have a benefit to the industry and have a very high potential to market.

The team Members comprised of A.M.S.B. Adikari, W. K. I. L. Wanniarachchi of the Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, N.C. Ganegoda of the Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, and G. Meegama of the Department of Computer Science, Faculty of Applied Sciences, University of Sri Jayewardenepura.

DEVELOPMENT OF A SEAWEED BASED SNACK FROM SELECTED **SEAWEED VARIETIES IN SRI LANKA**

Sri Lanka is rich with an abundant growth of seaweeds. Due to the lack of awareness of health benefits of seaweed consumption it is an underutilized marine resource in Sri Lanka. Thus the research aims to develop a seaweed based snack using seaweed varieties to popularize seaweed consumption in the country. Preliminary studies revealed Ulva fasciata as the best source to be utilized in the development of the snack. Ulva fasciata samples for the study were collected from Matara, Sri Lanka (Latitude: 5°56'53.74" (5.948262) north and Longitude: 80°28'17.71" (80.471588) east). The snack was developed by enhancing the flavor of the Ulva fasciata sheet which was developed by traditional the nori making technique with mushroom, garlic and chili extract which is appealing to the Sri Lankan taste. The study resulted a processed snack with L* a* b*values 29.28 + 1.14, -6.16 + 0.25, 12.52 + 0.81 respectively and a hardness of (g) 17.50 + 6.45. The moisture content (%), total fat content (%), protein content (%) and ash content (%) of the snack was determined according to the AOAC procedures and resulted 12.52 + 0.48, 0.26 + 0.042, 19.18 + 0.53 and 13.91 + 0.46 respectively. Total carbohydrate content (%) was analyzed according to the Dubois method and recorded as 9.48 + 0.14. The arithmetic difference was taken to determine the total fibre content (%) which was recorded as 44.64 + 0.23. The elemental composition of the processed snack was determined by X- ray fluorescence elemental analysis. The results recorded a significantly high content (ppm) of Calcium 13700 + 707 in the processed snack. As the final outcome, a nutritious seaweed snack was developed.

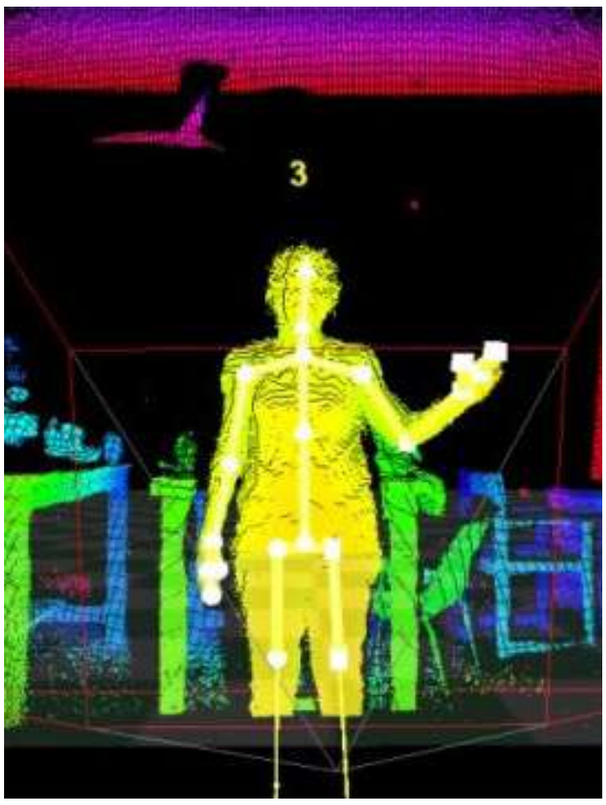
The team Members comprised of Mayushi Malshika Jayakody, Isuru Wijesekara and Mihiri Vanniararchchy.

VAGO SMART HOME: **HOME AUTOMATION SYSTEM**

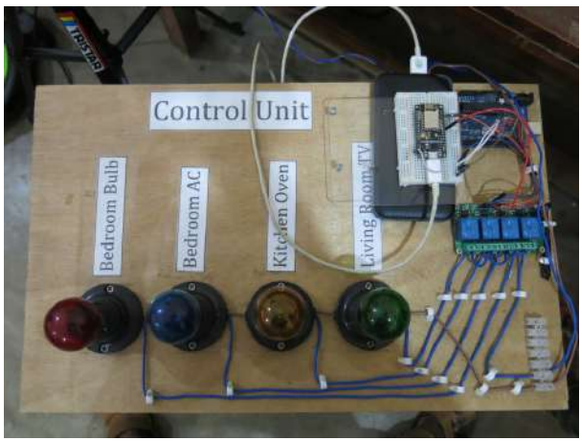
Due to many reasons like the aging population and chronic health conditions, the rate of disability has been progressively increased. Oftentimes they require special care and some assistance to perform their own daily routine. Thus, it is the responsibility of us as global citizens with capabilities to contribute to making a better and easy life style for them as well. As a solution, we developed an integrated system to the people who find themselves unable to spend their life without any external aid and bring them the ability of controlling home appliances by giving a value to their existing abilities.

Basically, the developed system has two gateways, where one of them is dedicated for voice mode and the other one for gesture mode which empowers the user to govern the electrical appliances at home. Hence, we called it VAGO (voice and gesturer operated) smart home. People who have hearing and speaking disabilities can avail the system as a gesture operated system where it employs gesture recognition. People with physical disabilities can manipulate it as a voice operated system which utilizes voice recognition. Administrator or any user who is registered with the system under the administrative environment is rendered the access into the system through face recognition. In addition, a wireless computer networking system which is fabricated in one unit called remote module plays the major role of communication between central unit of the system and appliances.

This developed system is built upon the sensor device Microsoft Kinect and it utilizes IR for capturing. Thus, the system functions at home and is also beneficial at any time during the day despite the lighting condition in the room. Moreover, it contains independent deployable wireless remote modules and user will experience a convenient installation as it does not require to rewire the house.



Team Members comprised of K.A.S.V Rathnayake, W.K.I.L. Wanniarachchi, and N.G.S. Gamage of the Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura and P.R.S. De Silva of the Department of Computer Science, Faculty of Applied Sciences, University of Sri Jayewardenepura.



Solar Water Heater

The current energy demand is catered by the utilization of fossil fuels. They are non-renewable energy resources with a high cost and is environmentally hazardous. Due to this reason, scientists researched and introduced the use of environmental friendly renewable energy resources. As a result, a huge attention was received on the utilization of solar energy during the past years. Solar energy is used to perform work by converting it in to many energy types. One such valuable conversion is heat by solar radiation. An advantageous utilization that is obtained from this energy is heating water. There are several methods of heating water as used in many types of water heating systems. This project focuses on the designing and construction of a solar water heating collector panel with a low cost. As an additional objective, the efficiency of this design is also examined.

This project developed a novel method by using all types of heat transferring methods which are conduction, convection and radiation. The design is developed by modifying the traditional flat plate collector and using materials that are readily available in the market. Therefore, we were able to reduce the cost easily. Further we have reduced the size of the solar collector panel by half considering to introduce this product for the heavily populated areas. The commercially available flat plate collectors use natural thermosiphon flow to transfer the heat. However, we have used the forced convection method to increase the heat transferring rate. This new design suggests a method to harvest the wasting radiation losses. The proposed solar water heater system can be used to obtain hot water up to 60 °C and is suitable for tropical countries like Sri Lanka.

Team Members.

- Mr. D.R.Ratnasinghe (USJP)
- Dr. Lilani Attygalle (USJP)
- Dr. Dinesh Attygalle (UOM)

DESIGN OF A LOW COST PROTO TYPE **SOLAR DRYER TO DRY SEAWEEDS**

Seaweeds are rich in micronutrients and can be used as important commodities for food or food additives. One of the popular seaweeds, Gracilariya edulis, contains carrageenan that can be used as a substitute for gelatin. Nowadays in Sri Lanka, the importation of dry seaweed has become popular, however due to the poor quality of dry seaweeds; seaweed farmers get less value for their seaweeds. In order to solve this problem, a low cost solar dryer which could dry seaweeds at an optimum condition with a slow drying rate was needed. The solar drying system is one of the most important applications of solar energy systems in tropical and subtropical countries. There are several types of solar dryers that are automated and meet technical and economical requirements. A solar dryer was constructed to dry sea weeds at optimum temperature without quality degradation.

The main components of the constructed hybrid solar dryer are solar collector, drying chamber and solar PV cells to power the control panel and an exhaust fan. The optimum temperature of the drying chamber is maintained at 550C which is an optimum drying temperature for high quality seaweeds. When the temperature becomes above 550C, the control panel will turn on the top exhaust fan. It will operate until the temperature reduces to 550C.The display board of the control panel shows the current operating temperature and relative humidity.

The light intensity of the solar collector is directly proportional to the temperature of the drying chamber. The moisture content of the seaweed sample and relative humidity of the drying chamber are inversely proportional to the temperature of the drying chamber. The initial moisture content of the seaweed sample is 79.32% (moisture analyzer) and the final moisture content of the sea weed sample is 13.94% (moisture analyzer) respectively. The optimum temperature in the drying chamber is 55°C. The optimum drying temperature of solar dryer and oven dryer are 55°C and 65°C respectively while the sun drying temperature is approximately 35°C-45°C.

Proximate analysis was done to compare the nutritional composition of the sea weed sample from three drying methods. The nutritional value of the solar dried sea weeds was almost the same to the oven dried sea weeds and superior than the sun dried sea weeds. The protein content (4.17%) and the moisture content (13.69%) of the solar dried sea weed sample are almost the same to the protein content (5.08%) and moisture content (12.67%) of the oven dried sea weed sample.

Thus as the final outcome an eco-friendly solar drier operating with 100% solar energy was developed and the quality of the solar dried sea weeds was almost same to the oven dried sea weeds and superior than the sun dried sea weeds.

Team Members

- Y.M. Samith Maduwantha Yapa
- Isuru Wijesekara
- Mihiri Vanniararchchy

COMPANY REGISTRATION IN SRI LANKA

Exito Global Holdings (Pvt) Ltd

Exito Global Holdings (Pvt) Ltd is a registered private limited company which provides all kinds of Business Development Support Services under 6 main titles to the businesses in Sri Lanka under the trademark of BizGuard. Company registration is the main service provided by then within 7 working days for the new business start-ups under the lowest cost in Sri Lanka. If a business wants to obtain a bank loan or an investment, definitely they should have a business plan. they are ready to provide a Business plan preparation service to their customers too. Bookkeeping and Accounting is another special service provided by then to identify the financial performance of businesses based on their requirement. It is compulsory to conduct annual audit and pay taxes for a business. Therefore, they provide Auditing and Taxation services to the businesses. Furthermore, individuals can obtain the taxation service from then as well. Another important service they provide is the Management system development which helps businesses to minimize the frauds and errors via optimizing the management process. Furthermore, they support businesses to combine with modern technology to increase their revenue such as with Social media marketing, Web development and Mobile application development. Additionally, the businesses can obtain business loan facilities and leasing facilities via then for business developments from reputed banks and financial institutions in Sri Lanka. If you need further clarifications, please contact then via info.exitoholdings@gmail.com

S. A. S. S. Perera

HYBRID GEAR SHIFTING **BICYCLE**

Rear gear mechanism

Staff Coordinator: Dr. M.H.V.D.Y. Mudunkotuwa

Team Members: Mr Y.S Ratiyala, Mr B.C Budhdhika, Mr K.N Auranga, W.M.G.P Jayarathna, Mr M.K.D.T.M Sathischandra, Mr Prathap Jayasooriya

Faculty: Faculty of Engineering

There is a global trend in the increased usage of bicycles in commuting as a low carbon transport solution. Some cyclists prefer manual gear shifting while the others find it difficult to operate such a system. The latter, lacks the understanding of gear shifting according to the terrain. To facilitate both types of cyclists, a hybrid gear shifting mechanism is proposed. This system incorporates both manual and automated gear shifting mechanisms making this product appealing to a wide range of cyclists.

Even though manual gear shifting bicycles and automatic gear shifting bicycles are available in the market, there is no such product that allows having both systems. This product can be economically manufactured by using a structure of a regular bicycle with the proposed hybrid attachment. This gear shifting mechanism will be further developed as a separate attachment that can be conveniently assembled to convert a manual gear shifting bicycle in to a hybrid gear shifting bicycle.

