

OCTOBER 2021

# IEEE

SRI LANKA SECTION  
**NEWSLETTER**

**Deep Learning  
For Covid-19**

**Cloud  
Computing**

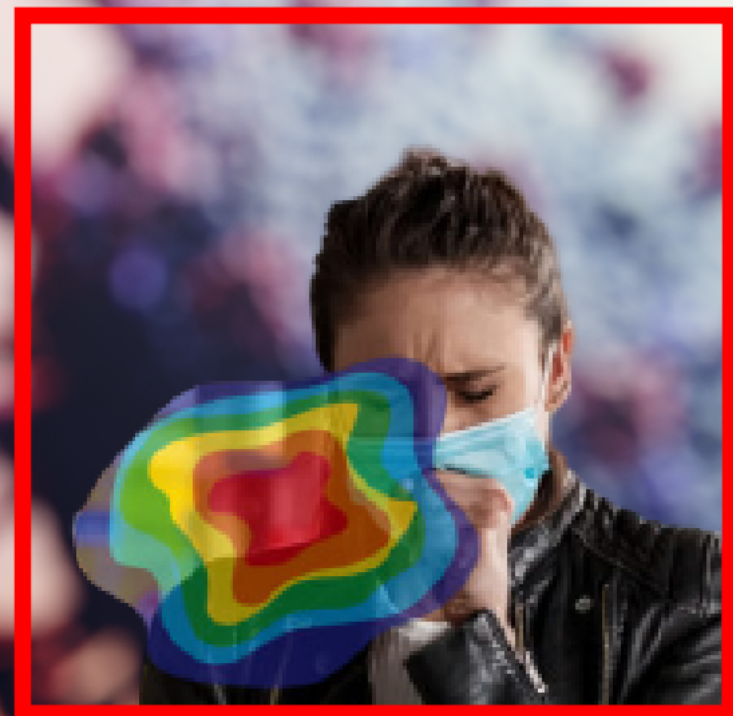
**How to design  
PCB**

**Benvenuto  
2021**

**Nothing is  
Impossible with**

**AI**

**CyberShield  
2021**



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# Message From The Chairman

Hello Readers,

Welcome to the 3<sup>rd</sup> e-newsletter of the IEEE Sri Lanka Section for the year 2021. I sincerely hope you and your families are keeping safe and healthy. I urge every member to take all precautions and follow the necessary safety protocols on Covid-19 and adhere to the guidelines issued by local authorities.

IEEE volunteers as always have arisen to the challenges and continued to amaze the membership with creative online engagements. Our student branches continued to deliver their services to the membership through many activities organised online. This issue of the newsletter highlights sixteen (16) of such events organised through-out the country.

I am happy to announce that IEEE Sri Lanka section signed a memorandum of understanding with Information and Communication Technology Agency of Sri Lanka (ICTA). This new initiative will provide a seamless path for recommended Startup by IEEE Sri Lankan Section to join the pre-incubation program of ICTA. In the long run the startup concepts and ideas generated at IEEE Sri Lanka section organised activities will receive help and guidance from ICTA to develop into local industries, supporting the local economy.

In the past months the section contributed to enhance the diversity of activities happened at local IEEE forums by coordinating “ADAHARAYA” event which was delivered in all three languages with a participation of 20 Student Branches and over 1500 Student members. Furthermore, Section Student Activities Committee (SAC) in collaboration with R10 SAC and Membership Development Committee organised “Spread the Word” and “IEEE Boost” with the scope of expanding the membership and improving the member engagement with the Section.

The Educational Activity Committee of the Section introduced 3Minute Thesis presentation (3MT) competition for the first time to our graduate student members. This year also we called applications for the Electronic Design Competition and we are hoping to have the finals in due course. For the year 2021, the section has granted ten (10) Technical Co-sponsorships to local conferences. We collaborated with IEEE Tainan Section to co-host 5th Online Computer Vision and Artificial Intelligence (OnCV&AI) workshop in September.

Our Industry Relations Committee with the collaboration of Dialog Axiata PLC delivered a member discount program for Dialog broadband connections for the first time. The first round of this benefit program was well received by the members. Prof. A. Nallanathan from Queen Mary, University of London delivered a lecture on the topic “Artificial Intelligence (AI) for Massive Internet of Things (mIoT)” as a part of section Distinguished Lecturer Program (DLP) on 9th of September. The event was well attended by both local and foreign researchers.

As usual, the editorial team was busy with this issue of the newsletter as well as with the newly initiated monthly event notice-bulletin. I congratulate Dr. Ahilan Kanagasundaram, the section editor, and his team again for delivering another successful newsletter. My heartiest thanks goes to all who contributed articles and reports. I am confident that the readers will enjoy your hard work.

While congratulating my team with the section level and all the other volunteers who have contributed immensely for the IEEE activities in the past few months, I hope you, the readers, will enjoy reading the articles featured in this issue.

Enjoy reading and stay safe.

**Dr. Maheshi Dissanayake**  
Chair/IEEE Sri Lanka Section



# Message From The Editor



It is indeed a great honour to be the editor for the IEEE Sri Lanka Section and it is an immense pleasure to launch the second edition of newsletter for 2021. We were overwhelmed and delighted to see the response we got from all of you through your submissions.

IEEE Sri Lanka section has been established to foster technological innovation and excellence for the benefit of humanity and for the advancement of technical professionalism.

2021 has been a challenging time for all of our members as we got to face the Covid situation. As the editor, I aim to balance articles and other news items. For this issue, we are honoured to have eight articles. We are also sharing the activities in which IEEE members were actively involved.

A huge thank you to all the persons who contributed writing the wonderful and inspiring articles, without which there wouldn't have been this newsletter issue. I also thank Chairperson of IEEE Sri Lanka section Dr. Maheshi Dissanayake and executive committee for supporting me.

I wish to place a special thanks to Mr. Anuraj and Mr. Heshan for their efforts behind this edition. Your feedback is of great help to us, do send us your comments to [ahilan@ieee.org](mailto:ahilan@ieee.org). I wish you a pleasant time reading through the Newsletter.

**Dr Ahilan Kanagasundaram**  
Editor / IEEE Sri Lanka Section

# Editorial Committee

## Editor

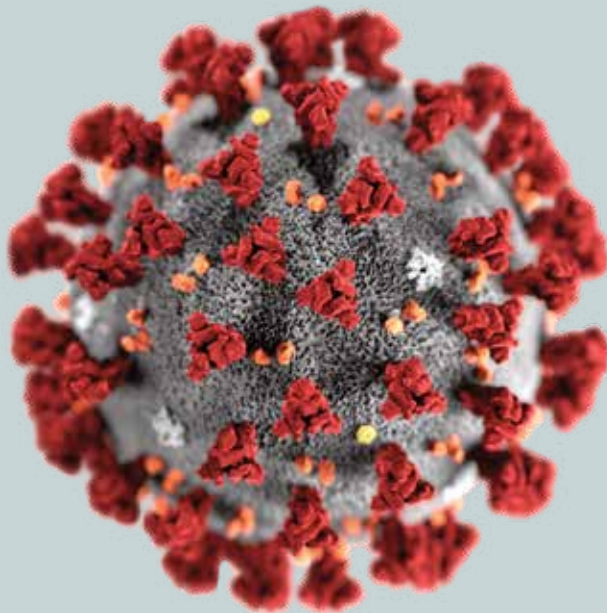
Dr. Ahilan Kanagasundaram

## Editorial Committee Members

Mr. Heshan Nayanajith

Mr. S.P.D Anuraj

# Deep Learning for COVID-19



Coronaviruses are a large family of viruses and SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) known as Covid-19 (COronaVirus Disease-19) is a newly identified member in this family. The first case of Covid-19 was detected in Wuhan, China in December 2019 and since then this virus spread across the world causing a global pandemic. According to the World Health Organization [1], so far (as of the first week of August 2021) there are around 0.2 billion Covid-19 cases and over 4.2 million dead due to Covid-19 reported globally, causing a massive disruption in our day-to-day life and economic crises. This article analyses how Deep Learning (DL) based technological advancements can help to fight with Covid-19.

DL is a machine learning (ML) technique, both are subfields of Artificial Intelligence (AI). AI aims to build intelligent machines. The traditional AI approaches mainly relied on explicit programming, where the knowledge of human experts is transformed into a 'Knowledge Base' by a set of rule-based programs. Inference was done using this rule-based knowledge base; For example, in an AI based disease diagnosing system if the symptoms such as whether a person has fever, headache, etc. are given the system will tell whether that person has dengue or not. On the other hand, in ML machines learn from data. For example, when a set of images of cats and dogs are given, the machines are trained to learn the difference between them. However, in ML some parts of the systems (such as what kinds of features are better suited for a particular problem) are still manually designed by human experts. DL, on the other hand, is a ML technique, based on Artificial Neural Networks (ANN), which mimics the way human brains work. They are called 'deep' because they use deeper version (contains many layers) of ANNs. As DL has the ability to learn from large amount of data, they are widely explored for different domains such as Natural Language Processing, Computer Vision, Medical Imaging, etc. and show state-of-the-art results. DL methods also have been explored for Covid-19 related applications, which includes literature mining, detection of misinformation, public opinion mining, Covid-19 diagnosis from radiology images, drug discovery, vision-based robotics. The following sections give an overview of these applications.

**Literature mining:** Since 2020 over 50,000 scientific articles related to Covid-19 have been published and several new papers have been continued to be published [2]. This makes it difficult for the researchers to keep in track with the latest findings and to identify relevant papers. Automated text mining-based information retrieval systems can help researchers with information extraction, question answering, and summarization of relevant information from this large collection of scientific literature. Various such systems already have been proposed for this purpose, e.g., CO-Search [3].

**Detection of misinformation and the identification of public opinion:** False and misleading information can easily spread through social media than real news does [4] and can negatively impact the public. For example, the spread of misinformation about the Covid-19 vaccines can hamper the government's efforts on controlling the pandemic. Therefore, automatic identification of misinformation is essential to reduce the spread of it. In addition, the public opinion on a particular matter also can be identified by automatically analysing social media posts. For example, if most of the people are reluctant to get vaccinated, government can take appropriate steps to encourage them to get the vaccine. Deep learning-based text analysis systems can help to detect misinformation and help to identify public sentiment.

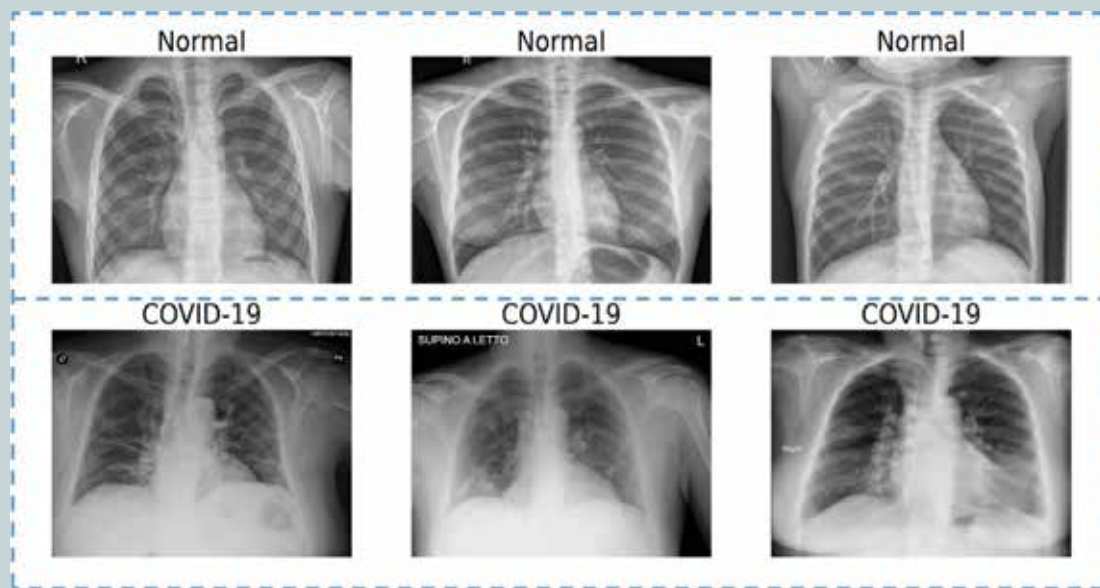


Figure 2: Chest X-rays of normal vs Covid-19 affected patients. Image copied from [5].

**Covid-19 diagnosis:** The commonly used RT-PCR (Reverse Transcription – Polymerase Chain Reaction) test for the diagnosis of Covid-19 requires specialist equipment, which are not readily available in most of the hospitals. In addition, RT-PCR test is often time consuming, requiring at least 24 hours to produce a result [6]. This RT-PCR test is not completely accurate and may require a second RT-PCR or a different test to confirm diagnosis [6]. A rapid detection of Covid-19 can help with timely treatment and help to reduce the spread of the virus by isolating the patient. Therefore, there is an urgent need to find alternative ways which are both fast and accurate for the detection of Covid-19. As Covid-19 is a respiratory disease chest imaging may provide a way to diagnose it. In addition, X-ray and CT machines are commonly available in many hospitals for taking chest images of the suspects. Therefore, there is a growing interest to use these medical images for the diagnosis of Covid-19. Figure 1 shows some example X-rays from normal and Covid-19 patients. Deep learning can help with the detection of Covid-19 by automatically analysing X-ray or CT images of the patients and can provide rapid predictions. Various approaches have been already explored in the medical imaging literature for this purpose.

**Drug repurposing:** Drug repurposing is a process of identifying new use of existing drugs. Deep learning can help to accelerate this process and hence may provide a way to find a cure for COVID-19. Although different computational approaches for drug repurposing exists, the widely used knowledge graph based drug repurposing approach construct a knowledge graph, where, nodes represent biomedical entities (e.g., drug, protein, disease) and the edges between them represent their relationships (e.g., disease-protein interaction) [7]. These approaches then use the drug-target interactions to rank the drugs for a particular disease.

Other vision-based applications: Wearing masks, maintaining social distancing, and disinfecting public places are some ways to control the spread of this virus. It is often difficult and risky to employ individuals to perform or monitor these tasks. Vision based deep learning systems can be deployed at the hospitals and public places to monitor and alarm if there is an undesirable situation occurs. Example situations includes, individuals without masks, social distancing is not maintained, etc. In addition, vision based drones/robots can be used for spraying disinfectants in common places and can be used for providing food and medicines to the infected patients.

There were many other applications explored for Covid-19, which include protein structure prediction [8], spread forecasting [8].

Challenges with deep learning approaches for Covid-19: Although various deep learning based applications were explored in the literature to cope with this pandemic, there are many challenges associated with them. Deep learning methods must be trained before deployment, which requires large amounts of labeled data. Human experts must be employed to annotate the training data, which is a tedious process. Data privacy is another problem when building these models. It should be ensured that any form of personal information is not used when building these models. Interpretability is another issue with deep learning systems. Usually deep learning based methods are black-box methods; when an input is given, the system will provide the corresponding output without giving any explicit explanation about how/why that output is obtained.

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# The new beginning of IEEE WIE Student Branch Affinity Group in Sabaragamuwa University of Sri Lanka



IEEE Women in Engineering (WIE) is a global network of IEEE members and volunteers dedicated to promoting women engineers and scientists, and inspiring girls around the world to follow their academic interests in a career in engineering and science.

We are happy to inform you that we have been successful in establishing the 5th IEEE WIE Affinity Group of Sri Lanka in the Sabaragamuwa University of Sri Lanka as a new chapter in the IEEE Women in Engineering (WIE) community.

The inaugural meeting was held on the 23rd of June 2021 from 6.00 p.m. to 7.00 p.m. as an online session due to the covid-19 pandemic. Prof. Udaya Ratnayake, Dr. Rasara Samarasinghe as the guest speaker, academic staff, and the students of the Sabaragamuwa University of Sri Lanka had participated in this Annual General Meeting.

Ms. Hiruni Seneviratne, Secretary of the IEEE student branch of the Sabaragamuwa University of Sri Lanka, hosted the program. The meeting was initiated by delivering a brief overview about the IEEE student branch of the Sabaragamuwa University of Sri Lanka by Mr. Hiran Hasanka, Chairperson of the IEEE student branch of the Sabaragamuwa University of Sri Lanka.

Prof. Udaya Ratnayake, Vice-Chancellor of the Sabaragamuwa University of Sri Lanka, and Dr. Rasangi Sabaragamuwa, Dean of the Faculty of Applied Sciences also shared their valuable thoughts with the participants.

The journey of the IEEE student branch of the Sabaragamuwa University of Sri Lanka has been reminded via a short video clip. The meeting was enlightened by the guest speech which was done by Dr. Rasara Samarasinghe, the chairperson of IEEE WIE Sri Lankan Section.

The most highlighted part of this event is appointing executive committee members for the year 2021/2022. M.A.F. Fasheera was appointed as the chairperson and Dasuni Jayathilake was appointed as the secretary for the first committee of the WIE affinity group of IEEE student branch of the Sabaragamuwa University of Sri Lanka.

At the concluding stage of the session, Prof. S. Vasanthapriyan, the head of the Department of Computing and Information Systems of the Faculty of Applied Sciences of the Sabaragamuwa University of Sri Lanka and the newly appointed counselor of the IEEE WIE Student branch affinity group of the Sabaragamuwa University of Sri Lanka, Ms. Upeksha Kudagama addressed the meeting.

Just as "We beyond description, beyond measure", the IEEE WIE Student branch affinity group of the Sabaragamuwa University of Sri Lanka, is looking forward to continuing this remarkable journey to sharpen up the skills of the students and make more knowledgeable persons for the industry. So, the waiting is over and a successful year is coming ahead.



# ICARC 2022



**2<sup>nd</sup> International Conference on  
Advanced Research in Computing  
ICARC 2022**  
23<sup>rd</sup> & 24<sup>th</sup> February 2022  
*"Towards a Digitally Empowered Society"*

**CALL FOR PAPERS**

2<sup>nd</sup> International Conference on Advanced Research in Computing (ICARC 2022) is organized by the Department of Computing and Information Systems, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka with the theme "Towards a Digitally Empowered Society". The ICARC 2022 will bring together researchers and practitioners to present their findings on a wide range of research.

- TRACK 01** Artificial Intelligence and Machine Learning
- TRACK 02** Data Science and Applications
- TRACK 03** Parallel and Distributed Computing
- TRACK 04** Human-Computer Interaction and Computer Vision
- TRACK 05** Software Engineering
- TRACK 06** Knowledge Management and Information Systems
- TRACK 07** Technology-enhanced Learning, Teaching and Evaluation
- TRACK 08** Industry R&D
- TRACK 09** Open

**IMPORTANT DATES**

- Paper Submission Open **01<sup>st</sup> September 2021**
- Paper Submission Closed **23<sup>rd</sup> November 2021**
- Paper Acceptance **01<sup>st</sup> January 2022**
- Camera Ready Submission **15<sup>th</sup> January 2022**
- Early Bird Registration **01<sup>st</sup> February 2022**
- Regular Registration **15<sup>th</sup> February 2022**
- Conference Dates **24<sup>th</sup> & 24<sup>th</sup> February 2022**

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**KEYNOTE SPEAKERS**



**Associate Professor  
Supavadee Aramvith**  
Department of Electrical Engineering,  
Chulalongkorn University,  
Thailand  
Topic- AI based Video Analytics



**Dr. Nalin Asanka**  
School of Computer Science,  
University of Auckland,  
New Zealand  
Topic- Mind the gap: Engineering Usable  
Security and Privacy Systems



**Prof. Chandimal Jayawardena**  
Sri Lanka Institute of Technology



**Dr. Sagara Sumathipala**  
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# SPLENDOUR 2021

## 20<sup>th</sup> anniversary celebration of IEEE student branch of University of Peradeniya

The IEEE student branch of the University of Peradeniya is the first-ever student branch to be established in Sri Lanka. The hard work of the enthusiasm of the student members and the help of academic and non-academic staff has lifted up the student branch to be one of the brilliant IEEE student branches in Sri Lanka at present. The Splendour 2021 was organized to celebrate the long journey and all the great things achieved by the student branch and the members over these past 20 years. The Splendour 2021 was an event of seven days consists of sessions of each affinity group of the student branch.

### Day 1 (19<sup>th</sup> July):

#### *Researches and undergraduate projects*

As the opening session of the event, on the very first day, an interesting panel discussion on “undergraduate researches and projects” was organized by the IEEE student branch. The two panelists who enlightened the event were prof K.M. Liyanage (Professor at DEEE UoP) and Dr. Janaka Wijekulasooriya (senior lecturer of DEEE UoP). It was a great chance for the undergraduates to clarify their doubts about projects and researchers. The event gave motivations for students to start on new projects and researches as well

### Day 2 (20<sup>th</sup> July):

#### *Trends and Opportunities in Power Engineering*

On the 2nd day of the week, a session on "Trends and Opportunities in power engineering", was organized by PES (Power and Energy Society), IEEE student branch chapter of UOP.

It was an excellent opportunity for undergraduates to gain Real-world engineering exposure in the new normal. The experts in the field were gathered to get a clear idea about today's field.

Eng. Nuhuman Marikkar (Deputy chief executive officer of LTL holdings, Ltd), Eng. M.R.Ranathunga (Additional General Manager(Projects), CEB), Eng. Niranjan De Silva (Professional Coach and trainer in Communication and Self-development). And also advisor of power and energy society, prof. Janaka Ekanayaka, of UOP, were the resource persons for the talk series.

### Day 3 (21<sup>th</sup> July):

#### *IoT*

IEEE RAS (Robotic and Automation Society) organized the second day of the event which was a talk on IoT. The guest speaker was engineer Migara Amithodhana(Chartered engineer) who has vast knowledge and a great deal of experience in this area. The event was a great platform for all the participants to have their hands in IoT.

### Day 4 (22<sup>th</sup> July):

#### *Advanced Development of Telecommunication Industry*

IEEE MTTs which is Microwave Theory and Techniques Society, Student Branch Chapter of the University of Peradeniya which is the first and only IEEE MTTs Student Branch Chapter in Sri Lanka was so delighted to take control on the 4th session. Two short talks and a panel discussion on 'Advanced Development of Telecommunication Industry' were conducted having five experts of the communication field on board. The keynote speakers for the event were Prof.Aruna Gunawardhana and Dr.Himal Uduwawela attached to the Department of Electrical and Electronic Engineering, University of Peradeniya. Prof.Disala Uduwawela of Department of Electrical and Electronic Engineering, University of Peradeniya, prof.Karu P.Essella of the University of Technology, Sydney, Australia, and Eng. Tharindu Dayarathne of Arthur C.Clerke Institute, Sri Lanka were the panelists for the panel discussion.

# SPLENDOUR 2021

20<sup>th</sup> anniversary celebration of IEEE student branch of University of Peradeniya

**Day 5 (23<sup>rd</sup> July):**

**Leadership Skills Development webinar by WIE**

The fifth-day event was organized by the WIE chapter of IEEE UOP. A webinar on Leadership Skills Development with the guest speaker, Michelle Fernando, present superintendent OT networks at BHP, Brisbane, Australia. It was clearly seen that this event became a source of great self-confidence and motivation for all the participants.

**Day 6(24<sup>th</sup> July):**

**Introduction to 5G communication**

On the 6<sup>th</sup> day of the event, IAS( Industrial Application Society) organized a talk on Introduction to 5G communication. This session was conducted by Mr. Yushan Siriwardhana, a Doctoral student at the Center for Wireless Communications, University of Oulu. The main objective discussed in this talk was 5G technology and its implementation.

**Day 7 (25<sup>th</sup> July):**

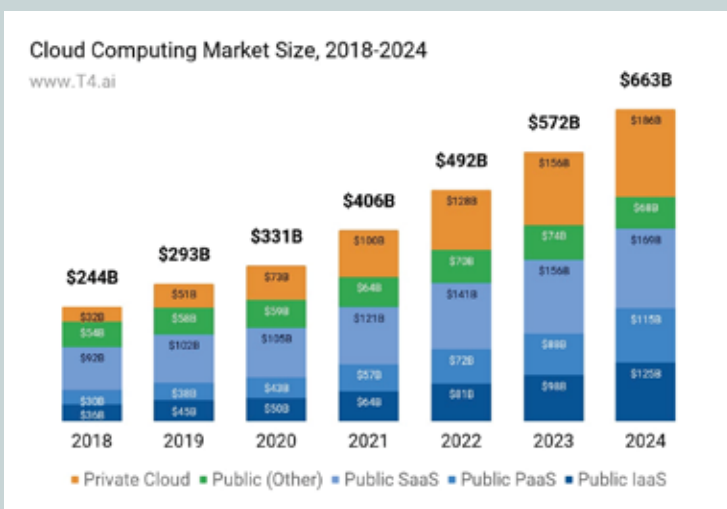
**Electrical and Electronic Engineering job market sb**

The student branch again organized the final session of the event which was a panel discussion on the Electrical and Electronic Engineering job market. The three panelists were engineer Indrasiri Gallage, former power plant manager, LVPP Ceylon electricity board., engineer Kiththi Perera, CEO, Sri Lanka Telecom., engineer Farazi Fahmi, director, research and development at Synopsys. With this great session, Splendour 2021 was concluded successfully.



# Trends Emerging in Cloud Computing

The On-demand availability of computer resources through the internet including storage, databases, IT infrastructure and other services on the basis of “pay as you go” is simply known as “Cloud computing”. The history of cloud computing runs back to the 1960s where the fundamental concepts were established. There onwards it has been upgraded with more added features and technologies. Cloud Computing has been trending significantly around the business world in the past few months with the COVID-19 global health crisis. Because of this unpredictability of the current situation, businesses have adapted to the “new normal” and organizations have adapted to cloud solutions and the digital transformation. Therefore the global pandemic in a sense has been acting as the catalyst in this acceleration of the usage of cloud services.



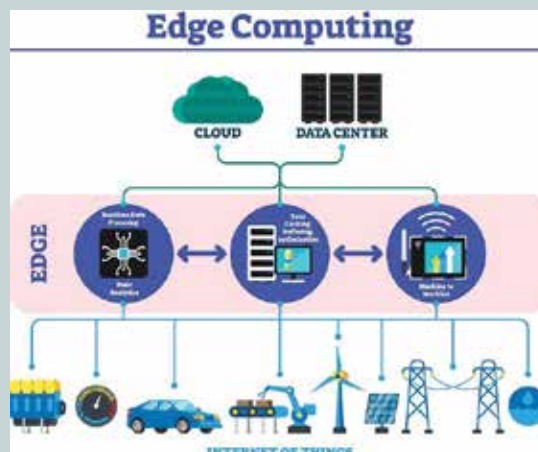
Adoption rate of Cloud Computing

With the influence of developing technologies and innovations, cloud computing is enhanced day-by-day and still Based on the requirements of the user, cloud computing is further categorized into three classes as public, private and hybrid clouds. Furtherly, services provided are categorized as Infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS) and Serverless computing. And there are service models such as Agile as a Service (AaaS), Artificial Intelligence as a Service (AIaaS), Blockchain as a Service

IoT as a Service (IoTaaS), Network as a Service (NaaS) and furthermore such services can also be obtained by Cloud computing. There are several benefits obtained through cloud computing. Cost effectiveness, security and data recovery are the main benefits among them that have influenced businesses to adapt to cloud computing in this pandemic situation. emerging as a technology.

Several trends are already upgraded into cloud computing and some are still on experimental level. Currently, the focus is mainly towards serverless computing. Serverless computing is a new cloud service mostly beneficial for software developers in managing network servers and helping in being more productive. It is expected to have rapid growth by the year 2025. Serverless Computing plays an important role in the digital transformation.

Artificial Intelligence Engineering is considered as an emerging technology in Cloud Computing. AI is expected to show a rapid growth in market by at least 2024 exceeding \$300 billion income. Even though Cloud computing has a lesser history than Artificial Intelligence, AI acts as a catalyst in Cloud computing adoption. As it is so important, AI was introduced to the “as a Service” family. AI Engineering is considered as the future in technology. Cloud computing along with AI engineering will be a massive resource to the future industrial world.



Edge - Cloud Architecture Layer

Another emerging trend that has been dominating in the IT field is the Edge computing which can be introduced as the deployment of computing infrastructure that connects the computations and data storages closer to originating sources of data. Edge computing plays a significant role in cloud computing. Edge cloud is more advantageous as it captures both functions and qualities of the on-premise servers and cloud servers. The edge to cloud architecture layer briefly describes how edge computing and cloud computing are interconnected.

Expansion of the Platform as a Service and the rise of the concept “Distributed Cloud” is also expected to show a growth in 2021. The basis of distributed cloud is that the public cloud services can be distributed among different physical locations while the governance and responsibility is held on to the initial public cloud provider. Furthermore, distributed cloud services can be categorized as distributed computing systems, distributed information systems and distributed pervasive systems. able position.

The events of 2020 remarkably affected on the distributed cloud computing and the ability of disaster recovery made many businesses expand themselves and adapt to this technology. Along with distributed cloud, Multi-Cloud solutions are also embraced by businesses allowing them to pursue two or more cloud services from several distributed cloud service vendors

Technologies evolve and upgrade every second, therefore it is very difficult to predict future innovations. But all we can predict is the emerging trends in an existing technology. Of course, Cloud Computing has not reached its peak level. But the future of the business world depends on several technologies and among them Cloud computing holds a remarkable position.

**Shavinda Wanigasekara**  
Student

Sabaragamuwa University of Sri Lanka



The graphic features a blue background with a large yellow speech bubble containing the text 'Hey !'. Below the speech bubble, a man in a suit is pointing towards it. To the left, there is a blue box with a yellow border containing a group photo of people and the text 'Are YOU Next?'. At the bottom of the graphic, the text 'Start Here ► Go Anywhere!' and the URL 'ieee.org/renew' are displayed.

Are YOU Next?

Start Here ► Go Anywhere!  
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Hey !

Renew your IEEE membership by 1st of November 2021 to be entered to win one of ten US\$500 Amazon gift cards.

Start Here ► Go Anywhere!  
[ieee.org/renew](http://ieee.org/renew)

## IEEE Techno Meetup Sri Lanka

Techno Meetup Sri Lanka has undoubtedly proved to be a novel experience for young tech enthusiasts across the country. Initiated in 2017 as a platform for knowledge sharing among undergraduates and industry professionals, Techno Meetup Sri Lanka hopes to provide a unique opportunity to its participants for the 5th consecutive year in 2021. Due to the COVID-19 pandemic situation a different approach was adapted by the programme in 2020. Techno Meetup planned a series of virtual events through which a larger audience was reached and the scope of the event was widened. This allowed the continuation of the Techno mission amidst pandemic restrictions.

In 2020, TMSL designed a program aligning each month with a technical theme and consisting of 4 elements: industrial level virtual meetup series, Tech Innovator; a series of documentary videos with industry professionals discussing real-life technical applications in the particular field, Let's breakthrough; a platform for young technical innovators in Sri Lanka to present their innovations to a broader audience, and sharing content based IEEE resources, especially IEEE Spectrum articles about latest technological advancements.



The month of June in 2020 was based on IoT and the first webinar was conducted by Mr Prabhath Weerasinghe, Head of Faculty of Computing at Saegis Campus Sri Lanka, on the topic “Unleashing the potential of IoT.” Mr. Nisal Hewagamage provided his insight to the first episode of the Tech Innovator. Electric vehicles was the next topic; the session was organized as a Distinguished Lecturers Programme in collaboration with the Electrical, Electronic and Telecommunication sectional committee of the Institute of Engineers, Sri Lanka (IESL) and IEEE Sri Lanka Section. Mr. Udaya Kumara Madawala who is a Professor at the University of Auckland, New Zealand, addressed the audience on “Wireless Grid Integration of EVs for V2G Applications”. The next topic addressed was Machine Learning, the webinar was titled “Human Languages from Machine’s Point of View,” and featured Mr Kesham Sodimana, a Google Developer Expert in Machine Learning. The next Tech Innovator edition released in August was featured by a Microsoft MVP in Artificial Intelligence, Mr. Haritha Thilakarathne. He provided his insight based on his experience in machine learning, deep learning, Azure AI stack, and developing intelligent applications.