SMART ROOM CONVERTER

Through the project of 'Smart Room Converter', their intention is to familiarize the smart room concept to the common society and make it feasible for common use. Their mission- 'Make the life smart' states the purpose of the project very clearly and briefly. While the "smart home" concept is growing in the international market, this concept is relatively new to the Sri Lankan community. Being unaware of modern trends, limited authorized sellers, and high costs are some of the reasons as to why Sri Lankan people are still reluctant use smart home devices. Most of the smart home devices that are available in the local market are brought down by online sellers from foreign countries and sell at exorbitant prices. In most instances, these products do not comply with local standards. Further, the instructions are often written in foreign languages and, therefore, the local buyers find it difficult to understand and setup these devices.

Therefore, the purpose was to produce a device to convert the existing appliances to smart ones, which would then negate the necessity to purchase an alternative smart device. One of the major intentions is to make all the levels get familiar with this smart home concept through this device. The Smart Home concept is a huge step forward in the world and energy efficiency will have a positive remark together with this, accessibility, safety, and cost effectiveness are the achievements which we can gain. Therefore, implementing the proposed item leads the society to familiarize themselves with this concept and through this, there are lots of benefits that can be directed towards the Sri Lankan economy as well as the Sri Lankan life style.

Basically, the designed device is a plug and play universal device, which indicates that the device would be manufacturer independent and can be used with most devices. Furthermore, it was produced at a reasonable cost. The local community can then purchase this device at an affordable price and convert their current appliances into smart devices. It is controlled by radio signals via WIFI networks. The smart features of the connected devices can be controlled by an application installed in the mobile phone named 'Shake it'. They also use gestures to control the connected devices through the IR rays emitted from the mobile phone. At the first stage they successfully established this to the devices that are very common items in a room like lights, fans etc.

Group Members:

- S.H.S. Kavinda
- K.K.D.D.P. Jayasuriya
- I.M.S.U. Illankoon
- W.K.A.M.K.K. Arthanayake
- K.A.D.L.D. Randika
- R.A.G.B. Pemasiri
- D.P.B. Athapattu
- H.M.J.J. Bandara

DRONE DELIVERY SYSTEM

Staff Coordinator: Dr. M.H.V.D.Y. Mudunkotuwa, Team Members: S.J.M. Sinhapura, W.A.A.C.S. Weerasooriya, A.P.M.M.L. Wijesinghe, W.M.K.N.B. Weerasinghe

This is a project which is based on autonomous navigation of drones, this project intends to support disaster management systems. Specifically, this could be used to deliver food and other essential items to the victims who are trapped in homes due to floods that are frequently occurring in Sri Lanka.

To use this system, users only need a mobile phone with a preinstalled application to send a command to the drone. Then the drone automatically connects with the user through the internet and automatically finds the users live location. Then the drone autonomously navigates to the user's location and delivers the required item to the user securely avoiding various obstacles. Once a delivery is made the drone can deliver to the same location without having a connected mobile phone.

This system contains three parts

1. Drone
2. The Application
3. The Server

The data processing of the drone is executed by a 32-bit microcontroller. The drone contains various sensors such as gyroscope, accelerometer, barometer, GPS module, GSM module and a network of ultra-sonic sensors to keep the drone stable. The Drone is connected to the server using a GSM module that transmits the location [Longitude & Latitude] and the altitude of the drone which is in the maneuver.

The application has to be installed on a mobile phone. The User can connect to the server and acquire the details of the live location and the altitude of the drone. Users are also able to see the current location of the drone in the map of the application using the obstacle avoidance system. The drone can land on the ground securely and efficiently.

AGRO ROBOTICS FOR AGRICULTURE

This project is aimed at people who live in highly urbanized areas and have very little leisure time outside of their work life. Their miniaturized automated aquaponic system and greenhouse solves the problem of space that is quite essential to grow a garden, provides fertilization, and requires minimum attention to manage. This allows people to grow a beautiful garden right inside their homes without having to worry about managing and taking care of it, while also ridding them of the need to sacrifice much of their living space. Moreover, people have the opportunity to grow healthy, fresh, and non-toxic vegetables right in their homes which can be used for their daily consumption.

An aquaponic system uses the waste produced by farmed aquatic animals to supply nutrients to plants that are grown hydroponically, i.e. using mineral nutrient solutions in a water solvent instead of soil. Such a system is the basis of our product. The mini greenhouse is automated to provide the plants inside with the required environmental conditions. Up to five types of plants can be grown inside the greenhouse at a time, and the nutrients necessary for the plants to grow will be supplied through the aquaponic system. The two systems are installed alongside each other and work parallely.

Team Members

Directors

- J. A. Aravinda Jayakody
- R. M. D. D. Rathnayake
- Sandalu Pabasara
- M. J. M. S. Prera
- V.T. A. Dinushangi
- G. R. N. A. Gamlath
- K. I. D. Fonseka
- M. P. S. De Soyza

Junior Board

- Tharindu Prasad
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- Nipun Herath
- Rasindu Buddhika
- Dimuth Chathurdhi
- Aruni Nisansal
- Chathushka Jayarathne
- Vihanga Kalansooriya
- Lahiru Madhuranga
- Randula Wijayasundara
- J. A. Aravinda Madhubhashitha Jayakody

CNC WRITER

The CNC WTRITER is a portable machine which uses G-code based CNC technology. It can draw any image on any surface. First the image should be inserted into the G code generator software (which is available as free and open source). After the G code file simply save on a SD card as a txt document, the secure digital (SD) card is inserted to the SD card reading module of CNC machine. The entire task the user has to do is that. CNC WRITER can draw the image saved in SD card in a two-dimensional area on whatever surface the CNC machine mounted.

The novelty of this product is that it can draw images beyond its physical limits because the machine can move forwards or backwards by its wheel. After completing the area that the axis of machine can reach (approximately the area is 297 × 210 mm as same as size of an A4) it will let the user know by a buzzer. Then it should be moved 297 mm to forward. After moving, it can draw the rest of image. That is a procedure in brief.

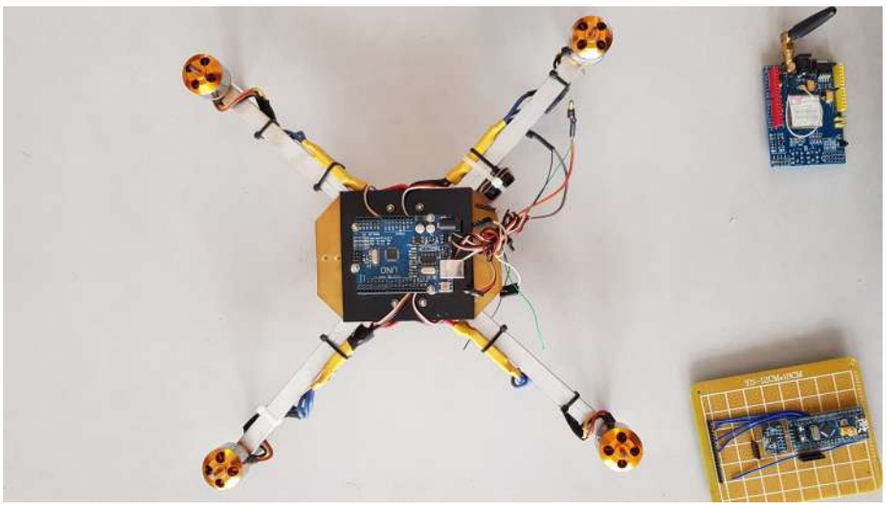
Though the header of CNC writer can be changed according to the application such as marker pen, pencil or a cutting tool, the CNC writer is specially designed for garment factories. So the machine has a fabric marker as the header and it can be changed. The machine can easily draw a large size of development on any fabric. So the employee who is cutting and stitching the fabric will have an accurate development. Thus there is no need to measure each and every part of the sample design and draw it manually or purchase large printers which are highly expensive. Not only for textile but also leather sheets, heavy flannel fabrics or polymers and anything that cannot be entered in to a usual printer machine, can be drawn with the CNC machine. It is commercially profitable. The CNC machine can do its task while the employee is cutting the part just finished by the CNC machine, so it is efficient. Especially a CNC machine can be manufactured by a comparatively less cost than printers.

There are some drawbacks in the prototype product of CNC writer. First, the machine cannot be operated for a long period because the stepper motor driver (we usedA4988 which is cheap than other drivers) can burnt ou. Secondly, they used a plastic chassis with dc motor to move the machine but it is not highly accurate to the millimeter.

Team Members

- Mr. A.P.G.D. Chamika
- Mr. M.M.P. Fernando
- Mr. R.A.T. Pasan

FIX THE CIRCUIT
VIRTUAL REALITY PLATFORM FOR LEARNING ELECTRONICS



The concept of virtual reality (VR) is always associated with a fantasy feeling as it allows users to experience a computer generated environment with sounds and videos. VR headsets have been used mainly for computer gaming and is immensely popular among the younger generation. The main objective of this project is to incorporate the VR concept for educational purposes where students can enjoy learning in a fun way.

In this project "Fix the circuit", the simulated environment consists of two parts which are learning and gaming. The learning part introduces different components of electronic circuits (resistors, capacitors, etc) and use of those in a circuit. The gaming part allows students to choose these components to build the desired circuit. Therefore, learning electronics can be done by building the circuit and visualizing it. After all, according to many studies conducted, in general we remember 10% of what we read, 20% of what we hear, 30% of what we see, 50% of what we see and hear and 80% if we personally experience. Therefore, with VR based educational tool it is clear learning will be more effective as it allows students to hear, see and more importantly allow them to personally do it.

The key feature of this project is "Fix the circuit". The project is a hands-on experience on building electronic circuits virtually, as the system is controlled using hand gestures using suitable motion sensors. The system developed under this project has applicability in many areas in Science and can be used as an attractive tool to popularize Science among school children. In this context the program can be translated to the Sinhalese language in the future and customized as a 'virtual laboratory' that is aligned with the national school curriculum.

Team Members

- R. A. Rathnayake, S. Jayawardhana, P. K. D. D. P. Pitigala, W. K. I. L. Wanniarachchi*
- Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura
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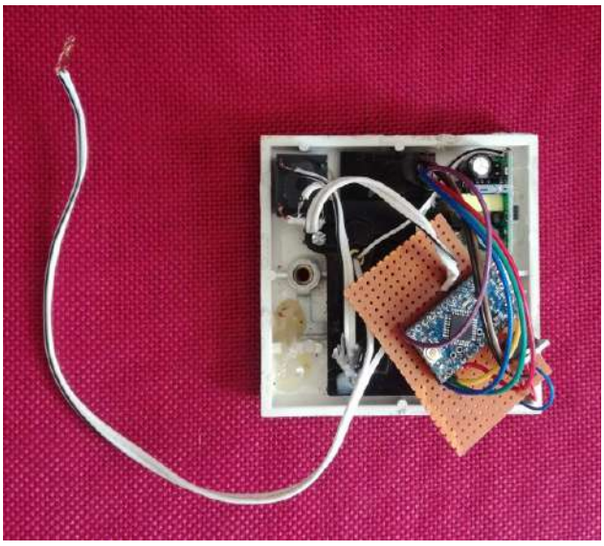
- Instrument Center, Faculty of Applied Sciences, University of Sri Jayewardenepura

HOME AUTOMATION **ON A BUDGET**

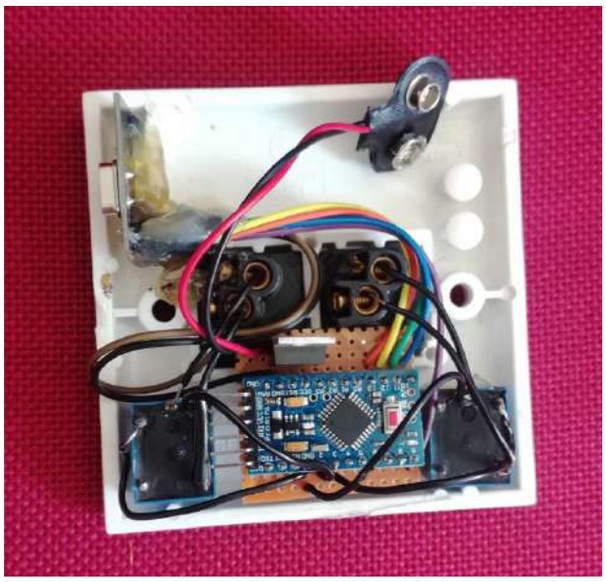


The main objective of this project is to develop a home automation system at an affordable price. The home automation systems available in the market today, are costly and another major disadvantage is that they are difficult to be installed to an existing wiring system in a building. To overcome these difficulties, they have developed a home automation system which consists of a modified gang switch and a smart plug which are based on Arduino microprocessors. This system is available at an affordable price and it can also be easily replaced with an existing wiring system. In addition, this system makes controlling the appliances easier especially to the handicapped and old aged people. When the system is installed it allows the user to control home appliances using an android application and the communication between Arduino microprocessors and the android mobile device is established via Bluetooth, which allows the user to control the appliances within a certain area.