# IEEE Techno Meetup Sri Lanka

The Month of Game Development reached the audience in a newer shape as a panel discussion. The event enlightened on “The Untapped Potential of Game Development” and was graced by three astounding panellists Mr. Thilina Premasiri, Head of Game Development at Arimac, Mr. Anish Wijesinghe, Founder and CEO of Motion Miracles and Mr. Poorna Perera, 3D Artist at LiveRoom and session was illuminated by the outstanding moderator Mr. Mazin Hussain, Editor-In-Chief at ReadMe. The panel discussion reached a huge success and set a higher bar to the event series. Following the success of the panel discussion, the month of telecommunication was discussed by an experienced panel in the industry which included Mr. Mahinda B. Herath, the Chief Executive Officer at Information and Communication Technology Agency of Sri Lanka (ICTA), Mr. Vinod Samarawickrama, Managing Director of Ericsson Sri Lanka & Maldives and Dr. Madhusanka Liyanage, 2020 IEEE RB ComSoc Outstanding Young Researcher along with the exceptional moderator and professional Youtuber Mr. Malinda Alahakoon. The topic discussed was “To the future through connectivity.”

Throughout the year Techno Meetup partnered with Articulate and ReadMe as Digital Media Patners and Motion Miracles as a knowledge partner. Techno Meetup 2020 successfully offered its audience with a complete experience of the latest technologies and trends in technology.

After a successful year of knowledge sharing and networking in 2020, IEEE Techno Meetup Sri Lanka hopes to continue its virtual journey in 2021 by providing an elevated experience to the participants. Under the theme “Traversing the Techno Journey,” the plan for 2021 consists of webinar series focusing on latest technological topics, a video series with the title “Technology for Humanity,” the Tech Innovator Podcast and a technical content sharing platform for sharing articles and technical content. Environment Protection, Sustainability through technology, Frontier technical advancements in combating the pandemic, Digital Wellbeing, Use cases of data science in day-to-day life, Technology associated with Digital Art, Music Technologies, Cube satellites, Rovers and Nanotechnology are the proposed topics to be covered in the 2021 series. At the Techno Meetup journey in 2021, the team hopes to have a series of knowledge sharing sessions, a flagship event in the form of Techno Forum and many more brainstorming sessions along its journey of educating and encouraging innovation for the advancement of humanity through technology.





# Video Transmission in 5G and Beyond



5G (or 5th Generation) is the latest commercially available standard for communication technologies. While the key improvement in the advancement from 1G to 5G was the transmission data rate, the advanced characteristics present in 5G is not merely high speed data, but also the high capacity and low latency. Theoretically 5G possess a faster transmission speed of hundred times than that of 4G, enabling download of a 3GB movie within a second. Traditional networks experience delays in accessing web page due to the time laps between the confirmation of the request and the delivering of the content, especially where web page consists of multimedia content. But in contrast 5G technology is capable of delivering services with low-latency while improving the multimedia viewing experience, with low power consumption.

The network resources, especially bandwidth, required to transmit a video file is highly dependable on its resolution (the number of pixels in a video picture). Inter alia, the type of the video content and acceptable latency level also plays a significant role when determining the bandwidth requirement for high user experience. Better resolution has been the name of the game for video industry over the last decades beginning from VGA, then DVD, 720 p, 1080p, 4K through to 8K at present. Such high resolution, high quality video traffics demands for significantly high bandwidth.

Even with the most advanced 5G technologies the bandwidth is scarce and costly. As the number of entities engage with high quality video increases, better solutions are sought to deliver videos to clients with higher user experience, while maintaining the bandwidth requirement as low as possible.

Raw videos hold a lot of information. Yet, inherently, it possesses significant amount of redundancy and correlation. In video compression these redundancies are exploited and data are rearranged to achieve higher compression ratio. Since at some levels these compression algorithms are not 100% reversible, they compress the videos at the expense of raw quality. These algorithms are hundreds of times more efficient and that is what makes video streaming possible.

Most of us are familiar with MPEG-2 and H.264 video formats, which are defined by Moving Picture Experts Group (MPEG). They are highly efficient and provide good quality images with minimal amount of bandwidth, while degrading the quality of the video as little as possible. Not too distance past, H.264 and MPEG-2 were adequate and reliable for video transmission to meet the user satisfaction. Yet, with the world of 4K and beyond, these compression standards fell too short.

# Video Transmission in 5G and Beyond

With the availability of extreme high quality such as 4K HD displays in the market, the Moving Picture Experts Group (MPEG) proposed HEVC/H.265 as the successor to H.264, which offers 50% better data compression maintaining the same level of video quality and has the potential to support resolutions up to 8K (8,192x4,320) pixels. To reach this extremely high compression, many novel algorithms were developed by the HEVC developers which eventually ended up in patent pools. These patent pools resulted in a high licence cost in HEVC embedded hardware and software, which worked negatively in the 2020 market as it faces a worthy competitor: VP9, which is a royalty free video codec.

With the introduction of 5G networks, new opportunities were created for video-enabled services for both individual and industry customers. Outlook for these services predicted 8K resolution and beyond, with new strict requirements for low 'end to end' latency for video delivery. In view of these demands, the successor for HEVC, the H.266 or Versatile Video Coding (VVC) was proposed on 6 July 2020, which ticked all the boxes in 5G video communication market. VVC has the potential both to enhance the user experience for existing video services and offer an appropriate performance level for new media services over 5G networks. VVC offers the highest compression efficiency available today, by delivering substantially higher quality at the same bit rate. Key versatility of VVC is its ability to handle not only traditional 2D-videos, but also all the computer-generated imagery with high sensitivity.

Yet, VVC already encounters healthy challenge from Alliance for Open Media (AOM) in the form of AOMedia Video 2 (AV2) while its predecessor AOMedia Video 1 (AV1) is picking up momentum in the market. AV2 might be the one perhaps destined to oust HEVC from the broadcasting domain point of view.

High-level content adaptive techniques tested with AV2, has claimed 20% to 40% savings in bandwidth with combination of HEVC and content aware encoding, compared with HEVC alone.

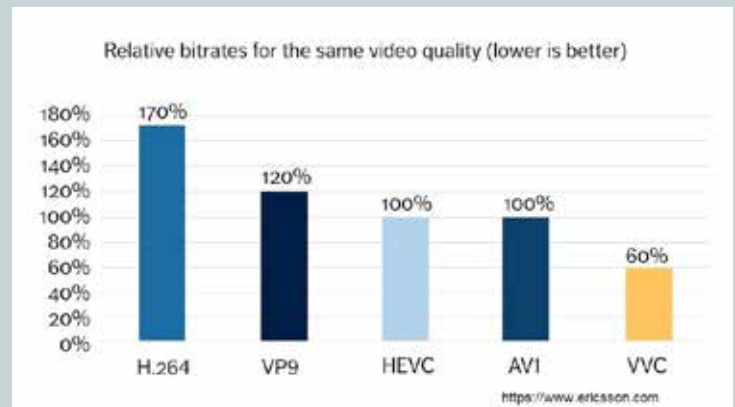


Figure 2: Relative bitrates for the same video quality  
<https://www.ericsson.com/>

In the present context live streaming an 8K video to an 8K displays is a challenging task for a 4G network, since both capacity and latency restrictions fall short of the user demand. Further, many gamers experience lags in high definition live gaming applications due to bandwidth restrictions. This problem would be solved with the emerging compression standards when 5G communication technology amalgamates either with VVC or AV2. Not only that, harmony of these two technologies would enable chains of various innovative services where timely delivery of multimedia data plays a significant role, such as in broadcasting industries, hologram industry, video conferencing, automation industries, remote controlling facilities and most importantly healthcare and medical industries.

In future, with the popularization of 5G networks and high-definition videos, more advanced technologies and business models will spew out. Whoever wins the compression war could play a major role in this global arena.

**Dr. Maheshi B. Dissanayake**  
Senior Lecturer,  
Faculty of Engineering,  
University of Peradeniya

# IEEE & WIE Awareness Online Webinar

## By IEEE Wayamba University of Sri Lanka Student Branch



The IEEE Wayamba University of Sri Lanka Student Branch held the annual IEEE and WIE awareness program on the 13th of May 2021 from 5.30 pm onwards. Because of the covid pandemic, the program had to be held virtually. With 150+ attendees, a two-and-a-half-hour program was conducted for university freshers and those interested in being a member of the IEEE organization. On the day of the event, the Student Branch recruits freshers.

The session was constituted with a panel of speakers. The panel consisted of Mr. Samith Chathuranga Perera, Former Vice Chairman at IEEE Young Professionals Sri Lanka, Mr. Tharanga Premathilake, Former Chairman at IEEE Wayamba University of Sri Lanka Student Branch, Ms. Warunika Hippola, Student Representative at IEEE Region 10, Ms. Gresha Srimani Samarakkody, Assistant Treasurer at IEEE WIE Sri Lanka Section, Mr. Harindu Sarathchandra, Former Chairman at IEEE Wayamba University of Sri Lanka Student Branch, Mr. Lakshara Gunawardhana, Co-chair for the IEEE Sri Lanka Section Student Young Professional Women in Engineering Congress 2020.

The program commenced with Ms. Warunika Hippola's session, Introduction to IEEE, which was proceeded by other speakers. The panel of speakers shared their experiences participating in IEEE events and how they have benefited from them. They gave their insights to participants on how to volunteer with IEEE, the benefits of being an IEEE member, and the opportunities offered by IEEE including Research Publications. Moreover, the audience was given the opportunity to know more about the University Student Branch, including previous events and upcoming events. It was an interesting and informative program that was filled with wholesome compliments from the audience for conducting the session successfully. IEEE Wayamba University of Sri Lanka Student Branch hopes to have a better future with this new beginning.

**“Do you know?”**  
Currently In the IEEE Sri Lanka section has 643 women in engineering membership.



## PCB Design Workshop and Competition

### By IEEE Student Branch of University of Peradeniya

A PCB Design Workshop and Competition was organized by IEEE Student Branch, the University of Peradeniya in collaboration with the Open University of Sri Lanka with three days webinar series and a project competition from 10 Jun 2021 to 12 Jun 2021. The workshop was aimed to provide knowledge about complete PCB designing from a very basic level to an advanced level while keeping participants motivated with daily challenges. The first two webinars were conducted by Eng. Ranjan Kulathunga on concepts of PCB Designing from Basics and Review of PCB's Advanced tips dedicating his valuable time. The final webinar which was on Applications of PCBs and PCB Fabrication was conducted by Prof. Aruna Gunawardena, encouraging students to be more familiar with the real-life working environment. During the series, the participants were allowed to form a group of a maximum of three members, accomplish the tasks given, and submit them at the end of the series. A number of competitive projects were compiled showing the enthusiasm of participants which is really appreciable. The three most outstanding projects were chosen and the three winning teams were awarded at the end of the program.



## IEEE Day AirDrop



20% discount  
**IEEEDAY21COM**



50% discount  
**IEEEDAYSMC2021**



50% discount  
**IEEEDAYSPSTU50**



**Half-price Society membership**



# Challenging Nature of UAV Mission Planning

Urban air mobility (UAM) has caused various societal impacts as it capable of performing transport and logistic missions in out-door environments and governments are already investing massively in the technology. Pilot projects are already performed in in cities such as Dubai, Singapore, Los Angeles and Dallas in the early 2020s, with technological advancements and it is predicted by early 2030s that Unmanned Aerial Vehicle (UAV) technology will spread cost effective services to major metropolitan areas around the globe. UAM will be useful for solving the urban mobility problem in general (urban traffic pollution and congestion) where the increasing two-dimensional capacity in transport networks will not be able to address existing traffic situation. As there is a global challenge of reducing emissions due to the reasons such as idling motor vehicles causing serious pollution and contribute strongly to issues with living in dense urban areas, UAM will be a potential strategy to support sustainable transportation and it be integrated in the existing mobility networks by providing time-efficient and safe mode of flight experience to more and more passengers at increasingly low cost. There is a trend in research and practice for using UAVs for disaster reliefs, emergencies, monitoring and reacting and many other different functions.

UAV technology has been shown to be viable and applicable in the areas such diverse areas as defense, search and rescue, agriculture, manufacturing, and environmental surveillance. A critical challenge to achieve effective and efficient exploitation of UAV technology for these purposes is to have place a coordination and monitoring system for the UAVs. The problems of goods delivery mission planning for UAVs fleets are subject of intensive and it belongs to the class of planning problems which have different degrees of attractiveness when evaluated against multiple decision criteria.

The problem addressed cover different layers of system architecture, which includes fleet level where the fleet is managed to provide delivery services and the platform level where it focuses on the individual functioning of the UAVs. The complex nature of this relates to both fleet and platform levels as shown in above figure.

Mission planning and mission control consists of finding sequence of waypoints that connects the start to the destination waypoint which differs from trajectory planning where the solution path is expressed in terms of the degrees of freedom of the vehicle.

What has been accomplished in the field has focused on UAV routing for transporting materials and surveillance without giving much attention to the changing conditions in weather and non-linear fuel consumption models. In contrast to general routing problems, several individual objective functions can be used in UAV routing such as reducing individual UAV costs, enhancing its profit, increasing safety in operations, reducing lead time, and increasing the load capacity of the entire system. This problem differs from the traditional time dependent Vehicle Routing Problem (VRP) as this problem needs to address both the fleet management as well as the individual vehicle management as shown in figure.

Influencing parameters for decision criteria in UAV mission planning includes numerous parameters and constraints. It can be seen that the decision space comprises of the following aspects:

- Routing and scheduling in 3D environment
- Changing weather conditions
- UAVs specifications
- Energy consumption affected by weather conditions
- Carrying payload of UAVs
- Collision avoidance against moving objects and fixed objects.

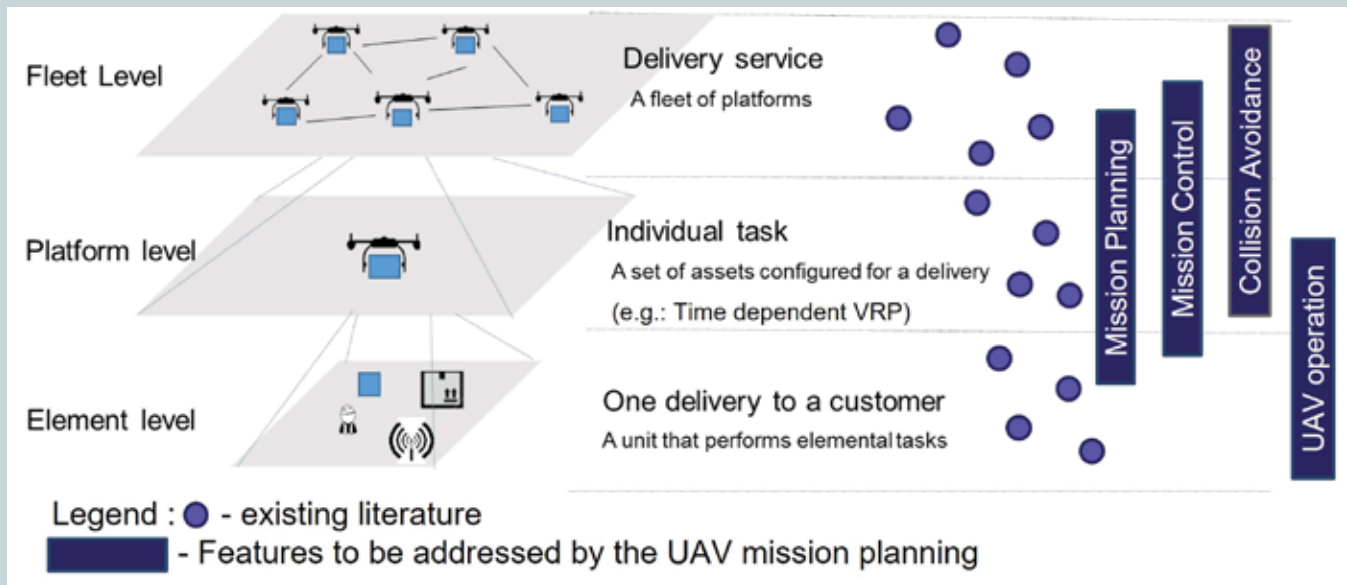


Figure 1. Overall hierarchical representation of the system related to UAV mission planning

All these elements emphasize the intractability of mission planning as it is challenging to develop models considering all the influencing aspects simultaneously. Due to these various independent aspects potential searching for possible solution are numerous. For instance, concerning collision avoidance, solutions differ with fixed obstacles vs moving flying obstacles and single obstacle vs many obstacles. As the solution space becomes large, prevention of collisions can be done by heuristics that guarantee collision free mission planning but at the cost of better solutions as the solutions requires to cover both fleet level and individual flight planning of each UAV. In the context of mission planning, with regards to fleet level collision avoidance constraints should be considered and in platform level constraints related to individual UAV such as payload constraints and energy constraints should be focused.

Thus, using heuristics does not guarantee better solutions. Existing methods for UAV mission planning have focused predominantly on finding paths that satisfy vehicle dynamics assuming linear fuel consumption. The current state of research in this domain is scattered and fragmented as existing studies fail to tie all the parts related to the gap together. The challenge is to close the gap between the real-world application needs and the existing technologies to support UAM, which will close some of the key gaps and solve some of the key challenges that must be managed to enable UAM on a truly large scale.

**Dr. A.I.T, Gamage**  
**Senior Lecturer,**  
**Department of Transport & Logistics**  
**Management, Faculty of Engineering,**  
**University of Moratuwa.**

# Annual Award for the Most Outstanding Undergraduate Energy Research 2022

## Annual Award for the Most Outstanding Undergraduate Energy Research 2022 Sri Lanka Energy Managers Association



### Sri Lanka Energy Managers Association (SLEMA)

SLEMA was founded in 1984 for the promotion of efficiency and rational use of energy in Sri Lanka, and was incorporated by an Act of Parliament in 1994. It is the pioneering organisation in the field of energy efficiency in Sri Lanka where the energy management fraternity is linked through SLEMA, making it the common forum for the energy managers to share their experiences and expertise. Regional and international energy experts and organisations interact with SLEMA as the pivotal organisation in the field of energy efficiency.

SLEMA envisages in making 3 annual awards to the best undergraduate students' research projects in local higher educational institutes carried out in the field of Energy to recognize and stimulate the research interest encouraging young undergraduates to pursue a career and/or to contribute to the uplifting and broadening the field of energy, in particular in Sri Lanka. The aim of these prestigious awards is to promote & inspire excellence in the study of energy related disciplines, to recognize and reward talent, and to promote and encourage energy applications in Sri Lanka.

### Objective

The objective of the awards is to recognize the significant research contributions made by the undergraduates in the Sri Lankan higher educational institutes to the discipline of energy.

### Application Areas of Projects

The sub disciplines that may include the following, but not limited to:

Energy efficiency (given a prominence), renewable energy, energy policies, energy economics, energy financing, energy technologies, energy physics, energy chemistry, energy accounting & auditing, cross border energy transfer, energy poverty, access to energy, energy conservation, energy storage, energy pricing, marketing energy products, energy humility, energy in transportation, industrial energy, energy transition, energy simulation, IoT based applications, energy management systems, & waste to energy etc

### Who is entitled to apply?

Any faculty (or College / School) in Sri Lanka recognized by the University Grants Commission of Sri Lanka under the Universities Act, which are in operation where at least one batch has completed final year projects, at the time of Call for Nominations. The award is for the undergraduate research projects completed in their final year.

### Number of Entries:

Number of entries from a Faculty (or College / School) is limited to 3. The nominations have to be submitted through the respective Dean of the Faculty (Head of College / School) on recommendation of the respective Head of the Department / Internal Supervisor.

# Annual Award for the Most Outstanding Undergraduate Energy Research 2022

## Application

An abstract of the research project not exceeding 2 pages indicating the project aim, approach, key findings and the potential impacts of the key findings to the society has to be submitted to the SLEMA electronically by the deadline, along with the duly filled prescribed Application / Abstract Submission Form (available at: [www.slema.lk](http://www.slema.lk)). The attributes given under the 'selection criteria' below should be emphasised in the Abstract.

## Number of Awards

SLEMA shall make 3 annual awards of excellence as follows

- Winner of the Year (Award of Excellence for the most outstanding research project)
- Runners-up (Merit Awards of the next 2 top ranked research projects)

## Selection criteria

The selection criteria shall give weight to the following attributes of the research

- Relevance and originality
- Impact on the society, and its wider applicability
- Contribution to the research discipline
- Use of principles
- Critical thinking and innovativeness
- Clarity of expression
- Level of challenging the status quo (business as usual)
- Optimum use of resources

The selection shall be carried out by an eminent panel of judges appointed by the SLEMA

## Deadline

The deadline for this call of applications shall be March 31, 2022

## Awards Ceremony

The shortlisted 3 winners may be invited to make a 10-minute presentation (project leaders) or present a poster at the Annual Sessions of the SLEMA, usually held on the last Friday of July every year, and the awards may be presented at the Annual Sessions.

## Resolution of discrepancies if any

The decision of the SLEMA shall be final

## Research Publications in the SLEMA Journal

The researchers have a window to publish their energy related research in the open access SLEMA Journal (<https://slemaj.sljol.info/about/>).

For details, please visit [www.slema.lk](http://www.slema.lk) or write to [slema@slt.net.lk](mailto:slema@slt.net.lk)



# COMMUNICATION SERVICE PROVIDER - Lecture Series

## By WIE Affinity group of the IEEE student branch of University of Peradeniya



The WIE Affinity group of the IEEE student branch of University of Peradeniya organized communication service provider lecture series for the 7<sup>th</sup> consecutive time on 7<sup>th</sup> December 2020 onwards to aim the undergraduates who are interested in telecommunication field with the support and guidance of Dr. Maheshi Dissanayake, current chair of IEEE Sri Lanka and advisor of the IEEE WIE Affinity Group of University of Peradeniya. Although it was held as an in class course in the previous years, due to the pandemic situation this time we moved to online mode of delivering lectures as webinars and conducted via 'Zoom' platform. We were able to successfully complete six webinars. It was open to all undergraduates all over the country.

The event was executed as a discussion and the professional expert in the fields of telecommunication Eng. Anuradha Udunuwara, Senior Engineer at Sri Lanka Telecom was invited as the guest speaker. His immense support throughout the series made this event successful. The course content was based on the telco-sofwarization

The lecture series was held for 6 days and the time duration of one lecture was 2 hours. The 1<sup>st</sup> lecture was held on 3<sup>rd</sup> December 2020 and the other lectures were held on 7<sup>th</sup>, 10<sup>th</sup>, 23<sup>rd</sup>, 28<sup>th</sup>, 30<sup>th</sup> December respectively.

The reach of the event was impeccable since the event beheld participation from undergraduates of universities and institutes around the country including those from

University of Jayawardenapura, University of Ruhuna, University of Jaffna, University of Colombo, University of Wayamba, University of Uva-Wellasa, NSBM Green University, Informatics Institute of Technology (IIT), Sri Lanka Technological Campus The Open University of Sri Lanka etc. An average of 100 students were there throughout the event and the active participation of the students were highlighted. Each student who successfully completed the course with 80% of attendance were awarded a certificate by IEEE WIE Student Branch Affinity Group of University of Peradeniya.

At the end of the lecture series Eng. Anuradha Udunuwara who was conducted the lecture series was awarded a token of appreciation by IEEE WIE Student Branch Affinity Group of University of Peradeniya.

The lecture series on "CSP" was organized as a platform to inspire young undergraduates to pursue their goals by deciding their future career path. The event allowed networking between the WIE Committee at University of Peradeniya and many other IEEE Student branches in Sri Lanka. The organizing committee was able to build valuable connections which will assuredly benefit in the future. The talk series including four successful webinars moulded the individuals participating to be better in many aspects. New iterations have been planned to be held annually in the future.



## Drives and Controls for Industrial Automation

### By IEEE PES Student Branch Chapter of University of Moratuwa

IEEE Power and Energy Society (PES) Student Branch Chapter of University of Moratuwa had organized a webinar under the topic “**Drives and Controls for Industrial Automation**”. Since drives and controls for automation is an essential part for those who are interested in the technical world, this webinar was held in hoping being guidance for them.

The webinar was conducted by Eng. Pathum Thennakoon, Assistant Manager, Automation and Business Development of Lalan S R Automation Systems (Pvt) Ltd. The webinar was held on 16th January 2021 from 6.00 pm to 8.00 pm under the consistent guidance of the chapter advisor , Dr. Lidula N. Widanagama Arachchige. The participants were able to learn the basic concepts of drives and controls for automation and the lecture was followed with a passionate Q & A session where the participants were able to interact with the guest lecture and share their knowledge and get solutions for their problems.



## INTRODUCTION TO HACKATHON WORKSHOP

### By IEEE Student Branch of University of Ruhuna

Introduction to hackathon workshop which was organized by IEEE Student Branch, University of Ruhuna was held on 21st of September 2020 at Department of Electrical and Information Computer Centre, Faculty of Engineering, University of Ruhuna, with the participation of over 70 students. The workshop was conducted over 2 hours. The workshop aims to share practical experience and give the general idea of hackathons.

At the beginning of the workshop brief introduction was given about hackathon competitions and the IEEEExtreme Programming Competition. All the participants were guided to use HackerRank platform to practice and to accordingly improve their coding skills.

Students were encouraged about achieving hacker-rank badges. Some of the challenges were solved while explaining during the session.



# Benvenuto 2021

By IEEE Student Branch of University of Jaffna

The IEEE Student Branch of the University of Jaffna (abbreviated as IEEE-SB-UoJ), Sri Lanka has members from the Department of Computer Science and the Faculty of Engineering. The IEEE-SB-UoJ had 66 student members (60 from Computer Science and 6 from Engineering) before September 2020 and the branch has 182 student members (110 from Computer Science, 74 from Engineering) and two graduate student members. The promotion committee of the IEEE-SB-UoJ worked very hard to achieve an increase of 118 new members by conducting several awareness sessions and circulating various flyers designed by the branch Ex-co members. With the rapid increase in the number of members in the branch, several activities have been conducted efficiently in a friendly manner amidst the pandemic situation.

The IEEE-SB-UoJ organised several webinars and workshops to enlighten not only its members but also members from other HEIs to the technological advancements in the field of Computing and Engineering. In addition, our student members wanted to show their skills and volunteer in the branch activities. So, the IEEE-SB-UoJ came up with an idea, "Benvenuto 2021". It is a team competition that was organized as a whole week contest running from 24th of January 2021 to 29th of January 2021 among all the student members of the branch to identify their talents and skills in content writing, video editing, flyer designing, website creation, and T-Shirt designing. The event was to provide a platform to the students as an ice-breaking event in the pandemic situation and to create strong connections among them.

*The following contests were organized:*

- **Designing Team flyer with the aim of introducing each team members**
- **Technical writing on trending technologies in computing and engineering**
- **Video editing for team introduction**
- **Kahoot - IEEE Awareness Session**
- **T-Shirt Designing for IEEE-SB-UoJ**
- **Web designing**
- **Riddles to gain extra points in the competition**

Around 180 members from the IEEE-SB-UoJ actively participated in the competitions. WhatsApp was used as a communication platform among teams. Each team consists of 12 members having a committee member as representative for each team, and an organizing team leader of Benevento to inform the members about several events.

This event as a whole provided an opportunity to identify several individuals with their own talents in video editing, flyer designing, content writing etc. Those members will be involved in the future activities of the branch.



# Remote Access Breadboard with Supplementary Software to Facilitate Virtual Practical

## Abstract

Due to the covid19 pandemic, students cannot do their practical work inside the laboratories. Online learning is proving to be effective only up to a certain extent, with the practical aspects such as laboratories mainly being postponed. The objective of our project is to enable the student to get the experience of electronics by using real components and a special breadboard whose connections can be controlled via the internet and showing them the results using a camera. A smaller version of the special breadboard is realized that can support simple experiments typically done in the 1st and the 2nd year undergraduate level.

## Introduction

Since the Covid-19 calls for distance among people students have moved to distant learning facilities. Although there is good simulation software, it was noted that students cannot get the same experience and exposure when they do a physical practical session. It is also not practically feasible to accommodate small batches in the laboratory since large batches will require many weeks for completion of a single practical.

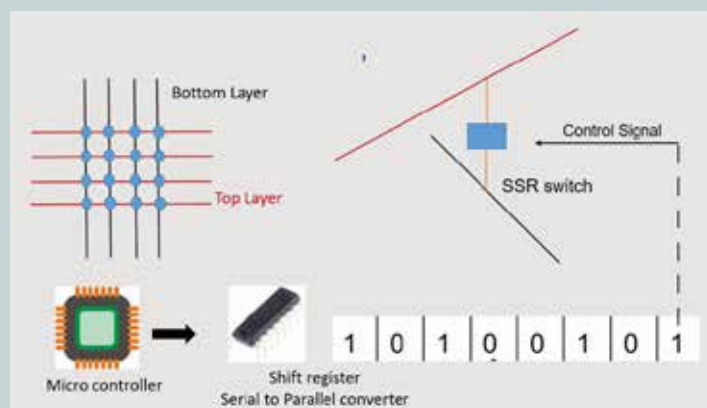
The advantages we get in a real practical over a simulation are as follows: Ability to see the real shape of the components, avoid issues of some simulation software that cannot accurately calculate some scenarios (Ex: high speed transients), and the errors of the real components are not perfectly modelled in simulation packages. We have found a solution to this problem using a practical solution.

Our approach is to have a remotely accessible breadboard that has reconfigurable connections. A Literary review on existing work related to such as 'VISIR' had addressed similar requirements of the remote access breadboard.

Upon researching the previous work, the efficiency of the connections, the attention to the use of minimum hardware per connection and the assessment and evaluation of the circuit were the aspects identified to have room to be improved [1]. Our solution attempts to improve those aspects.

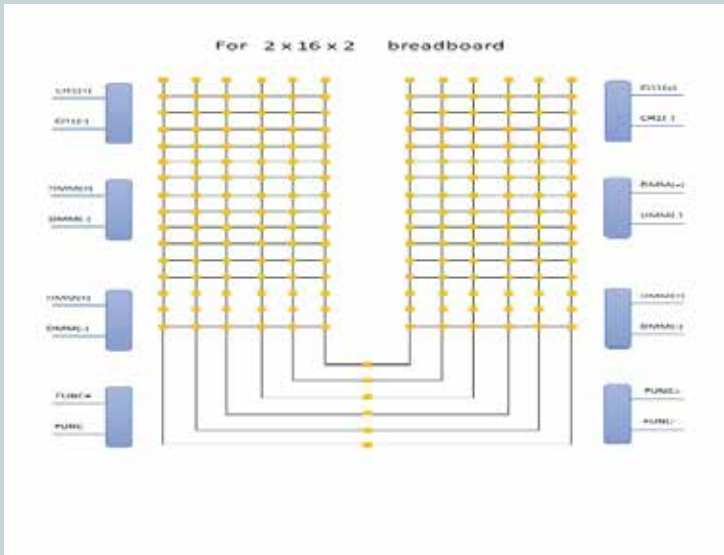
## System and Structure - Hardware

The core component of the smart breadboard will be two 16x6 switching matrices for each side. The switching matrix makes the connections in the breadboard according to the user input. In a normal breadboard, there are only horizontal connections by default, while vertical connections are done using wires. We have abstracted out this process so that the user can control which pins to connect, while the actual connections are made using a different architecture.



The idea is to have two separate layers, one with horizontally connected units, and the other with vertically connected units as shown in Figure 1. When a signal is sent, the connections will be configured by connecting two nodes between the layers by turning on/off switches.