The key components of this home automation system are the smart plug, the modified gang switch and the android mobile application. The smart plug has been developed in a way that any device connected to it such as a fan, TV, computer system or an air conditioner etc. can be switched on/off by using the mobile application or manually. The gang switch has been automated by using relays and they are controlled by signals from Arduino microprocessor in each unit. A conventional switching mechanism is also available to bypass the relay in case of a failure. The android application is capable of working with both voice commands and fingertip commands. As it is password protected, only an authorized person can use this application.

Group Members:

- Thushara M.A.D.K
- Bandara R.G.L.R
- Wijesekara W.A.C.H
- Shalindi K.A.A
- Samaranayake C.N.J
- Samarasekara M.C.D



PRESEEKER
AN EFFECTIVE ELEPHANT TRAIN COLLISION PREVENTION SYSTEM

Image of a designed and manufactured pole:

The Sri Lankan elephant which is native to Sri Lanka holds immense cultural value and is a huge tourist attraction to our country. However, because of many reasons the Sri Lankan elephant has been under threat for many years and is declared as an endangered species. Every year on average 10 elephants die due to train collisions. 'Preseeker' is an effective elephant train collision prevention system which works by detecting elephants beforehand and taking necessary steps to avoid accidents.

Most of the elephant-train collisions occur in the Eastern railway line at elephant passes where the railway track lies for about 30 km. Although there are solutions taken for this problem, still many collisions have occurred in the recent months. The current system used by the Sri Lankan Railway Authority has many drawbacks which were identified and considered in developing the proposed system-Preseeker. The current system uses an infrared thermal camera which is fixed on the locomotive whereby the elephants are detected by observing the images. However, this is not very effectual because although the elephants were detected and decelerated the train, the time for the fast moving train to stop without colliding is insufficient. Elephants get scared and stay still even when the train horn is used. Therefore, it would not support this either. Also, the camera is not able to capture the railway track at bends which makes the system highly ineffective at bends.

Preseeker consists of an array of poles which are fixed at either sides of the railway track, a base station and a prevention system at the locomotive. Three passive infrared sensors in the pole will detect an elephant or a herd of elephants and inform the base station. The system can identify whether it is an elephant or a herd and indicate the risk level. This will be transmitted to a range of 1 km where if a train is there, it will receive the signal and slow down. At the same time an alarm will get activated to alert the engine driver. Elephants are scared of the buzz of the bee. Therefore, an amplified buzzing sound will be emitted from the engine which would be used to scare off the elephants. To power the poles solar power is used which would be effective as those areas are sunny. Poles and all the other instruments are enclosed and are water proof. An active monitoring system is implemented to monitor the poles in two ways. They can be checked manually and also by sending an SMS to each pole from the base station.

Preseeker can be the perfect solution to the current elephant train collision problem in Sri Lanka. This would save the lives of elephants and the beauty of Sri Lanka which would create a positive influence to the current economic condition of Sri Lanka.

Team members:

- B. U. Kumarasiri
- M. A. D. K. Thushara
- W. M. S. G. Wanninayake
- R. G. L. R. Bandara

EA SUSTAINABLE GREENHOUSE **DESIGN FOR HOME GARDENS**

A greenhouse is a building where plants are grown under a controlled micro environment. The building cost and the maintenance cost of a greenhouse is very high. In the present situation there are many types of greenhouses and poly tunnels. But all of those are designed for commercial scale farmers and small farmers. Normally greenhouses are not used as home gardens. The technical knowledge about greenhouse is less among the normal people. Specially, in the low country, the people cannot produce their own food from their home gardens throughout the whole year. It is difficult to maintain a continuous food supply from home gardens. A high amount of renewable waste is released from households daily. To the environmental pollution the contribution of the household is very large. There is no suitable greenhouse design for small home gardens. The main objectives of this structure are - Create an attractive System for growing vegetables in home gardens, Growing vegetables throughout the year, Provide healthy vegetables for residents, Provide easy management & small growing system for busy people, Turn the home waste for usable type, Improve the douche satisfaction of stress people, Assemble agricultural knowledge disseminated. It is helped to grow fresh organic vegetables. The importance of this structure are - all In one gardening place, reduce the effect of adversely weather conditions, increase the plant protection from serious infestation of seasonal pests, all season garden, great garden design. This is not a fixed structure. It is a mobile structure. It is like a package. Any person can fix it very easily. A greenhouse requires us to make an initial investment, but the money we spend is well worth it in the long run. The cost of this greenhouse is Rs: 30000.00. If a family buys vegetables of Rs: 1500.00 weekly, they have to spend Rs: 30000.00 within 20 weeks. If they build this type of greenhouse structure, they can provide for their own food throughout their life time. If we can introduce this type of greenhouse structure to our people we can increase family income as well as food production.

Team member-

- T. G. Chathura Madusanka

Author

- T. G. Chathura Madusanka

SMART VILLAGE

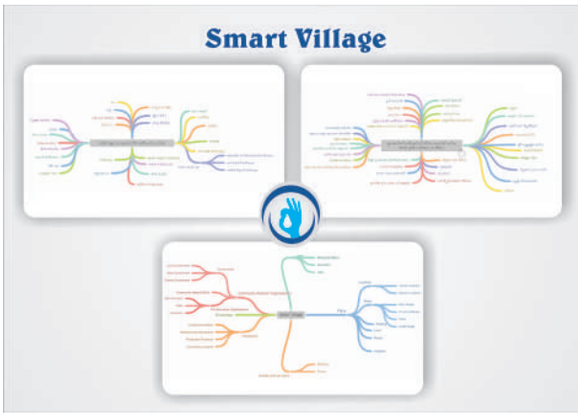
(Introducing a digital and Ethical Framework for Development)

The total number of villages in Sri Lanka is 14044. It is clear that, Sri Lanka is a country of villages, where the development of the nation significantly depends on the progress of the village. A village is the smallest administrative unit in Sri Lanka and were formed for effective decentralised governance. The evidences of these decentralised governing bodies are found in the pre-historical period up to the modern age. Chapter 10 (The consecrating of Pandukabhaya) of Mahavamsa reveal that King Pandukabhaya of Anuradhapura (474BC-367BC) established an organized system of governance; as well as introduced a post-called "Nagara Gutthika" (Guardian of the city). In addition to that he ordered the demarcation of all the villages in the island in his tenth year of reign. He was the first king to do so. During the colonial period the European colonial administrators appointed native headmen or leaders to function as intermediates between the native populous. After independence, Sri Lanka has introduced several national level programs to develop and enhance the economy and social status of village life. However, we are yet to see a fulfilment of these objectives. This cannot be realised unless we attempt to identify the root causes of these problems. This is because our attention is focused more towards the physical infrastructure rather than the human resources. Therefore, it is clear that an ethical focus to these problems remain unaddressed. Further, we have not introduced any system to evaluate the ethical background behind the community development programs and services. Therefore to achieve development we have to formulate an ethically fare environment based on professionalism within our community work.

Prior to the development in a village it is necessary to have a strong ethical system that is transparent irrespective of whatever project is to be implemented in that community. It is the readiness and the development of moral consciousness in that community that is important. This community morality will make a strong foundation for community development. A village consists of thousands of jobs as well, hundreds of institution and organizations. The ultimate purpose of these relationships is the development and enhancement of the living condition of the village people. So then, it is necessary to have a common ethical platform that can be applied for community development. Therefore, you need to identify the scale of ethical practices in the village day today activities. Therefore, to measure the scale of ethical practice within the village transaction, professional relationship and other services should be produced in a digital platform. This can be used by individuals and groups to measure the ethical status of their village and its services. You can use our system to measure 6000 jobs based on your village development and its ethical and professional involvement. As well as this, ethical audit can be applied to 30 major subject fields in your village setting.

Author :

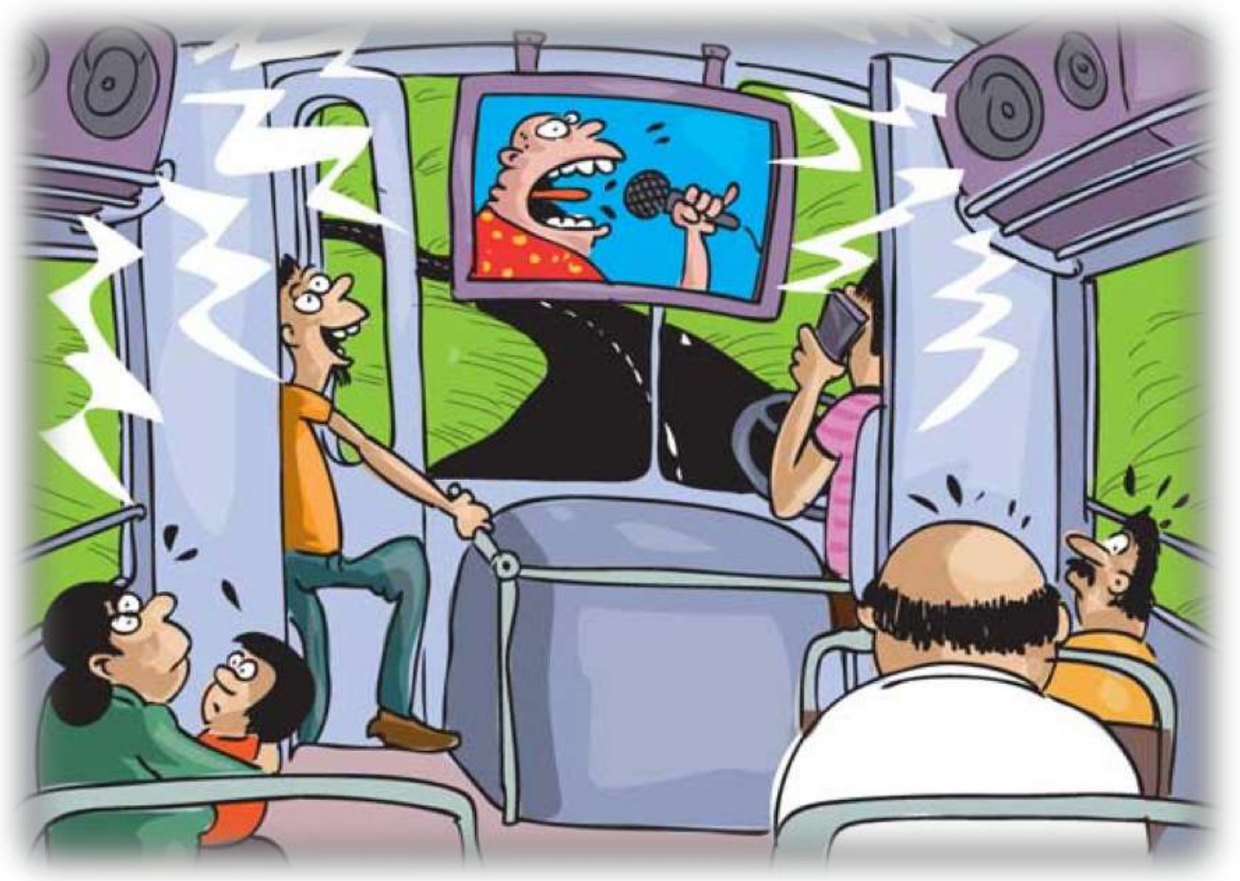
- Dr. Ratugamage Asha Nimali Fernando
- Mr. Sanjeewa Senarathne
- Murangani Karunarathne
- Hansika Mediwaka
- Osani Pitadeniya
- D.B. J. De Silva



OUTDOOR TELEVISION **NETWORK**

Created by W.S. Sanjaya Lowe

Problem and solution



Problem Worth Solving

Busses are the main and jaunt internal transport medium in current Sri Lanka. Within the past few years a number of complaints from passengers of busses can be seen and most of them are regarding the unnecessary music and other programmes that are aired on those busses. According to those complaints, the Sri Lanka Transport Board has taken action from the 1st of March 2019 where every bus should obtain permission before telecasting anything on the busses. But with my study I have identified that even with those rules and regulations the issues can still be seen. When we pitch the broad area of this issue, we can identify there is no suitable and absorbable media which is specially created for passengers and public areas.

On the other hand, the main and dynamic issue when we study about outdoor advertising media is the environment pollution and the productivity of the media. In Sri Lankan urban areas, the main outdoor advertising media can be seen as Leaflets, Handbills, Posters, Cut-outs and Banners. All of

them lead to increase the garbage issue in urban areas and badly affect the town elaboration too. Apart from that the Bill boards and LED screens which have been placed in high places in urban areas, they directly affect the town elaboration and indirectly affect to increase accidents. Even though the government and administrative parties come up with different solutions we can't expect proper solutions without having the most appropriate alternative outdoor advertising media.