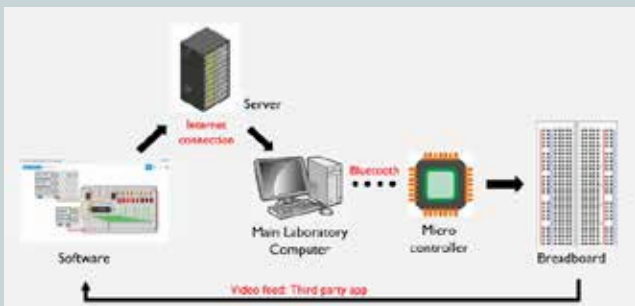
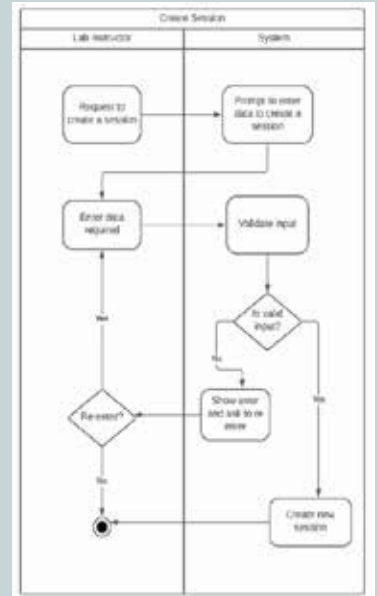
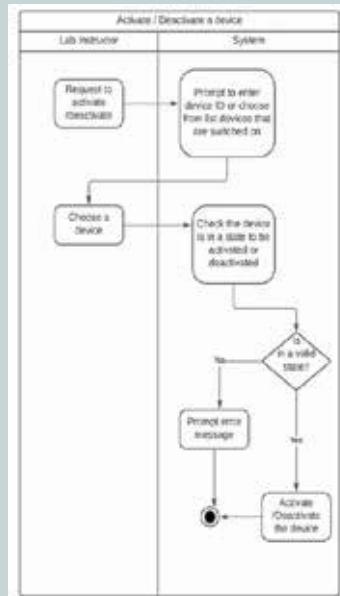
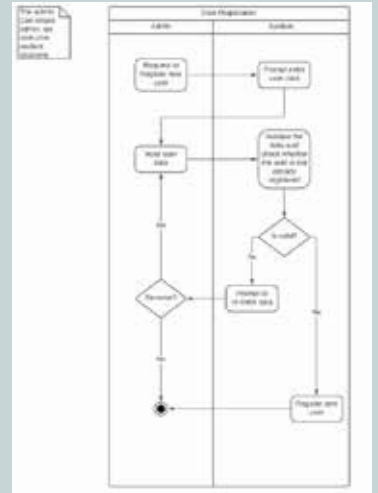
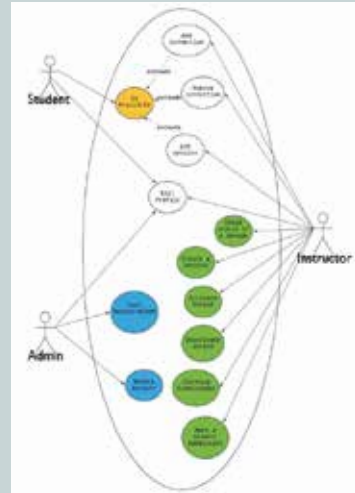
This matrix is implemented using Solid State Relay (SSR) switches and a shift register. A microcontroller handles the controlling of the switches and communication with the user's software interface.



The technical assistant (TA) of the lab is responsible for the component placement on the breadboard and he will update that in the software. So, users can see where the components are and make connections and check the results. Before powering up, TA must authenticate the schematic and after that, the deployment will happen. The video feed will be given to the user for his visual experience.

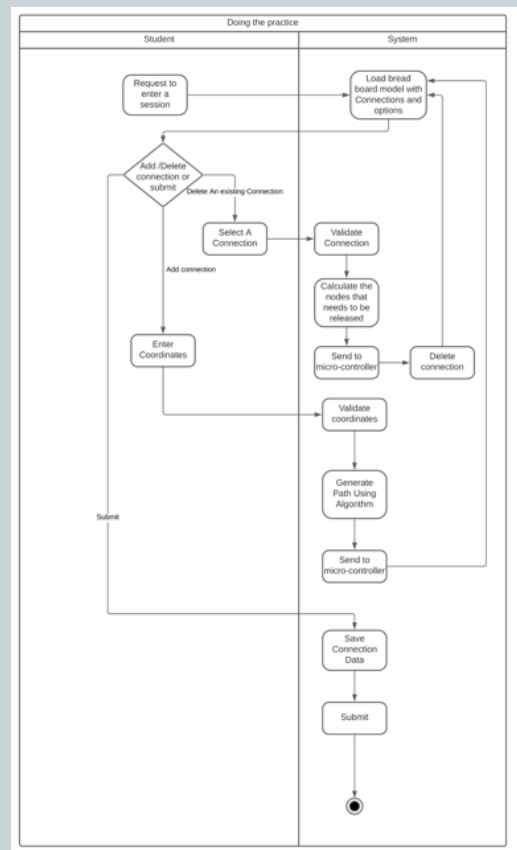
### System and Structure - Software

The microcontroller of each breadboard will be communicating with the admin computer of the laboratory. Users will be connecting with the admin computer through the internet via a web app. The Admin has the authority to shut down all the breadboards in emergency situations.

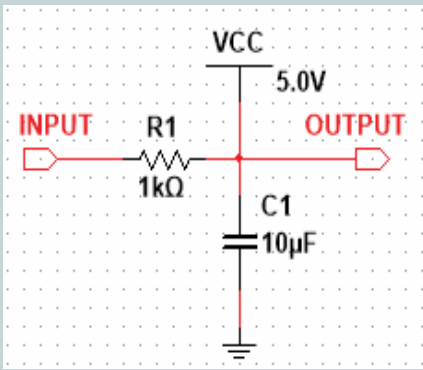


Concepts related to the implementation of the software are Student interface, Instructor interface, Message forwarding to the microcontroller, Acknowledgment of stable connection.

For the Video feed, we will use a third-party application for the moment. The use case diagram and activity diagrams are as follows



## Experiments - RC Low pass filter

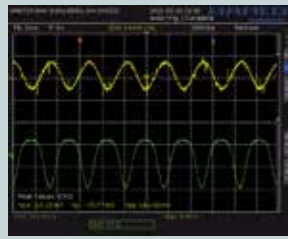
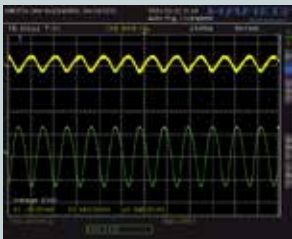
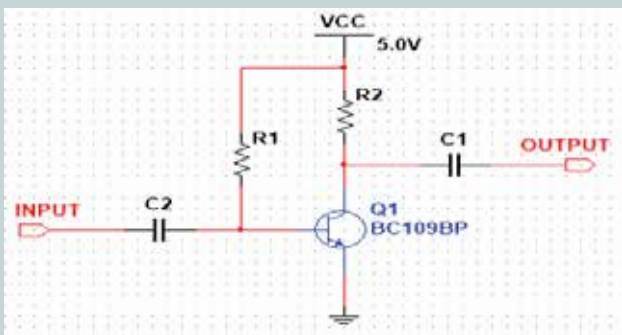


The test is done by using a 5Vp-p sinusoidal sin wave.

Input frequency (kHz)	Output p-p Voltage (mV)
1	51.2
5	20.4
8	5.7
10	1.8
20	0.7

For the 0-8kHz range, the circuit output is similar to the expected output from an RC filter. However, after 8kHz, the output is comparatively lower than expected. Therefore, we estimated it as the frequency cut-off of the smart breadboard.

## Experiments - BJT Amplifier



The test is done by using a 200mV p-p sinusoidal wave. The two oscilloscope screenshots show output as 2.86V p-p (without any distortion) and 4.40V p-p (with the upper half slightly cut-off mostly due to the quiescent point being too high). It is also worth noting that both images show very little to no noise. It is clear that the smart breadboard has almost zero effect on the proper functionality of the BJT amplifier circuit.

being developed separately and is to be combined with the hardware.

As per the above experimental results, we can recommend the breadboard to be used in most of the level 1 & level 2 analog electronic practicals at universities.

The system has the potential to be improved in the following ways:

1. scalability to house a larger breadboard structure.
2. bility to integrate common measuring devices ex: voltmeter, ammeter, oscillo scope.

## References

1. Mohamed Tawfik et.al,"Virtual Instrument Systems in Reality (VISIR)," IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES, pp. 60-72, 2013.



P.M.P.H Somarathne

## IEEE SLInspire

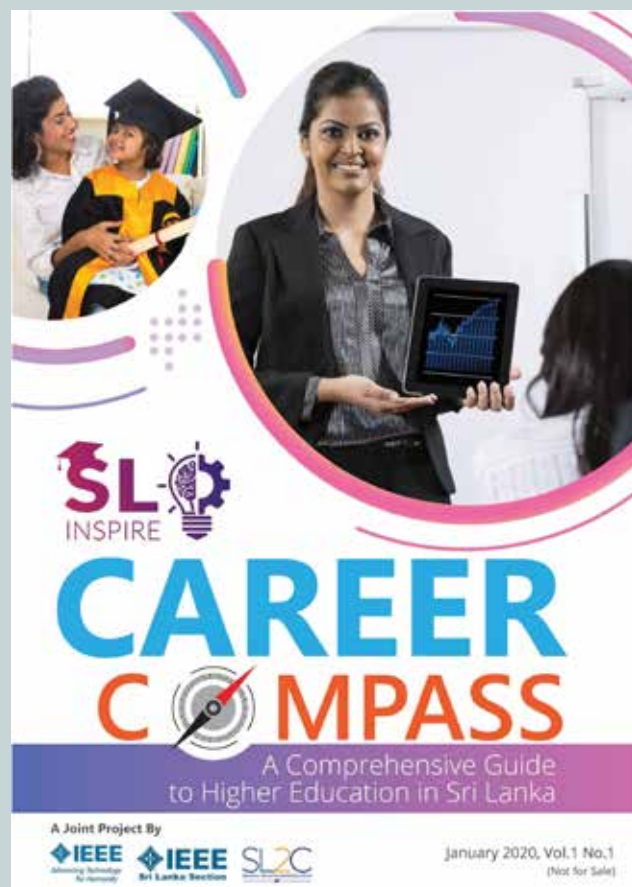
**IEEE SLInspire** is a collaborative project of SL2college where it primarily caters to school students who are moving towards their higher education. The prime objective is to make students aware of various known opportunities brought forward from the education sector within the nation, giving a heads start on settling with the right choices to make when moving towards higher education to spark themselves into achieving a successful career path.

Our mission is to help the students who are going to do their tertiary education via an online platform. Hence we have 6 main goals to be covered to open our students' eyes for an unbound future. Our main objective is the Career Compass seminar series where it gives a broad perspective on tertiary education for students by conducting seminars by professionals. These seminar will give an overview of government, private university opportunities and courses in vocational training institutes. Degree database is our second objective for the current year. We are currently in process of storing important details of all the universities of sri-lanka in one database. It will become handy for the students who are going to do tertiary education specially those who have not being selected for government universities.

Advance level Examination is a very competitive examination in Sri Lanka. It is the turning point of one's' life. Hence we need to practice more and more questions to show our excellence in the final examination. Exposure to past papers is the main core important fact in Advanced level examinations but practicing more questions with mock exams will also give a huge impact in our final examinations. Therefore SLI team has a question bank which is our third goal where it stores all the mock exams papers and MCQ quizzes will be held online similarly to a hackathon to encourage our student's participation.

Paper Archive is our next goal, which is past paper and marking schemes archive that helps students to practice answering papers according to a guideline. Paper Discussion videos and Lab Videos are our fifth and sixth objectives of our team.

The first seminar of career compass for the year 2021 was held on 20th of April from 6.30PM onward via Zoom platform. It was conducted for the students of Horana Sri Palee College who had successfully completed O/Ls, regarding SLInspire's platform and shedding wisdom into securing a successful career. An informative webinar was catered by with the graceful presence of Dr Dimuthusiri Suraweera & a deep understanding of IEEE SLInspire was given to all the participated students by Mrs. Warunika Hippola. The event was successfully held with 100+ participants and we manage to give them an invaluable insight for their future career.



# IEEE SLInspire

The Embedded Systems Workshop series for Beginners is an online workshop which was organized by IEEE SLInspire in collaboration with ENTTC, University of Moratuwa on 8th, 15th, 22nd and 29th of May 2021. This was to help beginners get into the world of Embedded Systems with confidence and expert guidance. The event was scheduled to be hosted within four weeks by six presenters under six sub-topics through Zoom.

The first two workshops were successfully conducted up to now with the participation of A/Ls students, School leavers (after A/L students) and University Undergraduates. We were able to gather about 1800 registrations for this event. All events were live-streamed on IEEE SLInspire official Facebook page and YouTube channel as well.

“Data Collection Night” of IEEE SLInspire. was successfully conducted on April 10th at Alta Vision Solar company, Homagama. It was one night of data collection regarding the Higher Education Universities of Sri Lanka. Extraction of data was done in collaboration with some volunteers.

All the educational resources such as paper archive under the Physical Science, Biological Science and Technical stream of A/L, and study tips for examinations can be found through our IEEE SLInspire website (<https://slinspire.lk/>) and all the conducted webinars and other insightful sessions are being shared in our YouTube channel. We will do our best as a team to give informative and insightful sessions for our students to make their career a success.

**Embedded Systems Workshop for Beginners**  
Learn the basics of electronics and software development while building a real-world product..!

**Topics Covered**

- Basics of PCB design verification and fabrication
- Introduction to microcontrollers
- Embedded system design
- Programming with Arduino and C++
- Embedded C++ programming
- Fundamentals of PCB design for microcontrollers using EDA software

**4 workshops weekends** Develop a real-world product from scratch within 4 weeks..!

**8th MAY 2021** **15th MAY 2021** **22nd MAY 2021** **29th MAY 2021** **9 AM ONWARDS**

**Presenters Panel**

- Dr. Subodha Charles** Senior Lecturer ENTTC, UoM
- Kithmin Wickremasinghe** Lecturer ENTTC, UoM
- Abarajithan Gnaneswaran** Former Lecturer ENTTC, UoM
- Deepana Ishtaweera** Final Year Undergraduate ENTTC, UoM
- Shalutha Rajapakshie** Final Year Undergraduate ENTTC, UoM
- Dilanka Wickramasinghe** Final Year Undergraduate ENTTC, UoM

**REGISTER NOW:** [bit.ly/SLIembeddedsystems](https://bit.ly/SLIembeddedsystems)

Logos: CAREER COMPASS, IEEE, ENTTC, SL INSPIRE

**CAREER COMPASS** WE EXTEND OUR SINCERE APPRECIATION to

**Dr Dimuthusiri Suraweerge**  
Senior Lecturer  
Department of Electrical & Electronics Technology  
Vocational Technology University

**Warunika Hippola**  
Research Assistant  
Sri Lanka Technological Campus

**&**

**Mr M.D.Jayasiri**, principal of Sri Palee College at Horana, **IEEE Student Branch of NSBM** for collaborating with us to conduct the webinar for students who have finished their **GCE Ordinary Level Examination in 2020**



# Sysout 1.0

By IEEE Student Branch of Sri Lanka Institute of Information Technology

The Power and Energy Society of the IEEE Student Branch of Sri Lanka Institute of Information Technology (SLIIT) organized “Sysout 1.0”, a two-day webinar series held on the 26th of June and the 3rd of July, which focused on providing its participants a better understanding of the fundamentals of the Java programming language. The main objectives of this event were to educate participants about a more practical based approach to coding in Java and to hence code their own Java applications, to enhance the knowledge regarding the Java Programming Language and to provide future opportunities available in this regard.

The sessions were conducted on two days by Mr. Thavidu Gopaluwewa and Dr. Shyam Reyal respectively, where on the first day the theory was briefed to prepare the participants for the coding session which was held on the second day successfully. In this webinar series the participants had the amazing chance to learn not only the facts about Java but also, how to set up JDK & JRE, Java development in Eclipse and competitive programming tips, which was a great opportunity for beginners.

At the end of the sessions, on both days, the platform was open for a Q&A session where the participants were given the opportunity to interact with our honourable panel of guest speakers and clarify any misconceptions or doubts, they had with regard to our topic. The participants who were actively present on both days were given valuable certificates on completion of the webinars. The event successfully concluded with over 750 participants.



The poster for the 'Sysout 1.0' webinar series features a dark blue background with a glowing network of nodes and lines. The title 'sysout 1.0' is in orange and white, followed by 'INTRODUCTION TO JAVA LANGUAGE' in white. The dates '27<sup>th</sup> & 28<sup>th</sup> May' are prominently displayed in orange and white. Below the dates, it says 'via zoom' with the Zoom logo. The bottom left corner contains the logos for IEEE PES (Power & Energy Society) and IEEE Student Branch | SLIIT. The bottom right corner lists the topics: 'Facts about Java', 'How to setup JDK & JRE', 'Java Development in Eclipse', and 'Competitive programming tips', followed by 'Registrations open!' in orange.

The objectives of the event were achieved, as observed by the feedback responses from the participants and the appreciation of the special guests. Valuable links were built between the organizing committee members and the Power and Energy Society of the IEEE Student Branch of SLIIT as a benefit of working together for this event. All this would not have been possible if not for the constant support given by the executive committee and the program, secretariat, design and publicity teams and everyone who helped immensely to make this a memorable event.

## Application of Machine Learning in Artificial Intelligence "Nothing is Impossible"



Humans are strange animals, which have curiosity about many things and capability of achieving things. So, scientists have proven the above quote in many instances. One is artificial intelligence. It was just a concept but nowadays it has become true. So artificial intelligence is the demonstrated intelligence by machines. Unlike natural intelligence AI does not have emotions and feelings like humans. Machine learning is a subset of AI and deep learning is a subset of machine learning. AI is applicable in many aspects such as in social media, healthcare, agriculture, marketing, banking and finance, space exploration, autonomous vehicles, gaming, chatbots, creativity etc.

First of all, it's very familiar to us that social media is using AI for different purposes. Social media is generating gargantuan amounts of data through users' chats, posts, and pictures and so on and whenever there is an abundance of data, artificial intelligence and machine learning are always involved. In social media platforms like Facebook, AI is used for face verification as well as machine learning and deep learning concepts are used to detect facial features and then it tags your friends with the help of that. In the same way deep learning is used to extract every single detail from an image by using a bunch of deep neural networks. Machine learning algorithms are used to design user's suggestions based on the user's interest.

Secondly, artificial intelligence is used in chatbots. Nowadays virtual assistants have become a very common technology in almost every aspect. We can find them on some websites too. Many households have a virtual assistant that controls the home. Popular examples are Siri and Cortana which are gaining popularity because of the user experience they provide. The Amazon echo is an example of how artificial intelligence is used to translate human language into actions. This device uses speech recognition and natural language processing to perform a wide range of tasks on user's command. It can do more things such as playing the user's favourite songs, make phone calls, check weather conditions, control the devices at the user's house, and reserve a taxi for the user and so on.

Next, the autonomous vehicle concept was a key word in artificial intelligence for the earlier decades. Now it has become true. They are autonomous cars. Generally in autonomous cars, artificial intelligence systems collect data from the vehicle's cameras, radars, GPS and cloud services to produce control signals which drive the vehicle. In this case, advanced deep learning algorithms accurately predict what objects in the vehicle's vicinity are likely to do. This has made autonomous cars much more effective and safer. Tesla self-driving cars are the famous example for autonomous vehicles all around the world.

In Tesla self-driving cars, AI uses computer vision image detection and deep learning to automatically detect objects and drive around without human involvement. In the same way Tesla autopilot software is much more than driving the car. It will drive when the driver tells it to go. The autopilot will check the user's calendar and drive his scattered appointments. In the present there are fully self-driving cars with the autopilot features. We will be seen rob taxi version which can fetch passengers without any one behind the wheel near future.

Finally, artificial intelligence has made a huge impact on human's life and it will continue to do so. As mentioned in the beginning, scientists are turning impossible things into possible things using artificial intelligence. But AI has disadvantages as well as advantages too. Only the future knows how it will affect humans.

**Mr. Tharindu Sandaruwan**  
Sabaragamuwa University Sri Lanka

A vertical promotional banner with a dark blue background. At the top, the text "50% SAVINGS FOR STEM MAJORS!" is written in large, white, hand-drawn style letters. Below this, "USE PROMO CODE FUTURE50" is written in a similar style. The background of the banner shows a close-up of a green microchip being held by a robotic hand. At the bottom, the IEEE logo and the word "IEEE" are displayed in white.

**50%  
SAVINGS  
FOR STEM  
MAJORS!**

**USE PROMO CODE  
FUTURE50**

 **IEEE**

# RevolUX'21 – A designathon in the new normal

## By IEEE student branch of UCSC



RevolUX'21, a statewide UI/UX design competition organized by the IEEE student branch of UCSC in partnership with AIESEC in University of Colombo to unleash the creative and artistic talents of Sri Lankan undergraduates and schoolchildren, was successfully completed.

RevolUX was one of the initiatives taken by the IEEE student branch of UCSC and AIESEC in University of Colombo with the tagline "Artistry in the New Normal" to expose participants to different trends in User Interface and User Experience Design, as well as relevant disciplines so that they can understand a problem and come up with a solution from the user's perspective that will meet their needs.

Two workshops and an introductory session preceded the final 12-hour designathon for the top 10 finalists, which was held virtually. Students and undergraduates who took part in the event were able to garner a fantastic experience and a wealth of knowledge from the workshops held, as well as compete against their peers from all around the island.

The inaugural workshop was held on June 5, 2021, to offer participants an overview of UX/UI, its job market, and emerging trends. As the keynote speaker, Ms Oshadi Wattuhewa, Senior UX Engineer of 99X Technology, accompanied us.

Mr Muditha Batagoda, Senior UX Lead at JRC Software (Pvt) Ltd, was the speaker for the second session, which took place on the 12th of June without delay. Both sessions had a large delegation of over 700 people, which motivated us to reach the pinnacle of the event.

From the 1st of June until the 12th of June 2021, participants were able to register for the designathon. Nevertheless, due to overwhelming demand from delegates, it was extended until June 16th, 2021.

Then came the introduction session, which was exclusively for the teams that already had registered for the designathon on June 19th, 2021. As the speaker for this session, Mr Suresh Godakanda, a UI/UX Engineer at Pearson Lanka (Private) Limited, presented an overview of designing tools.



## RevolUX'21 – A designathon in the new normal

By IEEE student branch of UCSC

The first round of RevolUX'21 began on the 20th of June 2021 and ended on the 27th of June 2021. Teams of four people from various institutions and schools competed by creating UI mockups for their respective problem scenarios. There were about 70 entries, and an expert judging panel determined the top 10 teams from the others. Creativity and usability were considered as judging criteria.

On June 3rd, 2021, the top 10 teams participated in a final 12-hour hackathon for cash awards. Within the allotted time, the teams had to create UI prototypes for a particular issue scenario. The next day of the designathon, live pitching and a Q&A session were held through the Zoom platform, which was aired on Facebook, and were judged by a panel of industry professionals, with the top three teams were chosen.

The University of Colombo School of Computing's team RANDomS crowned champions and awarded a cash prize of Rs.30000. The first runners up, Team Thrid Eye of University of Kelaniya, earned a cash prize of Rs.20,000, while the second runners up, Team RedSkins of University of Colombo School of Computing, received a cash prize of Rs.10000. A social media contest was held to determine the most popular team, and Team Aethon of University of Colombo won the competition and got a cash prize of Rs.5000.

The organizing team of RevolUX'21 arranged an entertainment segment during the final pitching event, in which Ms Adithya Weliwatta, a Voice of Teens competitor, and Mr Prabhath Darshana, a Voice of Sri Lanka contest, performed and made the occasion more vibrant.

With over 1000+ attendees, 50+ partners, and positive feedback from delegates and industry professionals, the event was a resounding success.



Do you know ?

“

The IEEE Sri Lanka section started on 2003-11-14.

”

# CYBERHAT 1.0 – Practical Based Cyber Security Workshop

By IEEE Computer Society Student Branch Chapter of Sri Lanka Technological Campus



**CYBERHAT 1.0**  
Getting started with  
Cybersecurity and Ethical Hacking

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**1<sup>ST</sup> OF JANUARY  
MIDNIGHT**

3<sup>rd</sup> JANUARY  
SUNDAY

3.00 PM  
ONWARDS

zoom

KNOWLEDGE PARTNER: **Cyberior**  
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ORGANIZED BY:  
**IEEE COMPUTER SOCIETY**  
SRI LANKA TECHNOLOGICAL CAMPUS  
STUDENT BRANCH CHAPTER

**IEEE**  
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**SLTC**

CYBERHAT 1.0 was the second project for the year 2020 organized by the IEEE Computer Society Student Branch Chapter of Sri Lanka Technological Campus in order to provide a Practical Based Cyber Security Workshop.

Cybersecurity is one of the hottest career options in today's world and with every advancement in technology as well as in the Internet space, the demand for cybersecurity experts across the globe is increasing at a rapid pace. Also, it needs a massive amount of knowledge to become a cybersecurity expert to handle some of the sophisticated threats. Job opportunities are projected to grow substantially because of learning and knowing cybersecurity. This workshop was a great opportunity for all the Individuals who are interested in cybersecurity including Engineering, Technology, and Computing undergraduates, Freelancing and self-learning individuals, Fresh Intern undergraduate students in the Information Technology Industry and Information Technology motivated school students in Sri Lanka.

The workshop was successfully conducted by Jude Myuran. K, one of the most experienced personalities in the Cyber Security Industry. He is an expert on Network Security, Cloud Computing with MSc. Network & Information Security – Kingston University | UK and BE. Electronics & Communications - Visvesvaraya Technological University | Bangalore | India. Moreover, he has work experience in Virtusa Pvt Ltd as an Assistant Manager in Network and Security Operations, Third Space Global as an Assistant Manager in IT & Network Operations, London Stock Exchange Group BSL as a Network Engineer, Sumathi Information Technologies as a Senior Network Engineer and Virtusa Pvt Ltd as an Engineer Specialist in IT Infrastructure.

Main objectives of this workshop were to make the participants knowledgeable about Cybersecurity, how it is processing in the present, and the problems that can come across due to cybercrime. This workshop was delivered as an interactive video session through Zoom Platform on the 3rd of January starting from 3.00 pm and all the participants were awarded a valuable certificate after proving their knowledge after the workshop.

CYBERHAT 1.0 was concluded successfully with more than 650 participants including India and Pakistan and more than 500 students were able to gain certificates obtaining more than 75% marks for the skill quiz. There was overwhelmingly positive feedback from the participants. Many participants requested the second phase of this workshop in the coming future.



**CYBERHAT 1.0**  
Getting started with  
Cybersecurity and Ethical Hacking

Cybersecurity threats are on the rise  
*Are you protected?*

**WHY IS CYBERSECURITY IMPORTANT?**

Living in a digital world makes everything connected and connected things vulnerable to hackers.  
Hackers attack every 39 seconds on average 2,344 times a day.  
Anyone can be attacked with 43% of affected parties are from small businesses in last year.  
The cybersecurity job market is one of the most emerging job markets in the world.

Want more reasons to learn cybersecurity?

REGISTER NOW  
GET AWARDED WITH  
**A VALUABLE CERTIFICATE**

3<sup>rd</sup> JANUARY  
SUNDAY

3.00 PM  
ONWARDS

zoom

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# Fighting COVID-19 with Optimized Supply Chains

The SARS-CoV2 virus, popularly known as COVID-19 or novel coronavirus, has wreaked havoc on the world. Business as usual has been thrown out of the window. An often-overlooked domain within the IEEE purview has gained in importance to assure the fight against the pandemic. The domain of supply chain assembles a myriad of engineering, and management techniques to optimize the flow of materials, money, and information to satisfy consumer demand. Although supply chains are often considered part of the Technology and Engineering Management Council, the multi-disciplinary nature of the domain provides opportunities for enhanced collaborations leading to innovative solutions.

The medical supply chain has taken centerstage since the emergence of the pandemic. Assuring the availability of medicines, especially vaccines, in the right quantity at the right cost and quality where it is most required has been a challenge. Academics and practitioners have designed robust supply chains to answer this need. Complex algorithms and bespoke optimization techniques inspired by management science and engineering has often made strides in the fight against the pandemic. For instance, some vaccines need to maintain strict temperatures to ensure their efficacy. Artificial intelligence and machine learning (AI/ML) techniques are often employed to predict demand accurately to avoid stockouts and costly excesses. Real-time testing of the temperature can only be facilitated through technologies such as Internet of Things (IoT) using active sensors, especially when long distances need to be traversed. Similarly, blockchain technology is used by some pharmaceutical companies to assure that expensive medicines are not tampered with. Using geographical information systems and remote sensing allows authorities to map the supply lines and position warehouses and other critical nodes to allow for uninterrupted medical services



While empowering healthcare operations with an effective supply chain is paramount for the success of winning the war against COVID-19, one cannot underweight the importance of ensuring the food and beverage supply chains to keep the world ticking. On again and off again lockdowns across the world have left usually fragile food supply chains in utter chaos. Achieving an equilibrium between supply and demand has become increasingly difficult as the pandemic has a bearing on both consumption patterns as well as on production. Studies have shown that roughly 30-40% of the food produced in Sri Lanka does not get consumed in a normal year. One can only imagine how the present context has exacerbated this problem reminding us of images shown in the media where farmers had to dump their harvests in a heartbreaking fashion. Web and mobile applications have seen a surge over the past year and a half attempting to fill this vacuum in finding an equilibrium between demand and supply. This task is further confounded by the perishable nature of agricultural goods, which has a very short shelf life if transported in its primary state. With the lapse of cold chains and large-scale processing to ensure longevity of produce, many developing countries including Sri Lanka are struggling to overcome this challenge. However, applications of AI/ML to empower the web/mobile applications have emerged as a much-fancied solution. Other Industry 4.0 applications discussed previously too had some bearing in the value added, upscale food supply chains.

However, further cost reduction would be necessary to apply to mass scale supply chains where value trumps quality. One of the major challenges is convincing the farming community and the wholesale merchants in the upstream of the supply chain to do away with their traditional operational practices which are often intrinsic or based on pen and paper to adopt tech-driven solutions to provide better margins. There are more success cases in making this transition than one would imagine.

Last mile delivery has also taken a new lease of life since the emergence of the pandemic. While adapting to online shopping has not been as prolific as one would've initially imagined, there is still a considerable shift. Shared economy platforms have also joined the bandwagon by mobilizing their fleet to replenish the need for groceries and fast-moving consumer goods. Computational algorithms based on the classic operations research domain of the transport problem and vehicle routing problem have been widely applied to reduce delivery costs and delivery times while optimizing the vehicle fleet.



Supply chains are part and parcel of everything we come across in life. Through optimizing flows of materials, money, and information, supply chains empower the world to tick seamlessly. Oftentimes, people notice the time on a clock by observing the position of the hands on the clock but seldom appreciate the complex mechanism interconnecting cogwheels that ensure that the clock ticks accurately. Similarly, while we appreciate the importance of goods and services around us, it is equally importance to appreciate the supply chain that empowers seamless service.

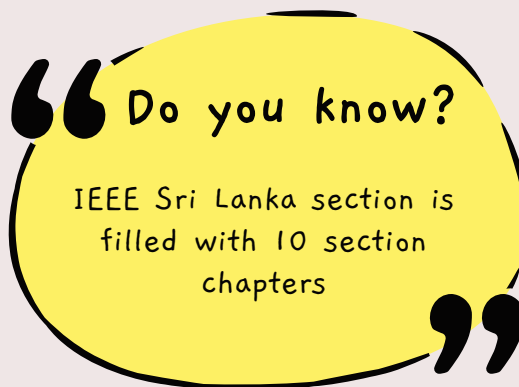
**Dr. H. Niles Perera**

Senior Lecturer,

Department of Transport & Logistics Management,

Faculty of Engineering,

University of Moratuwa





# Flutter and Mobile Development

## By IEEE Student Branch of Rajarata University of Sri Lanka

IEEE Student Branch of Rajarata University of Sri Lanka organized an online session for undergraduate students to those who are willing to create a mobile application with Flutter on 17th April 2021 via the zoom platform from 7 pm to 9 pm. The session carried an introduction to Flutter and mobile development and gave a kick start to the beginners.

The event was conducted by a well-experienced speaker, Mr. Radika Dilanka, Software Engineer at Insfra Technologies (Pvt) Ltd. Techtalk Rajarata is a series of monthly technical sessions we have been conducting at Rajarata University of Sri Lanka. In this pandemic situation, we are conducting webinars. We planned to organize the Techtalk for April as a webinar called "**Flutter and Mobile Development**", which benefited many.