Another issue identified is the lack of the effectiveness of using these traditional outdoor advertising Media. It means there is a significant gap between the Cost and Reach level of people. Internationally and globally people used to communicate and advertise via the internet because the cost of using that media is relatively low and the reach level is higher than others. It represents 37% present from global marketing Medias due to the ability to clearly identify the Reach and Views. There for again it proves by this fact that society need alternative outdoor advertising solution.

When we come up with the solution for these factors there is a high need to be practical, and one should be concerned about the social and cultural needs and wants and should have an appropriate analysis about technical needs, whilst showing concern about the potential internet abilities.

Solution

After analyzing these, I have come up with this solution as New Outdoor Television Network. It is a collection of normal TVs' which is placed in crowded areas in urban areas. Special telecast Software which has been developed by me, can be used to connect the normal TV's and can control the telecasts of the normal TV's by the main computer. That main computer can organize the programmes which should be telecast by the normal TV.

Problem identification for this outdoor television network is the passengers inconvenience with unnecessary music and other programmes which have been telecast by busses. Thus we mainly focus on the TV's in busses to connect that controllable software, and then without any effect on the drivers and conductors, the passengers can enjoy the suitable programmes which have been arranged by the main computer. To take this project to a more reliable and practical level; we are supposed to give an approximate 2000-5000 monthly salary to the drivers to join this outdoor television network.

For the crowded public areas like super markets, shopping complexes, restaurants and banks, accordingly these aspects can be organized to telecast suitable music and programs.

The use of the traditional advertising media such Leaflets, Handbills, Posters, Cut-outs, Banners and the LED screens can be easily replaced by this network, and then we can overcome the problem of the less effectiveness of using TV, Radio, and Internet. The reach level of the community can be addressed by placing these Televisions in crowded areas. To certify the level of reach, it can be done by using the data survey which is supposed to be done by a reliable third party. Then it would be more reliable and transparent.

EX - to calculate the reach level inside the busses, we can used the data which is maintained by the Sri Lankan Transport Board.

This identified solution for the above mentioned problems express a more practical solution. I have

planned to start this project as a new innovative business successfully. I hope to implement all these steps with help and under the supervision of the relevant government authority parties.

Objectives

- Make people happy and increase knowledge when people are walking or travelling outdoors.
- Increase the passion of eco marketing concept outdoors by providing environment friendly advertising infrastructure.

Television Network

The Network is a combination of TVs' which have been connected with a special mini pc. I have created a software for playing videos and running essential functions on TVs' which are required to implement the whole project. Functions of each TVs in networks are as I have described below,

- Automatically run software when mini pc and screen switched on.
- Administrators can manually change the time of playing educational, entertainment and advertising videos.
- Screen shows, the date and time - between every 30 minutes.
- When videos are playing, the spectator can view, on the corner of the screen the remaining time for changing advertisements and other clips amongst each other.
- Automatically the volume is balanced when videos are playing educational programmes and advertisements.
- The Admin can get a report about the broadcasting status and time of playing in each video.

Entertainment and educational programs

He has selected a few videos as media to achieve our purpose. According to this, we have discussed with you-tubers who are creating educational and entertainment clips for play on TV Screen Networks. You-tube channels which have selected to play on network are listed as follows

NODUTU LOKAYA

About

අප ජීවත් වෙන ලෝකයේ සිදු වෙන සිදුවීම් සියල්ල එකම තැනකින්.

Categories

Education

WISHMA LOKAYA

About

ලෝකය ගැන විශ්වය ගැන අලුත් දේවල් දැනගන්න ආස හැමෝටම.

Categories

Education

Songs

Under this project we hope to display Sinhala songs with acoustic music and other suitable Sinhalese songs. As for the project plan, we hope to display the photos of the singer, lyric writer and the crew during the song to show our respect for the great production.

DEVELOPMENT OF AN ANTI-ULCER ORAL CREAM **USING SESBANIA GRANDIFLORA ("KATHURUMURUNGA")**

Sesbania grandiflora belonging to the family Leguminosae commonly known as "Kathurumurunga" (hummingbird) is often planted for its edible leaves and flowers in Sri Lanka. It is believed to have originated either in India or Southeast Asia and grows primarily in hot and humid areas of the world. All parts of Sesbania grandiflora are utilized for medicine in Southeastern Asia and India including preparations derived from the roots, bark, gum, leaves, flowers, and fruit. In folk medicine it is resorted to be aperient, diuretic, emetic, emmenagogue, febrifuge, laxative, and tonic. Medicinal uses of Sesbania grandiflora is numerous ranging from a laxative to anticancer properties. It is a well-known for curbing anxiety caused oral and gastric ulcers. Condition of 'Apthos Ulcers/Recurrent Apthos Stomatitis (RAS)' is benign and self-limiting and it is a major cause for loss of quality of life. The present study was aimed on developing a local/oral liquid remedy to cure and control oral apthos ulcers. The plant species Sesbania grandiflora was purchased from local market and preparation of aqueous and ethanolic crude extracts were carried out using standard protocols. The plant powder was used for further analysis. Qualitative photochemical studies revealed the presence of Alkaloids, Carbohydrates, Phytosterols, Saponnins, Tannins and Flavonoids. Standard cytotoxicity studies proved non toxicity of the crude extract. Detection of Tannins and Flavonoids confirmed the effectiveness of Sesbania grandiflora on antiulcer activity since those two compounds are the key agents responsible according to the literature. Clinical studies from the product 'oral paste' are on progress. So far, no similar product has been advanced in Sri Lanka. Therefore, this will be the first to develop an anti – ulcer cream using Sesbania grandiflora.

Team members:

Dr. Chandimal Alahakoon, Department of Family Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura

Dr. Chandima Jeewandara, Department of Family Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura

Prof. Pradeepa Jayawardena, Department of Pharmacology, Faculty of Medical Sciences, University of Sri Jayewardenepura

Ms. Chandrika Rajapaksha, Department of Ayurveda, Maharagama.

Corresponding author:

Dr. Chandimal Alahakoon, Department of Family Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura

PRODUCTION OF TIO2 FROM ILMENITE BEACH SAND WHICH IS ENHANCED **THE ACID REACTIVITY BY ROASTING WITH ZNO/ZNS**

Hydrometallurgy 166 (2016) 73–79

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Decomposition of ilmenite by ZnO/ZnS: Enhanced leaching in acid solutions

N.D.H. Arachchi [a], G.S. Peiris [b], M. Shimomura [c], P.M. Jayaweera [a,*]

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[b] School of Chemistry, Physics and Mechanical Engineering, Queensland University of Technology, Brisbane, QLD 4001, Australia
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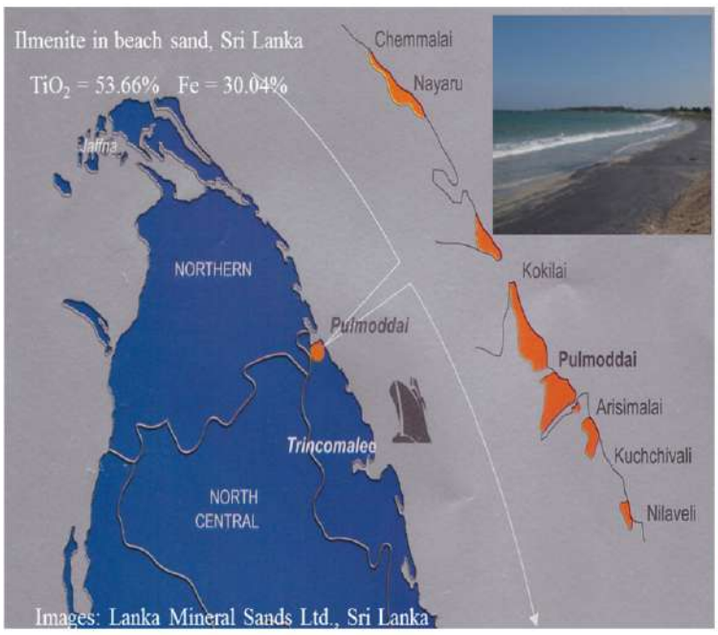
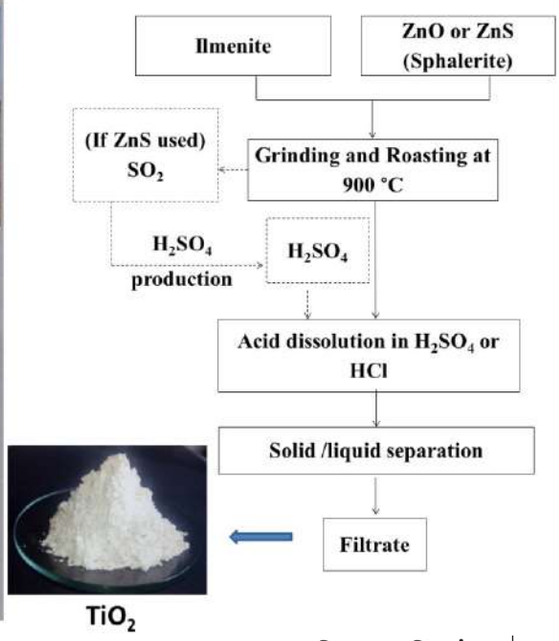
Inventors

1. Prof P.M Jayaweera, PI, Department of Chemistry, University of Sri Jayewardenepura
2. N.D.H. Archchi , Department of Chemistry, University of Sri Jayewardenepura

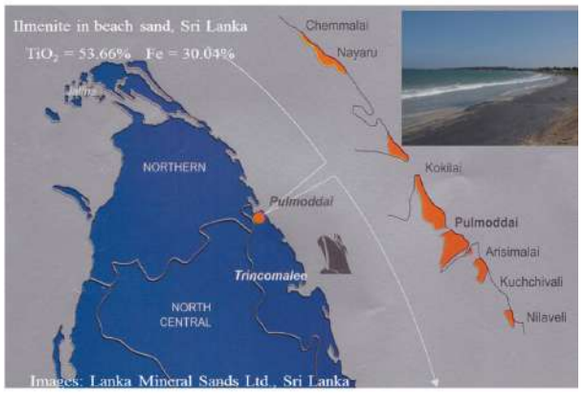
Highlights of the invention

1. Acid reactivity of the ilmenite has been enhanced by roasting ilmenite with ZnO /ZnS.
2. (Ilmenite is acid resistant and difficult to process)
3. Zinc recovery and recycling.
4. Required H2SO4 to the process has been produced from intermediates of the process





LOW COST LI-ION/S RECHARGEABLE BATTERIES FOR **ENERGY STORAGE DEVICES USING ILMENITE**



Inventors

Prof. P.M Jayaweera,PI , Department of Chemistry, University of Sri Jayewardenepura

G.K Jayasekara, Department of Chemistry, University of Sri Jayewardenepura

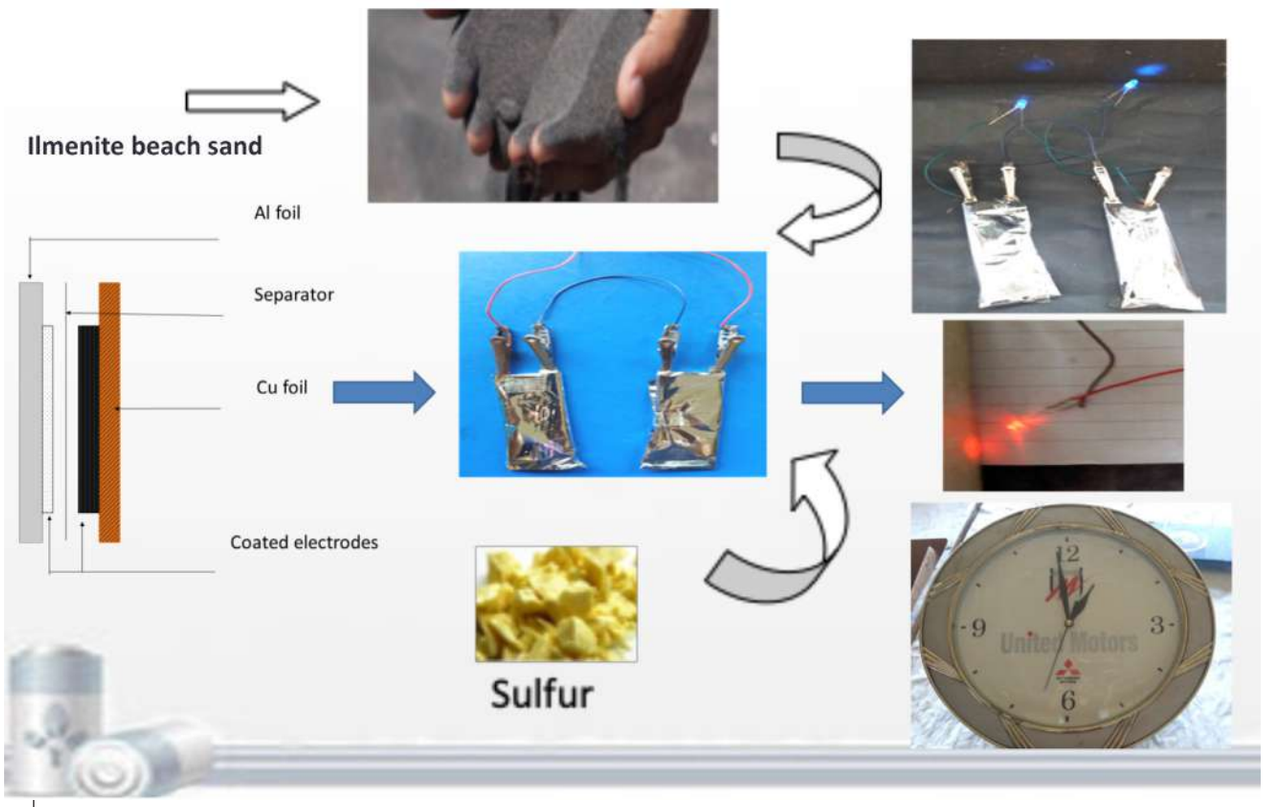
Highlights of the invention

A battery has been designed with environmental friendly materials under normal laboratory conditions which is low cost and with high safety.

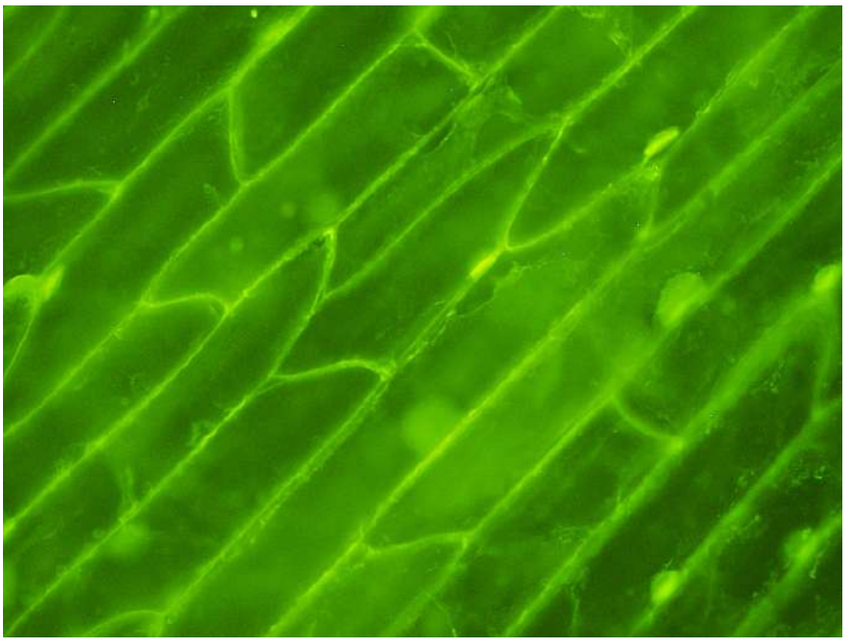
The composite anode cell has demonstrated fast discharge of high current for a short period of time.

The anode prepared with ilmenite has demonstrated slow discharge of small current for a long period of time.

The designed battery can be discharged and recharged number of times without losing its performance.



METAL COMPLEXES FOR THERAPEUTIC AND **DIAGNOSTIC APPLIATIONS**



The research focus is an application oriented synthesis and characterization of novel metal ligand systems with potent anticancer activity and biomolecular imaging ability.

Description

They have been able to formulate a novel potent therapeutic agent for breast cancer through targeting sigma receptors which are over expressed in breast cancer cells. They have also explored the ability of these metal complexes to serve as biological imaging agents. Currently they have some exciting work lined up to explore the use of metal complexes in tracking the various stages of cell apoptosis.

New metal complexes for fluorescence imaging applications

Ferene based rhenium tricarbonyl complexes have shown promising fluorescence imaging applications in plant cells as well as rat peritoneal cells and were found to be non-toxic for rat peritoneal cells.

Authors: Kokila Ranasinghe, Inoka C Perera and Theshini Perera

A NOVEL TRIDENTATE LIGAND AND ITS FAC-RE(CO) 3 L COMPLEX **AS POTENTIAL IMAGING AND THERAPEUTIC AGENTS FOR LUNG CANCER**

A novel napthlane-derivatized ligand and its rhenium tricarbonyl complex have been synthesized and characterized. Biological studies have shown promising results where NCI-H292 cells treated with the metal complex indicated apparent morphological changes, such as cell shrinkage, reduction in cell volume and irregular cell shapes, which are indicative of apoptoic cell death. Thus, these compounds could be further investigated as therapeutic agents for lung cancer.

Authors: Taniya Darshani, Inoka C Perera, Sameera R Samarakoon and Theshini Perera

Slow Release Nanofertilizer

Inventors

1. Prof Nilwala Kottegoda – PI University of SJP/ Sri Lanka Institute of Nanotechnology
2. Prof Veranja Karunaratne - Sri Lanka Institute of Nanotechnology
3. Prof Gehan Amaratunga - Sri Lanka Institute of Nanotechnology

Highlights of the invention

– A novel urea based efficient and slow release nanofertilizer has been synthesized.

- The process has been scaled up and tested the efficacy of the fertilizer for rice and tea at farmers field level.

- Yield improvements up to 15% has been realized with 25-50% reduction of the fertilizer usage.

Achievements –

Four (04) US patents have been approved.

SRI LANKAN TRADITIONAL RICE BASED **VALUE ADDED PRODUCTS**

Pahan Godakumbura, M. A.B. Prashantha, P.A. N. Thushara, Saduni Arachchi, Nirmani
Department of Chemistry, University of Sri Jayewardenepura

Sri Lankan traditional rice varieties are composed of high amounts of nutritional values, antioxidant, and anti-amylase and anti-glycation activities, compared to enriched varieties.

Also, due to the high consumer interest for ready-to-eat snack products, a novel vegetarian cereal bar has been developed.

Green leafy porridges made with leaf water extracts, rice and coconut milk are common Sri Lankan dietary remedies. They are a good source of minerals, vitamins and phytonutrients. The porridge made of green leaves is consumed as breakfast as a practise by most Sri Lankans since ancient times. By preparing rice based porridges and using the knowledge of indigenous medicine, the health benefits of these porridges can be studied.

THE DEVELOPMENT OF A HOME **SCALE PADDY PARBOILING KIT**

Department of Biosystems Technology (BST) - Food Processing Technology,

Faculty of Technology,

University of Sri Jayewardenepura

Rice is an edible, starchy, cereal grain. 40% to 60% of the world population particularly Asian people, consume rice or rice- based food items as their main food. It must be noted that 95 % of the world's rice is consumed by human beings. Sri Lanka is an Asian country, therefore the main food item is rice since ancient times. People consume rice, directly by cooking rice flour based products of rice noodles, rice biscuits, extruded products, "pittu" and string hoppers. 70 % of the cultivated paddy in Sri Lanka is subjected to parboiling while processing to produce parboiled rice.

Parboiling is a process that changes the chemical and physical properties within the harvested paddy. Parboiled rice is nutrient rich, and rice husk can be removed more easily relative to the normally processed rice. Processing of damaged rice can be minimized during the rice milling. This process is used widely by farmers in home scale and large scale processing. Paddy Parboiling consists of three processing steps.

These are,

1. Paddy Soaking
2. Heat Treating
3. Drying

Paddy should be soaked prior to heat treating. This increases the moisture content of the paddy. The time of the soaking depends on the variety of rice. Then, the soaked paddy should be subjected to the heating process for a predetermined time by using steam or boiling it with water, when starch undergoes gelatinization. After that the paddy should dry until 14% of the moisture content is achieved for storing or milling. This method that was introduced by the institute of post-harvest technology, Anuradhapura, to parboil paddy. Has some technical; issues. By avoiding those issue, the parboiling practice can be done with more efficiency.

Normally in the IPHT Method for parboiling, it is a time and labour consuming method and most of the heat is exchanged to the environment in practicing this method as fuel, wood and coconut shells are used. However, at present, they cannot be found in urban areas and also large amounts of those fuels are used in the entire parboiling process. Further there is some risk in safety of laborers while using this method because there are no safety handles in this equipment. Those are the main issues of the IPHT method for parboiling.

In this project, a home scale paddy parboiling device is developed for small scale

farmers to parboil paddy in efficient manners. This device is smart and can be used to process paddy by spending a short time to the normal home scale parboiling method. Because in this method, the heat exchanged to the environment is in very low from using the steam barrier. LP gas is used as fuel while steam pressure is used for heating, therefore, there is no need of large amounts of water.

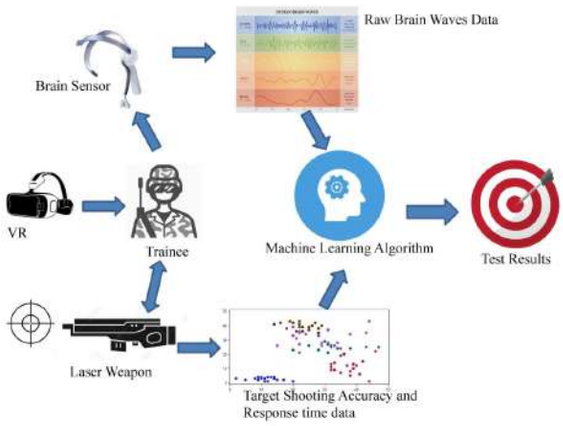
At present, Most of the people use LP gas for their day today cooking. And gas tanks of their kitchen can also be used for this. And this can be operated by only one person and further personal safety is provided from 'safely handles' in this equipment. The vessel of this device is constructed with two water removing valves. So it can be used for soaking and heat treating without removing paddy from the soaking vessel to the parboiling vessel. When it is the end of the soaking of paddy, the excess water can be removed until water that is needed for steaming, by opening valve 1 (figure: 2). Then the remaining water can be removed after heat treating by using valve 2. Therefore parboiled paddy can be introduced on to the mat without any trouble for drying. There are four safety handles for easy handling of vessel during the processing.

There is no rapid inexpensive home scale parboiling method which belongs to a small space available among farmers currently. The proposed device will be equipped with a flame that is lit by LP Gas. It gives a continuous heating process, belongs to a small space area to operate and produces small amounts of smoke. Therefore, this is an environmentally healthy method. The proposed device can treat amounts of 30kg-50kg of a paddy batch within 10-15 minutes. For this purpose, a rapid heating system and a steam pressure barrier which is made from gunny bag material with a metal lid, will be used. The soaking of paddy can also be performed by using the vessel of this device prior to steaming. Thus two processes will be achieved in one device. It is a very inexpensive and rapid parboiling method and is easy to handle. By using this device the processing of paddy parboiling could be done efficiently. The quality of rice based products could be improved and also this will reduce the processing time, the farmers' cost, and also increase the nutrient value of rice.

Research team

- B.W.E.R. Gunawardha
- W.A.R. Madumal
- G.A.H.K.Y. Jayaweera
- W.P.S.D. Ganegoda
- M.C.K. Jayalath
- M.A.H. Piyumika
- K.A.B.K. Kodikara
- G.T.P. Prabodya

EAGLE EYE MILITARY **TRAINING SIMULATOR**



EagleEye is a Military training Simulator built with VR (Virtual Reality) glass, Brainwawe sensor attached to trainee's head, and laser training weapons. The system can simulate certain basic training environments such as Close Quarter Target Shooting and Long Range Target Shoot while monitoring the Brainwawes and response times of the trainee soldiers. This can be also used with trained soldiers for research work.

The Laser weapons are used to stimulate the Target Shooting and VR glass stimulates the real combat environment while Brainwawe sensor & weaponry sensors monitor and gather data relate to behavior of the trainee. These sensors will feed data to central server and the data can be used in Big Data analytics. This data is helpful to the high level commanders and military researchers to improve the training programme. This also gives the ability to personalize training for each individual soldier by monitoring their action during the training, which will help to improve the soldiers' performance up to the required level or above. On the other hand, this system gives the ability for soldiers to do drills and be ready for emergency situations such as hostage rescue, counter terrorism, and etc.

In Military, training soldiers and maintaining an army during a time of peace is very costly due to conducting actual training drills. Military training simulation like EagleEye can reduce the cost of training. Simulation environment does not require expensive training grounds. It can be built with VR headsets and high resolution computer graphics. This can cut down construction and maintenance cost of real training instrastructure facilities significantly. Also the cost for live ammo is reduced and requirement of consulting military training expertise can be minimized.