Key points discussed during the session were,

- Mobile Development
- Important things on mobile dev
- How to develop World class Mobile App
- Research before the development
- Target Audience
- Platform Selection
- Plan of Action
- Know you Budget
- Smooth and Efficient
- User Experience
- Maintain after development
- Make an app for a client
- Tools & Technoligise
- Mobile App Types
- Cross platform
- Pros & Cons in cross platform
- Why Flutter ReactNative vs Flutter
- Qualities of a Flutter app
- How flutter is so amazing
- Is flutter a Programming Language?
- Dart Programming Language
- How to Learn Dart?
- Pre-made widgets of Flutter (iOS/ Android)
- Boilerplate of Flutter app
- MaterialApp (Mostly on android)
- Flutter owns every pixel on the screen
- iOS look and feel in Flutter (Cupertino widgets)
- Pros & Cons of Flutter owns every pixel
- Platform adaptive app using Flutter
- How to start coding in Flutter
- How to install Flutter
- Flutter on Windows
- Where you can write the flutter code
- Plugins for Flutter & Dart
- How to create a new Flutter app
- Flutter File system
- pubspec.yaml file
- lib/main.dart or widget types?
- Types of Widgets in Flutter
- When to use Stateless widgets



**Webinar On**  
**FLUTTER AND**  
**MOBILE DEVELOPMENT**

17<sup>th</sup>  
April

7 PM -  
9 PM

**Mr. Radika Dilanka**  
Software Engineer | Insfra  
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TECH TALK  
RAJARATA

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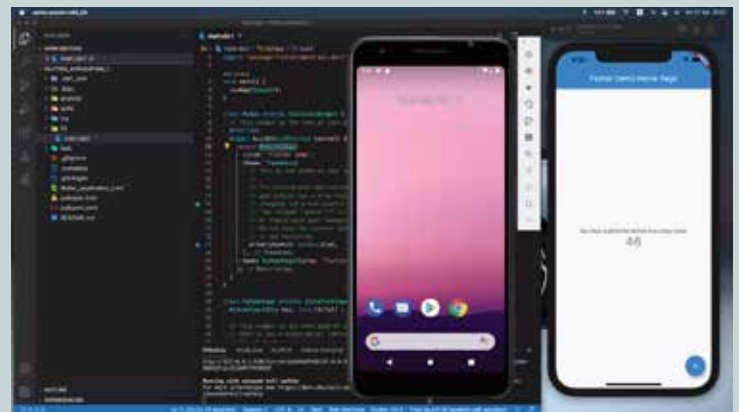
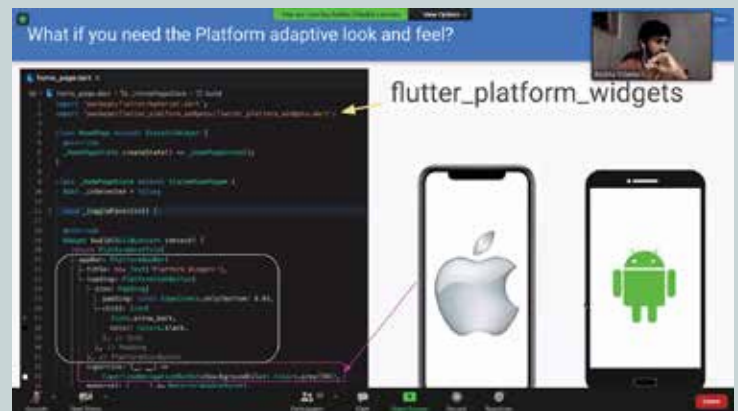
# Flutter and Mobile Development

## By IEEE Student Branch of Rajarata University of Sri Lanka

- What it mean by State?
- When to use State-full widgets
- Keys in Flutter
- Widget tree & Element tree
- Why Keys in Flutter?
- Types of Keys in Flutter
- Demo on coding
- Run on iPhone
- main.dart code explanation
- Run on Android
- CupertinoApp on iOS & Android
- PlatformApp (Adaptive look and feel)
- Summary of coding examples
- How to run iOS simulator on windows?
- Monetizing apps with Flutter
- Paid Apps
- in-app purchase apps
- Ad services for Flutter
- Google Ad Mob
- Google Ad Manager
- Google Mobile Ads SDK for Flutter
- Overlay banner Ads
- Inline Ads
- Interstitial Ads
- Rewarded Ads
- Native Ads

The speaker well explained the topic with demo sessions. There were around 40+ participants. At the end of the session, the speaker clarified the participants' doubts too. It was one of the remarkable webinars of IEEE Student Branch of Rajarata University of Sri Lanka.

Additionally, the support given by Excom and the members of IEEE Student Branch of Rajarata University of Sri Lanka who are volunteering in the Publicity team, Program committee, Logistics team, Design Committee, and Finance committee for the event cannot be forgotten.



## AI-Driven Sri Lanka

“AI-Driven Sri Lanka” a project by IEEE Young Professional Sri Lanka aims to impart AI knowledge and to develop related practical skills and upskill young individuals with an interest to pursue machine learning or related fields as academics or career path. Essentially, “AI-Driven Sri Lanka” visions to be the bridging gap between undergraduates and graduates to the AI Industry.

The initiative drives its mission breaking the program into components creating a funnel of education and awareness from grassroots levels.

### Awareness Sessions:

Focuses on spreading the words of possibilities of Machine Learning and the impact of AI Adoption. This component is fulfilled through panel discussion, tech talks, and byte size videos.

### Community:

Focuses on disseminating content and place of inspiration for AI hobbyists and enthusiasts. On the progressive growth of the community, the goal is to inspire and build AI-enabled products through community-driven initiatives.

### Bootcamps:

Focuses on educating and training anyone interested in getting started in Artificial Intelligence and for anyone interested in upskilling in the fields. The component makes use of webinars, cohort-based training building both theory and practical skills.

AI-Driven Sri Lanka kickstarted with the panel discussion on “AI Adoption” back in October 2020. The panel discussion was done in collaboration with Orel IT. The panelist discussed various topics ranging from AI Technologies, Building Mini AI Projects, Career Paths in AI, and Sri Lanka’s AI adoption across different domains in startups and industry.

Having set the base and gauging the interest of the audience, sub-brands/initiatives under the AI-Driven Sri Lanka brands were introduced to focus on the components individually with the plans of scaling vertically.

### Initiative

#### AI-Driven Sri Lanka Prebootcamp

A set of free virtual meetup series themed as a “Getting Started Series” helping AI enthusiasts get started in the AI journey and improve their domain understanding. The session is scheduled throughout the month of May, June, and July as a 5 part series.

#### AI-Driven Sri Lanka Community

The initiative focuses on building a community around AI-Driven Sri Lanka attracting like-minded individuals to autonomously building an audience and take forward the motives of the program. The community is present in Medium, Instagram, Twitter, and Facebook.

The community currently has an audience over a Facebook Group. The group can be found in the following link.

<https://www.facebook.com/groups/825144131581778>



## AI-Driven Sri Lanka

### AI-Driven Sri Lanka Create for Community

“Create for Community” is an initiative that focuses on building up content creators while building an audience around the AI-Driven Sri Lanka Community. The program focuses on sharing, authoring, creating, and curating content in the field of Artificial Intelligence and related fields. Under the program where subprograms that help the community members in technical writing and presentation skills



**Community Talks** - Tech talks conducted by the community members. Community Talks is a monthly talk series focused on sharing the experiences of the community working and learning AI. The talk not only gives opportunities to professionals but also to undergraduate students and self-learners. Having completed 2 talks for the month of March and April, the May talk is scheduled for the 31st. Registration information will be released soon.

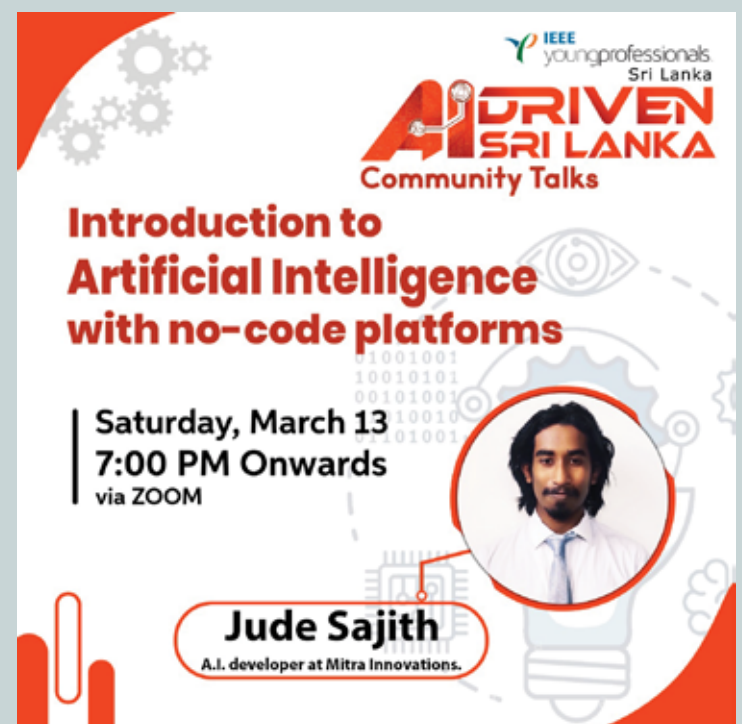
**IgniteShift** - A Medium.com publication where the community members write original articles based on their learning and experiences. The publication can be found at

<https://medium.com/ai-driven-sri-lanka-ignite-shift>

**Project Showcase** - A platform for community members to showcase their hobby projects, researches, and any products building in the fields of machine learning and related fields. This initiative focus on solving the discovery problem of Sri Lanka researches and projects while helping the community building a portfolio.

If you are interested in knowing more about AI-Driven Sri Lanka or want to be part of the community join the Facebook Group and contact us on our Facebook Page.

(<https://www.facebook.com/AIDrivenSriLanka>)



# Carbon Nanotube Network Field Effect Transistors: The small 'Big thing'

Carbon nanotube field effect transistors (CNT FETs) are a promising alternative for the existing Silicon based complementary metal-oxide-semiconductor (CMOS) technology. Due to its ultra-thin (~1.2 nm) tube like structure with a wall made up of single carbon atoms and high electron and hole transport, the CNTs have received an explosive interest as an electronic material. Single wall CNTs were discovered by Sumio Iijima from the NEC lab, Japan in 1991 (Nature (1991) 354, 56–58). The first CNT FET was reported in 1998 (Nature (1998) 393, 49–52) and thereon, they have been widely used for numerous applications including integrated circuits, and biosensors.

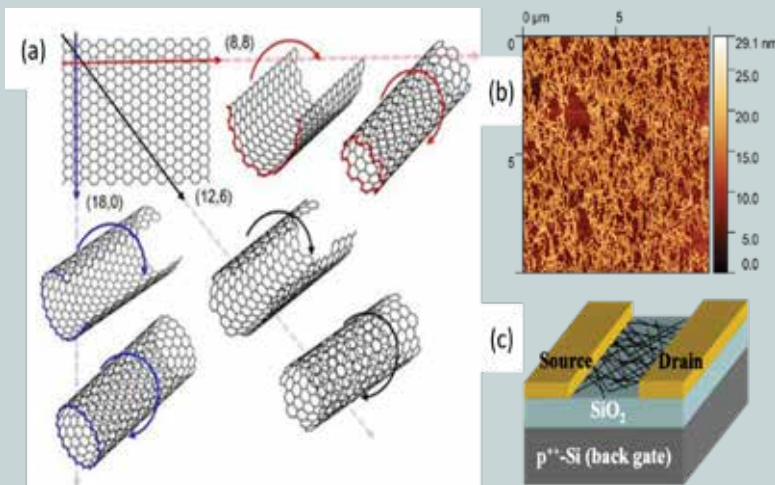


Figure 1: (a) Formation of different chirality of CNTs, (b) atomic force microscope image of a CNT network fabricated on a silicon die at University of Jaffna using a simple solution process technique and (c) schematic of a simple CNT network FET with a global back gate

As shown in figure 1 (a) CNTs can be categorised into three based on their wall orientation: 1) arm chair, 2) Zig Zag, and 3) Chiral. Among these the arm chair and chiral are semiconducting and zigzag is metallic in nature. Hence, statistically 1/3 of all the CNTs made are metallic in nature. However, the semiconducting CNTs are important for making CNT FETs suitable for integrated circuits.

A CNT network is a two-dimensional electronic material which is made up of randomly oriented CNTs or CNT bundles. Large scale solution-based fabrication, outstanding charge transport and mechanical flexibility of CNT networks provides significant advantages for CNT network FETs in designing cost effective, low power consuming, and flexible electronic components. Figure 1 (b) shows such a single CNT network fabricated in the nano-bioelectronic lab at department of Physics, University of Jaffna. Figure 1 (c) shows the schematic diagram of a simple CNT network FET.

CNT FETs are Schottky barrier FETs as the CNT-metal contact plays the central role in gating (Physical review letters (2002) 89, 106801). This gives a huge advantage for the CNT FETs as the electrical properties of these FETs can be easily tailored by using different metals as source and drain. The CNT FETs can be either p-type or n-type FETs based on the metal used to make the source and drain contacts. CNT network FETs with platinum electrodes were PMOS and titanium electrodes were NMOS.

Despite excellent electronic properties, the CNT FETs faced difficulties to enter the integrated applications due to problems in separating the semiconducting CNTs and limitations in fabrication methods. Metallic CNTs are highly conductive and presence of a single metallic tube can deteriorate the electrical properties of the FET. Hence it is essential that the metallic tubes have to be carefully removed from the semiconducting CNTs. For IC design, 99.999999 % of semiconducting CNTs are essential while the most recent purification technique allowed to make about 99.99 % semiconducting CNTs. Recent works showed that the semiconducting CNTs can be selectively deposited on a Silicon wafer using commercially available 99.99 % semiconducting CNTs. Thereon, the researches on CNT FETs towards microprocessor design have speedup.

The first one-bit microprocessor with 178 CNT network FETs were made by a group of engineers and scientists at MIT in 2013 (Nature (2013) 501, 526–530). This is considered as an important milestone in using CNT FETs for integrated circuits. A high-performance medium-scale integrated circuits based on network CNT FETs were reported in 2017 (ACS Nano (2017) 11, 4124–4132). The report used palladium (Pd) electrodes for p-type FETs and Scandium electrodes for n-type FETs. Figure 2 shows the schematic of the FET used in the work (Figure 2 (a)), transfer (Figure 2 (b)), and output (Figure 2 (c)), characteristic curves of the p- and n-type FETs. Figure 2 (d) illustrates the electronic band alignment of the CNT FETs with both Pd and Sc electrodes. In this paper, A 4-bit full adder consisting of 132 transistors was reported in the report.

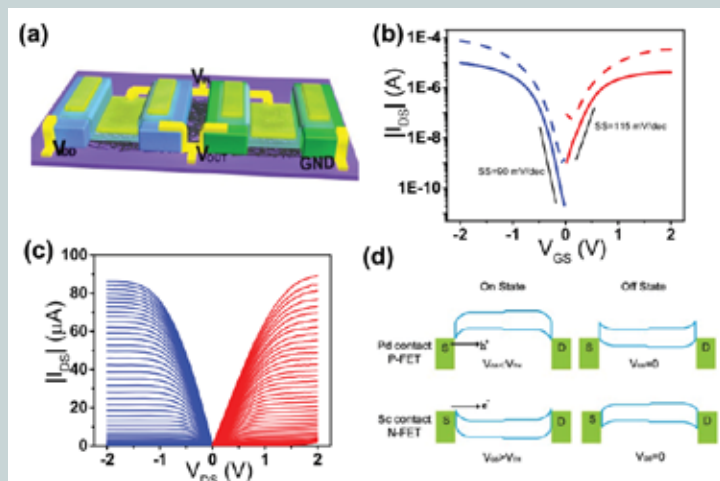


Figure 2: (a) Schematic of CNT network FETs. (b) Transfer characteristics of p-FETs (blue curves) and n-FETs (red curves), (c) Output characteristics of the p-FET (blue lines) and n-FET (red lines) and (d) Band diagrams of a p-FET and an n-FET in the on and off states (ACS Nano (2017) 11, 4124–4132).

The first 16-bit microprocessor named RV16XNano with over 14000 CNT FETs were made by the same group from MIT, USA. The microprocessor is based on the RISC-V opensource chip architecture and fabricated using processes used in traditional silicon chip foundries. The same group has recently reported the deposition of CNT network on an industrial scale wafer and fabrication of CNT FETs using existing silicon manufacturing facilities (Nature Electronics (2020) 3, 492–501). Figure 3 (a) shows the microscopic image of a fully fabricated RV16X-NANO die. The processor core is in the middle with test circuitry surrounding the perimeter.