Military training simulators are developed and used in developed countries, but those technologies are confidential and are restricted to those countries. Therefore, developing countries like Sri Lanka should develop such advanced military simulators in house, to strengthen countries' military.

Project Supervisor

- Dr. D.M.R. Dinalankara

Team Members

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- R.Y Opanayaka
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- G.D.N. Wickramarathna
- M,K.D.T.M. Sathischandra
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- D.P.B Athapattu
- R.A.G.B Pemasiri

DRIVE

A lot of youngsters studying for Advanced Level examinations and typical undergraduates hustling to cover the daily dose of Assignments and Examinations have no solution other than pulling all-nighters. To stay boosted throughout the night and to engage in their routine activities the next day, one would feel like the most common and convenient solution is consuming an Energy Drink. However, the downside of taking such beverages with zero nutritional value increases obesity rates, tooth decay, high blood pressure, anxiety, insomnia, hyperactivity with many more other dangerous side effects.

This is where DRIVE comes into play. DRIVE is the combination of a variety of natural foods that are proven to raise the metabolism of the consumers and have them feeling fueled all day long. DRIVE comes in the form of a smoothie, consisting of a diverse range of ingredients starting from leafy greens and fruits packed with Vitamins to rich cocoa. Every ingredient used is known to have their own way of boosting up the energy levels and thereby improving the quality of life. Proteins, Vitamin B, E, Fiber, Omega-3, Omega-6, Magnesium, Manganese, Iron, Potassium, and Zinc are only a few of the Vitamins and Minerals that are packed in this smoothie. DRIVE can be consumed at night or any time during the day to have a boost in energy levels and it is the healthiest choice for breakfast.

DRIVE aims for an environmental-friendly option by being presented in a bio-degradable paper cup which can be easily discarded. DRIVE is the healthiest choice and the most perfect substitute to cater a much needed requirement of the current society.

Team members:

- Maleesha Piumini Panangala
- R.W. Thileka Kithmini Wijeweera

Author name

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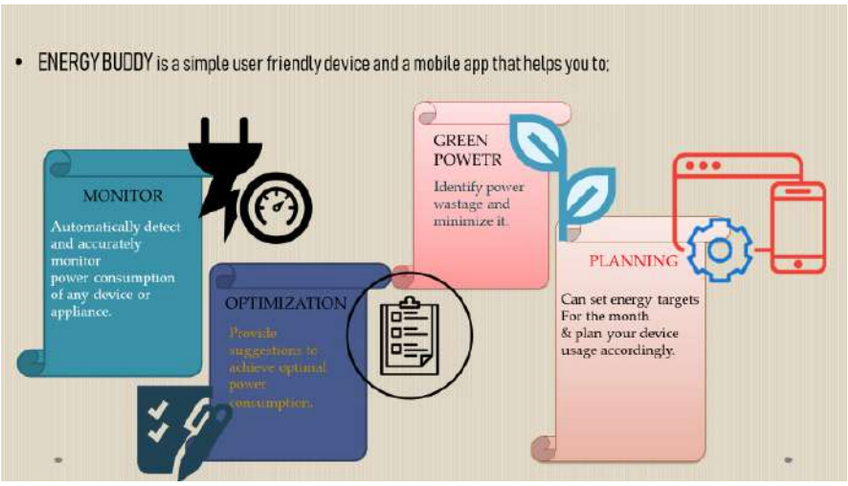
ENERGY **BUDDY**



A simplistic overview:

Due to the recent advancements in natural and physical sciences, most devices of the future can be expected to become "smart" (i.e., smart devices). Compared to its traditional counterpart, a "smart device" would be intelligent, connected, and autonomous. In the electronic industry, these advancements are driven by the new-generation technologies such as Internet of things (IoT), artificial intelligence, machine learning, and robotics. At present, the term "smart device", widely associates with home appliances (e.g. smart TV, smart refrigerators) only. However, smart devices can be used for many other purposes.

Smart metering is one such application, where a smart device helps the community to monitor and manage energy consumption. Compared to a traditional energy meter, where the readings are taken once a month and the bill is calculated manually, a smart energy meter will enable users to monitor energy usage, calculate the bill, and profile energy consumption with the help of his mobile phone.

Although several smart energy meters are available in the local market, to install such a device, authorization and approval must be obtained from the Ceylon Electricity Board (CEB) as it requires modification of supply side terminals. Furthermore, this requires the supervision and assistance of a qualified electrician. On the contrary, if a smart energy meter can be directly plugged into the distribution box of a house/building complex (i.e., consumer side terminals), the process will be simplified and the likelihood of a customer buying such a device will increase. Moreover, such a device could provide additional information such as: identifying the exact location of a fault, identifying the power consumption of individual appliances, and provide instructions and alarms to reduce overall energy consumption. A handful of such devices can be found in the online forums, e-commerce websites, and in the literature, most are still at the research and development stage. Additionally, the information provided by these devices are region specific and may not meet the requirements, energy profiles, appliance, and or tariff system of the local market.

Therefore, in this project we intend to develop a smart energy meter, which we call "Energy Buddy", that can be installed within the distribution box (consumer side) and will provide a vast amount of useful information directly to the user's mobile phone. Using AI, our device will automatically detect, which is a novel feature of our device, and monitor power consumption of each activated device. This device will be custom designed to meet the requirements of the local market.

Team Members:

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DEVELOPMENT OF A DOMESTIC FILTER UNIT TO REMOVE DRINKING WATER CONTAMINANTS USING **SRI LANKAN NATURAL RUTILE SAND AND WOOD BASED ACTIVATED CARBON**

The provision of adequate volumes of safe, clean drinking water to the world's growing population is a continual and increasing challenge for water authorities. Although the health aspects of water are primarily focused, consumers generally judge the quality of water by its aesthetic value. In the Sri Lankan context, cyanotoxin in water has been hypothesized as one root for Chronic Kidney Disease of unknown etiology (CKDu). Furthermore, unpleasant Taste & Odour (T&O) in drinking water has become a crucial issue in the Anurdhapura, Pollonnaruwa, Ampara, Trincomalee and Batticaloe districts. The general public rejects even the supplied treated water due to bad T&O and search for other sources of drinking water which is not 100% guaranteed as safe. Pesticides and antibiotic contamination of water is a burning concern in the Sri Lankan water sector as well. The current filter was designed as one solution to these intense and urgent issues in Sri Lanka. Natural Rutile sand was used as a photo catalyst material which contains more than 90% of Titanium dioxide. The Rutile sand is found along the Pulmudaii coastal belt. The new filter includes laboratory produced wood based activated carbon, to increase the effectiveness and efficiency of the water treatment, by removing by products of pollutants. The model filter showed complete removal of taste and odour forming Geosmin and 2- MIB, cyanotoxin, antibiotics and Carbofuran pesticides tested. Hence, in the commercial production cycle, this product will help to provide safe, clean water to the population who consumed contaminates water from dug wells.

Team members:

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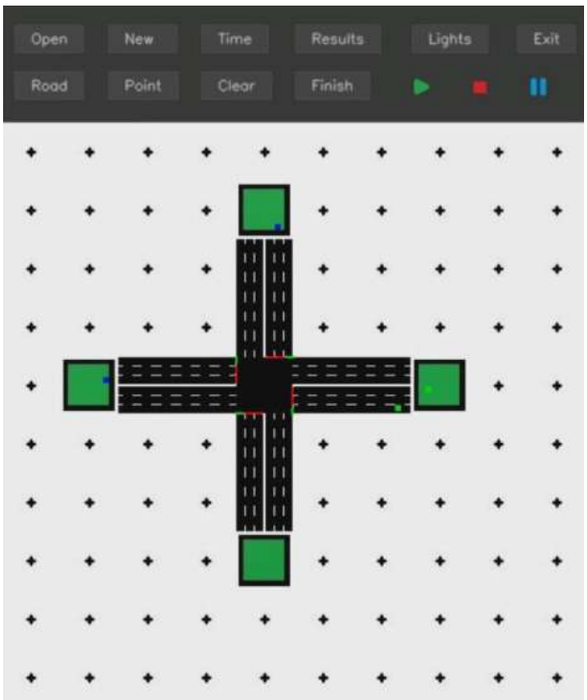
COORDINATED MULTIPOINT TRAFFIC **MANAGEMENT SYSTEM**



At present the Sri Lankan signalized intersections are controlled by semi-automated or automated systems and are operated based on signal time calculations based on historical data. Inability to replicate real time conditions in signal timing calculations lead to long queus in certain directions increases time and reduces the cost efficiency of travelling. In addition, during the special scenarios, such as road rallies, protests and accidents, the traffic should be controlled considering that particular incident. For example, ambulances have to wait in traffic till the roads get cleared. Based on such needs, this project intends to implement a smart traffic light system which is operated on traffic data collected on real time using on site digital cameras. The collected data is processed to calculate the traffic length in lanes, hence changing the traffic light signal times reducing the traffic delays. In addition, traffic light signal timings will be changed in special scenarios accordingly. The main objective of this system is to implement a coordinated traffic light signaling system which communicates the data between two nearby traffic lights. The proposed system which is built on the simulator software has the capability to control three nearby traffic lights. Results are to be verified by applying it to the real traffic scenario to get the real output. Results show the potential of the smart traffic light system to minimize traffic on the roads in Sri Lanka.

Group Members

- Chanuka A. G.
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- Gamlath G. S. M.
- Hathurusinghe H. A. D. T. N. S.
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- Author: Samaranayake N. P. I. M.

PROGRESS OF DEVELOPING "SMART POWER GUIDE DEVICE"

M.D.I.B. Pathmasiri
K. I. A. Wijenayeka

The Energy Crisis is one of the major problems that can affect human existence. Accordingly, our country is facing a significant problem in providing enough electricity power to the people. Thus power saving is very important nowadays. It is very difficult to manage our electric power consumption daily to save power and minimize the electricity bill. This device enables us to find new strategies to reduce the household, industrial and any kind of electric power consumption and save power and money by proper management.

Objectives

- Save electric Power daily
- Predict the monthly electricity bill
- Limiting the monthly energy consumption
- Wireless control system

PROJECT PROGRESS

We have decided to divide this whole project in to three stages. These are,

1. Developing the electronic circuit and parts. (Complete)

2. Developing the Android application to control the devise wirelessly. (In progress)

3. Developing the hardware components and finishing. (In progress)

Stage 01 – (Developing the electronic circuit and parts.)

The electronic part of this device is almost completed and about 6 weeks are spent on stage 1. The main parts that used for the electronic circuit of this device are,

- ACS-712 30A Hall Effect Current Sensor
- 16 x 4 I2C LCD
- Node MCU board
- DS3231 Real Time Clock module
- 4 x 4 key pad
- 2 LED s

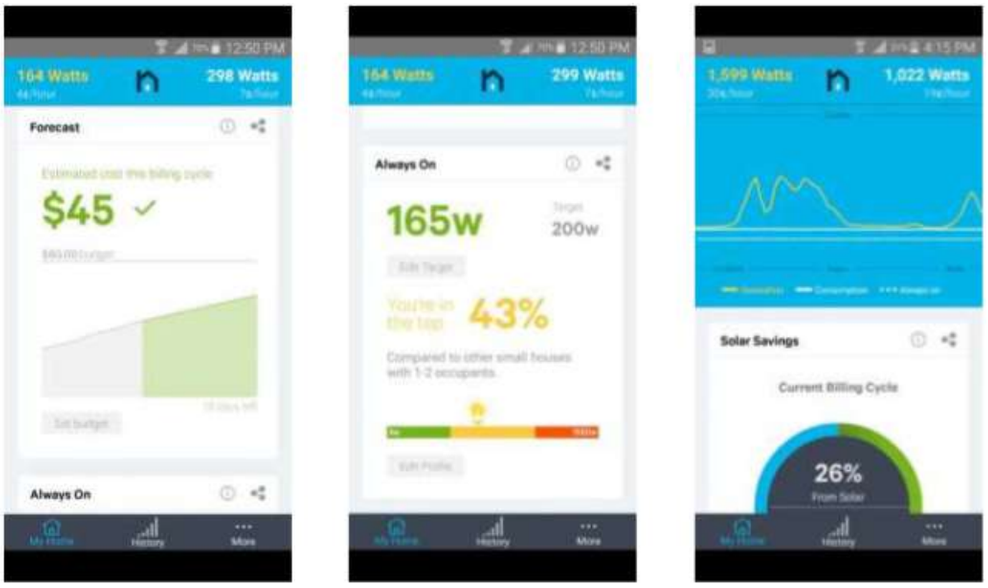
4. Completed part of the project.

Stage 02 – (Developing the Android application.)

Stage 2 is in progress and we hope to finish it within two weeks. We have finished the designing part of the application

Stage 3 – (Developing the hardware part and finishing)

Stage 3 is also in progress and in this stage we have to prepare a prototype of the house wiring system for the demonstration purpose. In these days both Stage 2 and 3 are processed in parallel and we hope to finish this project by the 2nd week of March 2019.



BED TO TROLLEY TRANSFER METHOD FOR THE **SICK AND DISABLED**

Prepared by: S.A.D.J Jayathilake

Out of the problems that the world is confronted with today; the increase of the aging population problem, is one which should seriously be taken into our consideration. With the increase of the aging population. The patients who suffer from neurological and other diseases also increase at a rapid level.

Particularly in transferring patients, those who suffer from such conditions from the bed to the trolley; both the patients and the health care workers experience a lot of hardships. Therefore the main objective which is expected to be achieved from this particular product, is to facilitate the transfer of patients who suffer from various neurological conditions from bed to trolley, without causing any pain to such persons. By this bed to trolley transfer system; without involving much labor, only a single health care worker can operate the feasible and movable mattress over layer, even without mobilizing the patient. Particularly this product is extremely beneficial for patients who suffer from nervous compression and such disorders in the spinal cord, as it reduces the pain caused to such patients in motion.

However this product i.e. bed to trolley transfer method for the sick and disabled is invented in consideration of the hygienic rules and conditions. Especially when transferring the patients, those who suffer from spinal cord injuries; by utilizing this mattress over layer, the main target is to avoid further damage caused to the spinal cord of such patients. Because; as far as the patients who suffer from spinal cord injuries are concerned when stabilizing a patient with spinal cord injuries; maintaining the natural curvature of the individual and also aligning of the pressure points of the body are extremely important. Thus keeping the entire body of such patients in a good condition is immensely significant. Because any disproportion of the body will affect the brain and the entire neurological system. The utilization of this product is of immense importance in dealing with the patients who suffer from such neurological conditions.

Smart Roomy

Through the project of 'Smart Roomy', our intention is to familiarize the smart room concept to the common society and make it feasible for common use. Our mission- 'Make the life smart' states the purpose of the project very clearly and briefly. While the "smart home" concept is growing in the international market, this concept is relatively new to the Sri Lankan community. Being unaware of modern trends, limited authorized sellers, and not being able to afford, are some of the reasons as to why Sri Lankan people are still reluctant to use smart home devices. Most of the smart home devices that are available in the local market are brought down by online sellers from foreign countries and sell at exorbitant prices. In most instances, these products do not comply with local standards. Also, the instructions are often written in foreign languages and, therefore, the local buyers find it difficult to understand and setup these devices.

Therefore our purpose was to produce a device to convert existing appliances to smart ones, which would then negate the necessity to purchase an alternative smart device. One of our major intentions is to make all levels get familiar with this smart home concept through this device. The Smart Home concept is a huge step forward in the world and energy efficiency will have a positive remark with this, while accessibility, safety, and cost effectiveness are the achievements which we can gain. Therefore, implementing our proposed item leads the society to get familiar with this concept and through this there are many benefits that we can direct towards the Sri Lankan economy as well as the Sri Lankan life style.

Basically, our designed device is a plug and play universal device, which indicates that the device would be manufacturer independent and can be used with most devices. Furthermore, it was produced at a reasonable cost. The local community can then purchase this device at an affordable price and convert their current appliances into smart devices. It is controlled by radio signals via WIFI networks. The smart features of the connected devices can be controlled by an application installed in the mobile phone named 'Shake it'. We also use gestures to control the connected devices through the IR rays emitted from the mobile phone. At the first stage we successfully established this to the devices that are very common items in a room like lights and fans etc.

Team Members :

- Mr. S.A.D.J Jayathilake
- Mr. R.A.S.T Gunawardena
- Ms. J.A.J.L Silva
- Mr. J.N Madusanka

SENETH WAVE POWERED **ELECTRICITY GENERATOR**

Inspirations & motivation for the Invention

The development of the "Seneth Wave Powered Electricity Generator" was inspired by the geographical location of our country as well as the fact that it's an island surrounded by the sea. It was noted and observed that the power of sea waves was not captured in a manner where that energy could be transformed to electricity generation efficiently. Utilizing Just 5% of the wave power around Sri Lanka could contribute to the entire electricity demand of the country. With the belief of introducing such an alternative approach for power generating "Seneth Wave Power Generator" was invented.

What is the Seneth Wave Powered eletricity Generator?

"Seneth Wave Powered Electricity Generator" is the name of this new invention of converting wave energy in to electricity using the wave lifting power and gravity. It is the final outcome of hard work in the last few years in the real sea conditions and the mechanism is proved that it could transform sea wave energy in to electricity with high efficiency.

It is a unique and Innovative thinking.

There are too many prototypes developed around the world to gather sea wave power but not one has been successful commercially. So how is this a success? The core system developed here is different from most of the other methodology. The equipment is not converting sea wave power directly to electricity, but it stores the sea wave power and releases it using gravity. This is simple, but has resolved many issues facing the wave energy conversion process. Due to this new mechanism, it can be built cheaply and can survive any harsh sea condition. The system is a closed system, so equipment is protected from corrosion. The entire equipment can be built in a factory and can be held anywhere on the sea bed. So, it does not need to find optimum site locations such as wind or solar power plants.

Is it economical?

One unit can develop up to 1 MW and the cost will be limited to Generator cost and a few other equipment. It is estimated that the 1 MW unit construction cost will be only one forth (25%) of the expected cost of the same unit of Solar or Wind. According to the available information, present power demand of Sri Lanka is approximately around 2 800 MW (Not verified). A plant consisted with 3 000- one MW units will provide the entire electricity demand of the country without affecting any seasonal effects such as drought or rain. It will save almost all the cost of the other power sources as far as the units are running in the sea.

Author Name: H.A.W.Senarath Bandara

BMI MACHINE

A BMI measurement is useful to assess who needs further testing to identify health risks such as heart disease. Busy people haven't the time to calculate their BMI value. This devise makes it easy. In this BMI, the measurer can determine the weight of the person who stands on the BMI measurer platform and also can determine the height when the person lifts the handle till it reaches the top of his/her head. After the processing aspect, the BMI value is shown on the display. Further, one can know about the position which you are in, depending on the BMI value calculated. Therefore a person may be Under-weight, Healthy-weight, Overweight or Obese, using the led indicator to inform to their position. Especially, a person can store their BMI value inside this unit. Compared to previous data, a person can determine their progress. In the developing part, while using the mobile app, a person can see their records remotely too.

K.I.A. Wijenayake, M.D.I.B. Pathmasiri, I.D.C.N. Wijesinghe.

AGRICULTURAL SOCKS TO **PREVENT LEPTOSPIROSIS (COMMON MEE UNA)**

Figure 1: selected materials for testing

Staff Coordinator

- Dr. M.H.V.D.Y. Mudunkotuwa,

Team Members

- Mr. H.M.T.R. Bandara, Mr. W.M.H.G.D.S. Wickramasinghe,

This project intends to protect paddy farmers from leptospirosis. There is an increased number of paddy farmers suffering from leptospirosis. Paddy farmers are prone to get infected leptospirosis when the wounds on the legs come into contact with the water in the paddy fields. Currently the existing solution is to use rubber boots to prevent skin contact with the water. However, when farmers are working in fields that are deeper than 4 inches, the boots tend to come off after getting caught in the mud. Since the boots don't fit the leg, there is an additional space between the boot and the leg. The water tends to enter the boot from the opening at the top. Therefore, using boots is not a solution to be protected from leptospirosis. Even though, there are waterproof socks available in the foreign markets, they don't come with a hard sole that can prevent farmers getting injured by the rocks in the paddy fields. Additionally, those socks available in the foreign markets, are not affordable to the Sri Lankan farmers. Therefore, this project provides a low-cost solution to protect farmers from leptospirosis. The proposed agricultural socks contain three-fold protection against the mud water. The sock has three layers where the innermost cotton nylon mixed layer is covered with perfluoro octane sulfonate. The second canvas layer is protected by a layer of wax and the outer layer is made of a combination of nylon, vinyl and polyester for water resistance.

Figure 2: After applying perfluorooctane sulfonate to investigatewaterproofing ability

MR BIN CLEANER: A SMART WASTE MANAGEMENT SYSTEM

Group Members:

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- Yaseer M.S.M
- Atheeb M.A.M
- Ahamed M.N.A
- Aasif L.M

Coordinator:

Dr. Niranji Satanarachchi
Faculty of Engineering
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One of the pressing environmental and social needs in Sri Lanka and the world, is to develop adequately systematic and effective methods of garbage disposal, collection, handling and the recycling. Garbage recycling faces numerous challenges by not being supported well with innovative technologies and positive behaviour of people at the prior steps. Addressing this challenge, the project has aimed to design and develop a bin system which segregates plastic from other waste products and make the waste collectors' work easy by adding several important technological sophistications. The bin integrates four key methodological steps to achieve this task.

Automatic open/close system

The bin will automatically open when a person comes near the bin. Ultrasonic sensor is used to sense the presence.

Garbage Monitoring System

Ultrasonic sensor is used to detect the waste level in the bin. When the bin is full, by using GSM module it will send a message to the garbage collector. By using GPS module the location of the bin and the route to the bin will be shown.

Segregating the plastic from other waste materials

Image processing is used in order to detect the plastic. A Raspberry pi and a camera is used to achieve this. Here we feed many types and shapes of plastic to the system and train them.

The rewarding system

A reward is given to the person who collects the waste effectively. An application is created to notify the person of how much reward he has gained.

The bin system is suitable for some specific places like restaurants, parks and malls. When a person comes near the bin, it will automatically open, and when he dumps the garbage, it will fall on a conveyor belt. A camera will capture images of the garbage and would identify whether it is a plastic or not. If it is plastic, it will be drifted towards the plastic cabin, and if not, to another cabin. When the bin is full, a message will be sent to the collector indicating the location of the bin. If he collects the waste within the given time he will be rewarded.

By using this innovative and novel idea of the automated recycling bin system, it is expected to motivate the public to be aware and actively engage in practicing good garbage disposal habits. Further, it intends to connect the points of disposal, users and the collectors in an efficient and intelligent system. It has the potential to be developed and integrated in to an effective garbage handling and disposal system in the Sri Lankan context.

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- Muhaimin M.W.M.A

DEVELOPMENT OF A TREATMENT UNIT TO **TREAT TEXTILE DYE CONTAINED WASTEWATER EFFLUENTS**

Textile dye effluent is one of the major types of water pollutants that is released to the environment in huge loads. At present, more than 7 × 105 kg of synthetic dyes are consumed annually in the forms of 100 000 of structurally different colors to fulfill the requirement of rapidly changing fashion trends. Textile dyes are designed to resist the natural degradation processes and persist in the environment for a long time. Around 280 000 tons of dyes together with different types of flame retardants, heavy metals, bisphenols, formaldehydes, aromatic amines, etc. are discharged to the environment worldwide, annually. The existing conventional treatment methods are highly expensive while having several drawbacks, thus it is not accessible to all parts of the world. Sri Lanka, as a niche of a high-quality supplier of apparel to the world, is required to discover the new dimensions and capacities of textile and textile processing sectors. When achieving the target, it is essential to address to treat a heavy load of textile dye contained wastewater effluent to maintain environmental pollution standards. Thus, the present study is focused on the development of a textile dye contained wastewater treatment unit as a green alternative approach with low initial and maintenance cost. Treatment was designed in three stages: adsorption, biodegradation and phytoremediation respectively. The textile dye was first directed to a chamber filled with natural soil collected from the particular area of the country and then directed to the biological treatment unit that contained a consortium of microbes which were isolated from the textile waste water canals around the industrial zone. Finally, the treated water was further clarified by sending it through the phytoremediation treatment unit which contains selected aquatic floating plants. The treated effluent showed complete degradation of the textile dye through the treatment process and phytotoxicity assay confirmed the treatment has removed the toxic nature of the dye as well.

Team members:

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- Snr. Prof. Pathmalal M. Manage: Centre for Water Quality and Algae Research, Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura.
- Dr. D. T. Jayawardana: Department of Forestry and Environmental Science, Faculty of Applied Sciences, University of Sri Jayewardenepura.
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MIX & MATCH
CREATE YOUR OWN CINDERELLA STORY

The greatest misconception that ladies have nowadays is that "High heels are pleasure with pain". The fundamental concept of Mix & Match is to prove them wrong. It is true that sometimes high-heels can feel as painful as someone sticking hot-pins into the soles of your feet, but, this is only because we fail to understand that the shoe that fits one person pinches the other. It is time to abandon the literal concept of putting yourself in someone else's shoe. We believe that every woman is beautiful and deserves to feel beautiful and showcase her own sense of style but it should make her feel comfortable as well. A lady can carry kindness, respect, integrity, class and much more, but it is her pair of shoes that carries the lady. So, ladies, it's time to begin that great journey of a thousand miles with a fabulous pair of heels.