Figure 2 (b) shows a 150 mm wafer consisting 32 RV16XNano dies fabricated using existing silicon fabrication techniques. The RV16XNano processor is considered as the first functional CPU made-up of CNT FETs.

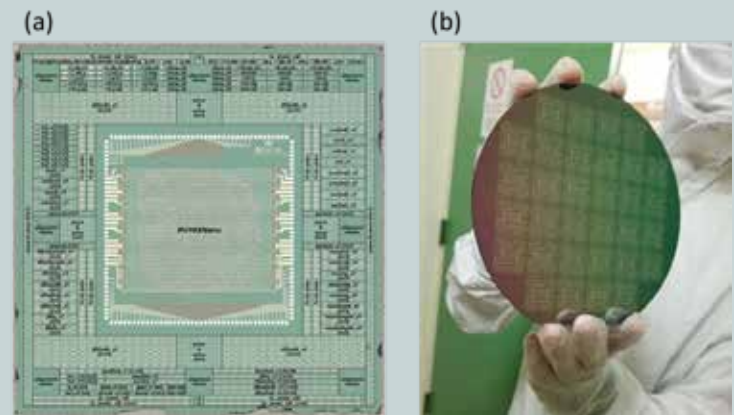


Figure 3: Image of a fully fabricated RV16X-NANO die and (b) a 150-mm wafer built with 32 RV16X-NANO dies (Nature (2019) 572, 595–602)

As the Silicon fabrication techniques have reached its saturation, a change in material is required to keep the Moore's law alive. Intel is working to achieve the 2 nm Silicon process in 2023. However, going beyond the 2 nm node using Si as the material could be complex and costly as it enters into the intra molecular region of the silicon crystal. Due to its extremely thinner dimension, CNT has all the potentials to be the next dominant material in the semiconductor industry. Recent works on CNT FETs are moving in the right way and has shown that the challenges in CNT FET process can be easily overcome and mass production is possible. We can expect the first commercial CNT FET in near future.

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# GLAMOURFEMME '21

By WIE Affinity group of the IEEE student branch of University of SLIIT

Women in Engineering (WIE) Affinity Group of IEEE Student Branch of SLIIT organized **GlamourFemme'21** for the fourth consecutive year which was held as a career guidance event mainly focused on supporting the young undergraduates to select their respective field of Engineering (Electrical and Electronics, Civil, Mechanical and Mechatronics) and the field of Information Technology. The event has been held as an on campus event for the undergraduates in the years 2018 and 2019, but this year the event was conducted as a panel discussion through an online platform on 22nd May 2021 due to the current pandemic situation COVID 19 and the event participation was extended to undergraduates from other universities as well. The event was indeed glamorous and immensely successful in focusing on how important the role of a woman is in the field of Engineering (Electrical and Electronics, Civil) and Information Technology. The session was conducted as a panel discussion and the panellists gave a positive influence on the participants according to the objectives of the organizing committee.

Some of the goals of GlamourFemme '21 were,

- To Support the undergraduates to select their respective career path in a better way in the fields of Information Technology, Civil, Electrical and Electronic industries.
- To inspire the young female undergraduates and to encourage them to follow their path of interest as all industries hold equal opportunities for women.
- To motivate attendees in becoming an expert in various industries, locally and globally.

- To educate the extensive range of opportunities a fresh undergraduate has in the different fields of study in engineering.

Glamourfemme'21 was an Island wide webinar. Therefore, the webinar announcing process was quite a challenge for the Publicity team. As a result, GlamourFemme was brought to the attention of the targeted crowd with three successful panellists in the specific fields. We shared the posts of the event via social media, and we could gather about 120+ participants during the session. The event was shared and held live through the Facebook pages of IEEE Student Branch of SLIIT and IEEE WIE Affinity Group of SLIIT with the support of our official broadcasting partner, Faculty of Engineering Media Club (FEMC).

The panel discussion was conducted by three guest speakers with amazing visionaries and also with various goals, professions and achievements. The three guest speakers who joined hands with GlamourFemme '21 were,



## Climate Crisis and Clean Energy



Electronic waste, also known as WEEE (Waste Electrical and Electronic Equipment), is a term utilized for electronic devices, such as mobile phones, television, desktop or laptop, storage devices, input devices, output devices, etc., that are no longer in use. As of now, more than 53 metric tons of e-waste is generated every year globally which has been a brisk rise when looking back at the past decade where only 35 metric tons of e-waste was produced back in 2011. Information gathered by the Global E-waste Monitor indicates that Asia produced the highest amount of e-waste in 2019 which is more than 46%. Furthermore, China is recognized as the country generating the largest amount of electronic trash

The short lifespan of electronic devices and lifestyle changes of humans are some causes to escalate the generation of e-waste. As the production and usage of electronic devices are expanding daily, the growth of electronic waste will certainly climb up further. WEEE has caught the attention of the public with this hasty rise of e-waste production, the huge threat formed towards the health of humans, as well as to all ecosystems, and the significance of proper e-waste disposal.

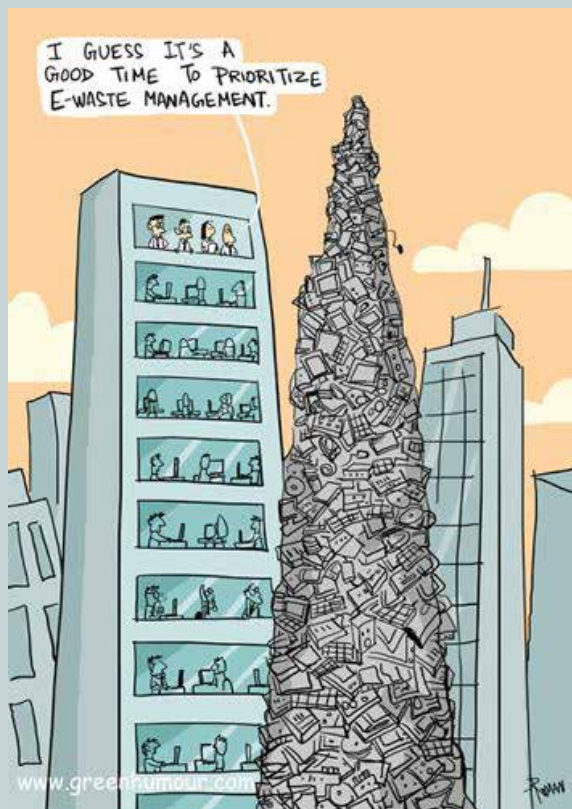
Electronic devices are made of more than 50 different elements, and most of them are extremely harmful to the environment and living beings. Some valuable elements like gold and silver are also found in e-waste and are disposed in tons every year. Lead, Mercury, Cadmium, Sulfur, PFAO are some of the most dangerous elements that will adversely affect humans.

If a mother expecting a baby gets exposed to Lead (Pb) which is mostly discovered in batteries, behavioral changes, hyperactivity, and development of the baby will be affected which will have negative results throughout the lifetime of the child. Also, non-communicable diseases like cancer can turn up later in life. Loss of memory and muscle weakness are some effects when humans are exposed to Mercury (Hg). Mercury can also be a reason for infertility in animals and can even cause death.

The soil ecosystem will be damaged, and the development of children will also have a negative effect by the element Cadmium (Cd) that is found in WEEE. The release of Sulphur (S) will negatively impact organs such as the liver, kidney, and heart. Premature birth or even stillbirth is possible when a pregnant mother gets exposed to the chemical PFOA which is commonly found in non-stick pans and dishes.



E-waste management has been a rather concerning issue for many countries in the world including developing countries. This problematic nature is a result of difficulties faced in generation, transboundary flow, and management of e-waste.



Governments all around the world have been keen on developing national e-waste policies and legislation to deal with this upsurge of e-waste in recent years. For instance, enforcing bans on specific electronic items which are harmful to nature, together with state laws and policies with respect to safely recycling e-waste are a few of the measures taken for this purpose.

Certain organizations have been established to take care of this e-waste in an efficient, ethical, and eco-friendly manner adhering to the prevailing state laws. A few of the leading and top e-waste management companies in the global market include enviro-Hub Holdings Ltd., Global Electric Electronic Processing Inc., Boliden AB, Tetronics (International) Ltd.

We can minimize the amount of e-waste produced in the following ways which will also increase sustainability in the long run.

**Sell, Swap or donate:** Individuals and companies sell, or trade used products that are no longer of worth to them but could be helpful to someone else. As the demand for electronic devices rises day by day with technology being more integrated into our lives, this method can be of great help. In some cases, these tradable electronic devices do not even have to be in good condition as well. Moreover, electronic items can be donated to charities or institutions in need as an aid to those who cannot afford to buy that equipment.

**Recycle:** E-waste recycling is put into action for electronic items that have been far beyond the options of repairing, selling, or donating. E-waste recycling produces numerous final products which are of value in various industries. For example, steel from game consoles may be recycled for computer casings, vehicle components, and beams. Precious metals like gold, silver, platinum, and palladium found on the circuit boards can be used to make jewelry or parts for mobile phones. The valuable metals used in phones may be recycled and utilized in other electronic devices.

In this process of recycling, specialist waste disposal companies shift the collected e-waste at recycling centers to a reprocessing plant where the discarded items are shredded into smaller pieces. Then the ferrous metals, non-metallic metals, and plastic contained in them are separated using various techniques.

Although e-waste represents a small percent of overall waste, it represents 70 percent of overall toxic waste making e-waste recycling necessary. Complete removal of toxic components in EEE is not practically possible but can be maximized up to some extent.



As mentioned above, the process of recycling should be conducted in a safe and standardized manner abiding by prevailing laws and policies. Reconditioned electrical and electronic devices should be refurbished and reused as a complete product instead of being discarded which pollutes the environment. Educational and awareness programs covering the potential risks of the rapidly growing e-waste problem should be developed and implemented among communities to spread awareness. These programs play a vital role in both developed and developing countries. It's everyone's duty and responsibility to be mindful of e-waste and properly dispose them to secure the future of the environment.

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Sri Lanka



# CyberShield 2021

By IEEE Computer Society of IEEE Student Branch of SLIIT

CyberShield 2021 was a 2-day, virtual event organized by the IEEE Computer Society of IEEE Student Branch of SLIIT, with the sole aim of providing the participants with a basic knowledge on Cyber Security and how it would have its roots running deep in Cyberattacks on all kinds of companies, organizations as well as the lives of numerous individuals. The event was open to all undergraduates and any Cyber security enthusiast who wanted to pursue a career in cyber security.

The main purpose of this event was to provide a basic knowledge in the field of cyber-security to its participants. The basic concepts of cyber-security such as cyber-security concepts, types of attacks, best practices and extortion software, red teaming, penetration testing, hacking tools, job opportunities and much more to discuss. The aim of this series of event was to provide students with broad and contradictory knowledge from the basics to the field of cybersecurity. It was more advantageous for students who wanted to specialize in cyber-security and pursue a career in fields related to cyber security.

The first day of the event was conducted by Mr Kavinga Yapa Abeywardena, a distinguished lecturer from Sri Lanka Institute of Information Technology. This session was conducted on the basics of cyber-security, mainly focusing the theoretical approach to cybercrimes, industries, common prevention strategies, technologies, and concepts of cyber-security and more. Thus, the first day ended successfully, giving participants a conceptually better theoretical idea about cybersecurity, which helped the participants to start the next session which discussed the practical approach towards cyber-security more successfully.

The second day of the event was conducted by Mr. Jude Mayuran, who is the Principal Architect at Cyberior Infosec Pvt Ltd. He provided a better hands-on experience of red teaming, penetration testing, tools, trespassing, job opportunities and much more. A wide range of practical approaches were discussed, giving participants an understanding of the future. The participants were given the opportunity to watch how to hack CCTV cameras, android smartphones, social media and more, which was very interesting to all participants. At the end of both sessions, the forum was open for a Q&A session and participants were given the opportunity to interact with our esteemed guest speakers on our topic.

The objectives of the event were achieved, and it could be clearly observed by considering all the positive feedback from the participants and the appreciation of the special guests. Valuable networking opportunities were open between the participants and the speakers, and participants had the benefit of clearing their doubts on cyber security with the interactive information session. The feedback for the session was extremely positive and most participants requested another CyberShield event in the near future.



## CyberShield 2021

By IEEE Computer Society of IEEE Student Branch of SLIIT

The event was completed successfully with over 600+ participants from various universities, on both days, who participated through Zoom as well as the Facebook live. The event concluded with over 5+ hours of valuable knowledge shared between its participants. Overall, the event was a huge success, and all this would not have been possible if not for the constant support given by the Organizing Committee of CyberShield, the efforts of the speakers, and everyone who helped immensely to make this a memorable event for everyone.



## ILLŪSIŌ

By IEEE Industry Applications Society of Sri Lanka Technological Campus

ILLŪSIŌ was a project organized by the IEEE Industry Applications Society of Sri Lanka Technological Campus to actuate people on novel technical approaches which are AR, VR, and MR technologies. AR (Augmented Reality), VR (Virtual Reality), and MR (Mixed Reality) are techniques that bring us into an alternate universe surrounded by alive data, images, and unique experiences. The applications of these modern technologies are almost all over the world. Through this project, we intended to give introductory knowledge on these new technological concepts to the audience who were looking forward to updating their technological knowledge.

This project was carried out through two phases as a webinar and a post-webinar competition. The first phase of the project was a webinar, which was held on the 13th of July 2021 via the Zoom online meeting platform. Eng. Upulanka Premasiri was invited as the guest speaker of the event and a judge of the post-webinar competition. He is a senior lecturer at the University of Moratuwa also a senior developer and a consultant in XR and digital game development. It was a great honor to have him as the key-note speaker of the event as he was capable to deliver a great presentation covering all the areas attaining the event expectations. Eng. Premasiri delivered a detailed overview of what is AR, VR, & MR, how it implements in different fields such as engineering, designing, marketing, medical science, etc.

# ILLŪSIŌ

By IEEE Industry Applications Society of Sri Lanka Technological Campus

Also, he showed the directions to how to do further studies on these realities and the ways to get a great income by using this modern technology. The webinar was limited to two and half-hour time frame. It streamed in Facebook as well as YouTube, and there were 600+ participants joined through Zoom, 200+ participants joined through Facebook, and 100+ participants through YouTube. Total 900+ participants and great feedback that we received, remark the success of this webinar.

The second phase of this project was a post-webinar competition. It was on selecting the best illustration on a new idea for a new platform to support industry or a field as per own interest. It was a great ebullience to have 100+ submissions within one week of the given period. The winner was chosen by a panel of judges and awarded a scholarship to do further studies on AR, VR, & MR technology. Also, the best twenty illustrations were published on every IEEE IAS of SLTC official social media platform. Every individual who participated in the competition was awarded a certificate.

This project was a great opportunity for the audience who is inquisitive to improve their technical knowledge to get over a technology which is modern, unfamiliar but highly demanded throughout the world.

## Do you know?

“The Sri Lanka section is rich with 20 student branches all over the island.”

**ILLŪSIŌ** ADVENTURE INTO A WORLD OF IMAGINATION  
**FREE WEBINAR ON AUGMENTED VIRTUAL AND MIXED REALITIES**

**WHAT IS AR, VR, & MR?**  
 AR, VR, & MR is an integration of virtual and physical worlds, which apply almost in every industry such as,

- Engineering
- Automotive industry
- Medical and hospitality
- Marketing and retail
- Transportation
- Education
- Media
- Gaming

**GUEST SPEAKER**  
**Eng. Upulanka Premasiri**

- Lecturer department of information technology, Faculty of Information Technology, University of Moratuwa.
- Senior developer and consultant in XR and digital game development.
- B.Sc. (Hons) in Software Engineering (UOK), Specialized in Digital Game Development.
- AMIESL – IESLCE, Telecommunication Engineering.

**MODERATOR**  
 Manula Rajapakse

**13th** June 2021  
**Sunday** 6.00pm onwards..

Via

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**EVERY PARTICIPANT WILL RECEIVE A VALUABLE CERTIFICATE**

**June 13th** Sunday 6.00pm onwards..  
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**HURRY UP AND REGISTER NOW**

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# Thank You!

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# Thank You!

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# Thank You