Mix & Match is a one of a kind customized online shoe store where ladies can self-design their preferred footwear with respect to heel, material, color, accessories and many more features. But it is not any of the above that sets us apart from online customized shoe stores; it is the special feature that comes with every footwear a customer purchase. A customer will receive not only a pair of shoes, but 3 shoes embedded in one with a single purchase. Our website is a user-friendly interface that anyone can easily access and design a final pair of high heels, to fit one's budget, all of this with just a click of a button. Customers are guided step by step throughout the whole process from the design of the pair of high-heel, to finalizing the design and inputting the customized foot measurements. Customers will have the chance to choose different shoe-accessories that can be easily attached as well as detached from the shoe at one's own convenience.

Shop for modern classics and eye-catching styles with an extensive selection and design of high-heels to follow your wardrobe. All it took Cinderella was the right pair of shoes, so ladies are you ready? It's time to create your own Cinderella story with Mix & Match.

Co-Founders

- H.K.Rashmini Rathnaweera
- Maheshi Piumika Panditha
- A.P. Thiruni De Vas Gunawardena

Author

- Rashmini Rathnaweera

MUD BRICKS & CEMENT BRICKS **REINFORCED WITH COCONUT FIBER**

Staff Coordinators: Dr. M.H.V.D.Y. Mudunkotuwa, Mr. H.M.T.R. Bandara

Team Members: Mr. R.K.A.M. Rajapakse, Mr. W.M.H.G.D.S. Wickramasinghe,

Mr. R.M.R.B. Weraliyadda, Mr. D.A.S.N. Sanjula, Mr. R.L.K. Nishantha, Mr. N.G.M.P. Nilwala

Project Title: Mud Bricks Reinforced With Coconut Fiber

Research focus: Improving thermal properties, strength of mud bricks & producing a light weight brick

Faculty: Faculty of Engineering

Mud bricks and cement bricks are the preferred construction materials in Sri Lanka. Even though it has been widely used in Sri Lanka over the years, there has been no significant improvements to the traditional mud brick and the cement block. The Cement block is often criticized for not providing the necessary thermal comfort in the tropics. This study aims to enhance the properties of the traditional mud brick and the cement block by reinforcing the brick with coconut fiber, a material found abundantly in Sri Lanka. Since the coconut fiber and brick industry are well established in Sri Lanka, commercial development of such a product is feasible.

There have been similar studies where construction materials were reinforced using different kinds of fiber. However, there have been no such studies on using coconut fiber as a reinforcement in bricks. The study aims to develop a low cost, lighter weight brick of high strength and enhanced thermal comfort. Mixing coconut fiber or fiber dust with these two types of blocks and achieving lower thermal conductivity can be anticipated providing the dwellers with better thermal comfort. The prepared mud bricks and cement blocks are tested for thermal conductivity, compressive strength and water absorption.

Mixing ratios

Mud Bricks:

Ratios by Volume (Mud : Coconut Fiber)	Amount of samples made
3:1	3
2:1	3
4:1	3

Ratios by Volume (Mud : Coconut Fiber Dust)	Amount of samples made
1:0.5	3
1:0.75	3
1:1	3

3control samples are made additionally (no coconut fiber of coconut fiber dust is mixed)

Figure 1: Unburnt mud brick samples

Figure 2: Making the mixture of the mud bricks

Cement Bricks: Mixing ratios

Ratios by Volume (Cement : Coconut Fiber Dust : Chips)	Amount of samples made
1:2:12	3
1:3:12	3
1:4:12	3

Ratios by Volume (Cement : Coconut Fiber: Chips)	Amount of samples made
1:0.5:12	3
1:1:12	3
1:1.5:12	3

3 control samples are made additionally (no coconut fiber of coconut fiber dust is mixed)

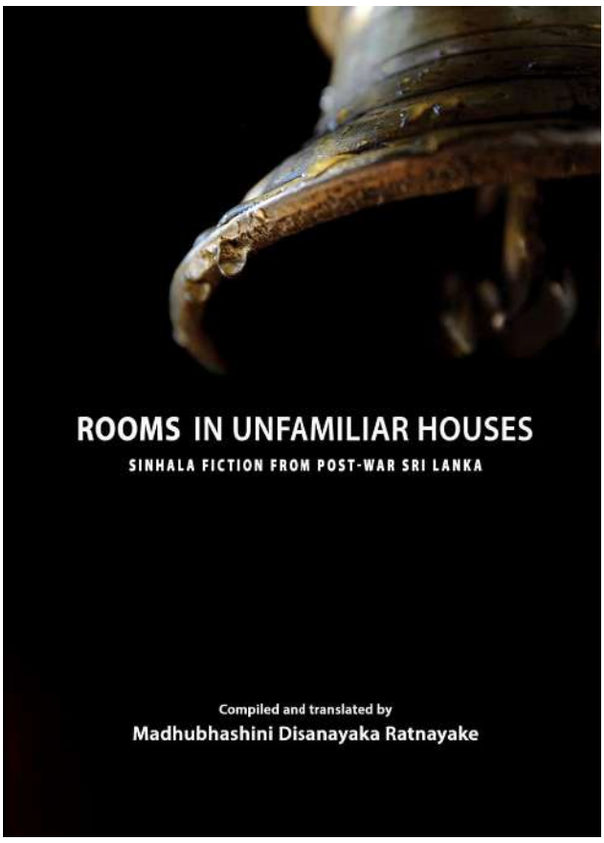
Figure 3: Cement brick samples

Figure 4: Cement brick samples (ratios marked)

SUCCESS STORIES OF THE FACULTY OF HUMANITIES AND SOCIAL SCIENCES

ROOMS IN UNFAMILIAR HOUSES

A Collection of Sinhala fiction in translation from post -war Sri Lanka



This is a collection of translated fiction from post 2008, dealing with the issues that affect a post conflict society like ethnicity, religion, identity, love and the possibilities of peace. Award winning Sinhala writers are collected here and this is the first time that an anthology of Sinhala translations collected according to the theme of conflict and ethnicity has been published in English.

"SANDESHAVALI KAVI NALUWA" A NOVEL THEATRICAL PRODUCTION

Sandesawali Kavi Naluwa characterizes a unique historical landmark of the legendary journey of the University of Sri Jayewardenepura. It enacts the core of the Sandesha Kavya, and portrays on-stage a significant facet of the Sri Lankan literary history to the 21st century audience. This will be showcased as the main event of the Innovate Sri Lanka Exhibition 2019.

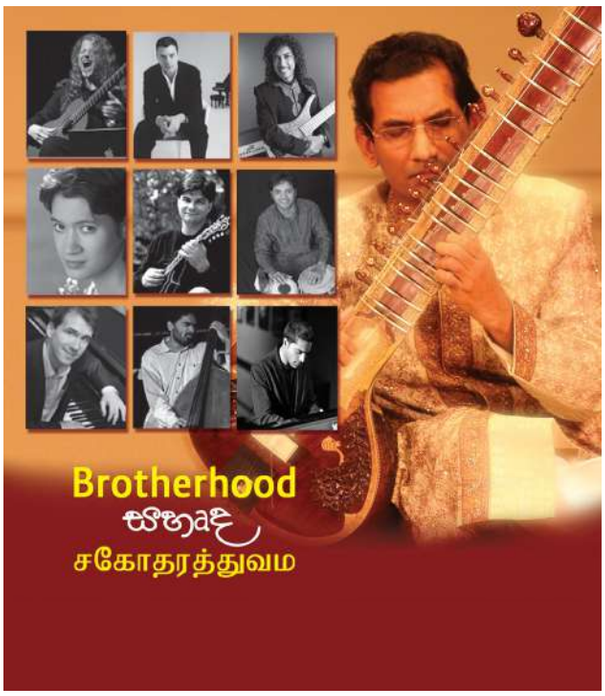
Sandeshavali Kavi Naluva is founded on 5 Sandesha Kavya, namely; Paravi Sandeshaya, Kokila Sandeshaya, Selalihini Sandeshaya, Gira Sandeshaya and Hansa Sandeshaya written during the Kotte period of Sri Lankan history and it is a research based production. The performance, specifically set against the backdrop of the reign of the king Parakramabahu VI of the kingdom of Kotte during 1412-1467, draws on the traditions of Musical Theatre and Poetic Drama.

The script of Sandeshawali Kavi Naluwa has been developed by Ms. Hansamala Ritigahapola who is a senior lecturer of the Department of Sinhala and Mass Communication. Various poems carefully chosen from the five Sandesha Kavya have been set to music by Prof. Pradeep Ratnayake, Dr. Priyantha Thilakasiri, and Mr. Nuwan Vithanage. The dance moves that transformed the

script to a poetic musical drama have been created by Mr. P.W. T. Dian, Mr. Deepal Gunasena and Ms. H.P.A Sulochana of the Department of Languages, Cultural Studies & Performing Arts. Based on a thorough academic observation of calligraphy, and the numbers in inscriptions and ancient documents in the Kotte period, letters, and numbers used for Sandeshawali Kavi Naluwa have been designed by Prof. Karunasena Hettiarachchi (Department of History and Archeology).

This unique musical drama commences with the appreciation of the bird-messengers conveying the necessity for the messages to be winged to king Parakramabahu VI. Then, its substance, refers to an account of the flight the messenger birds take to the destination, and the sights they encounter during their journey. These sights include, for instance, natural beauty, bathing actions, and the crowded, busy city. Then, at the destination, the king is respectfully and courteously seated, as symbolized in Sandesha Kavya. Subsequently, the five messengers reveal to the king, by departing from the original content of Sandesha Kavya, which they worship and pray to the Upulvan God pleading him to protect the University of Sri Jayewardenepura from all probable and impending vices, menaces and risks. While characters enact these scenes through dance and mimesis, with all costumes to suit the contexts; stanzas blended with music are sung, which have been recorded in advance. The dramatic effects have also been created through a theatrical property.

SAHURDA – 'MUSIC OF THE WORLD' ALBUM



A set of world class professional musicians from the United States of America are giving life to the work of a Sri Lankan composer in this compact disk, possibly for the first time in the history of Sri Lankan music. Pradeep Ratnayake collaborated with these musicians and Professors of music during his time as a Fulbright scholar at the Columbia University, New York, which he attended on a United States-Sri Lanka Fulbright scholarship from 2008 to 2010. The brotherhood he found among the musicians and teachers in New York, and among the Sri Lankans in New Jersey who helped him record this music, inspired the name of this CD.

The characteristic style of Ratnayake that fuses various music traditions of the world together on the strings of his sitar is amply found here, where musicians from various traditions of music like Jazz, Western Classical, Modernist, Indian Classical and Sri Lankan folk, find beauty through unity among their various sounds. The distinct Sri Lankan identity that Ratnayake has brought into the sitar, along with new techniques of playing the instrument, is his contribution to world music. Through his original compositions, Sri Lankan folk melodies have travelled the world, being played at Ratnayake's Pradeepanjalee series of music in some of the most distinguished auditoriums in the world, like Carnegie Hall, New York; Asia Society, New York; BOZAR, Brussels; Vienna Musikverein, Austria; United Nations Office, Geneva; and the Walt Disney Concert Hall, Los Angeles; Kennedy Center, Washington D.C.; Yehudi Menuhin Hall in the European Parliament, Brussels; and Markham Theater, Toronto. He has collaborated with some of the best musicians in the world, who have played his work both here and abroad. His symphonic work, the Kuveni Concerto premiered in Germany in 2010 and is still being performed in Europe, the next concert being in July 2019. His combining of the sitar with instruments rarely heard with it, like the piano, has been path-breaking, and the compact disk produced by Baj Records in Japan with legendary Japanese pianist Masahiko Satoh is probably the first of its kind.

This compact disc too, brings in a new instrument into his repertoire, the mandolin, performed by Professor Terence Pender. Professor Ben Waltzer (piano); Professor Arthur Kampella (guitar); Professor Brad Garton (computer music); Hussein Jiffrey (bass guitar); Miranda Cuckson (violin), Nitin Mitta (tabla), Jacob Friedman (piano), Mahesh Balasooriya (piano) and Harish Raghavan (Double Bass) also join Pradeep Ratnayake on the sitar to show that in music, there is a place for all to meet in brotherhood.