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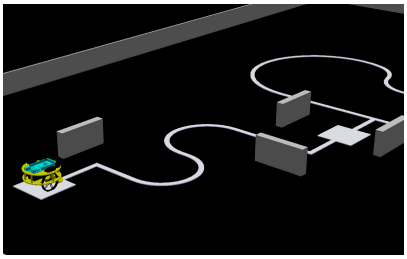

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SPOTLIGHT

A STUDENT TO SHINE

From ranking island 1st in A/Ls to a batch top in University of Moratuwa / **p25**

by Rahul Jeyanthan

Dr. Sankalpa Gamwarige

As an alumnus of the University of Moratuwa, and indeed being the first person to get a Ph.D. from ENTC, can you tell us about your experience, your most memorable experiences in the university and how you arrived at where you are today?

Similar to most of you, I was good at mathematics during my school years and followed the traditional path of pursuing the Physical Science stream for A/Ls, doing my A/Ls in 1995 and was selected to the University of Moratuwa with top marks. In the meantime, I did CIMA, which helped me develop my personality. Doing CIMA exposed me to the business community whom I could say taught me an irrational aspect of thinking; business people can take business-related decisions very well but they might not always be the most logical or rational which can be a bit hard to grasp for an engineering student. Even from my childhood, even though I was from a traditional middle-class family with my mother being a teacher and my father a technical officer, I was exposed to society from a young age and to people from all walks of life. This helped me develop two sides of my personality; my introverted side which helped me in my studies and my extroverted side which helped me build connections with people.

Even after entering the university, I tried to keep my extroverted side and introverted side balanced. When it comes to studies, I was never a person who studied in groups. If I wanted to do something, I had to do it myself. I also had several wonderful lecturers like Professor Indra Dayawansa, Professor Dileeka Dias, Engineer Kithsiri Samarasinghe, the later Dr. Amit Munindadasa, Dr. Dharmawardhana and especially Dr. Chulantha Kulasekerereally influenced my studies in which I excelled thanks to what I called my introvertedness. My extrovertedness came out when I played rugby. I did my internship in 2000 at Millennium IT and even then my extroverted personality helped me to connect with the Founder and CEO, Mr. Tony Weerasinghe. Even at Nagarro it helped me connect with the global Nagarro network and when I do make connections, I try to connect with people from a genuine and human level.

I had around 3 publications in international journals and about 10 conference papers that had high impact scores and were referred to heavily. When I was reading for my PhD at the University of Moratuwa, I did not have many other colleagues to go to like in a foreign university but as long as I had a problem to solve, it did not matter to me where I was studying or about the resources either. I worked on extending and further optimizing an algorithm first proposed at MIT and this involved a lot of rigorous mathematical proofs in probability-related theory. I also built friendships with many international intellectuals whom I met at international conferences that last to this day. I would say that was my experience then and now I remain part of the university as an external board member at the Board of Studies of the Faculty of Graduate Studies.

“I would like to share one other thing when entering the industry : You need to focus on continuous learning. I would use three words, Use more time”

As an individual who is now in an advanced role in the industry, what core skills helped you branch out from a hands-on engineer to your current position and role?

First, I should say that I prefer not to use the word "manager" because I think that word kills your leadership skills and I also never use my designation because I believe that creates a distance with whom you work with. When it comes to the skills I think that helped me come this far; mainly, I think it is building connections and I firmly believe that connections should be built on the principle of giving and not expecting anything in return. This ability to build connections is what modern companies look for and Nagarro is what I would call an empowered company where these connections are built on trust. Even though I have done and completed CIMA I am not a traditional manager who operates on process, procedures and KPIs. I believe that rational thinking will not lead to new ideas and that breakthroughs need to be spontaneous, and the workings and details can be rationalized later.

Are there any key areas that the local electronics industry should focus on and what changes are we likely to see in the future?

First, I don't think there is anything that can be called the "local electronics industry" as the world is global now. Globally, the electronics industry is steadily growing and predictions say that areas such as IoT can become a trillion-dollar industry by 2026-27. Now, the industry is growing into domains such as automobile, food processing and agriculture. I believe that the university should also try to collaborate with other universities and fields to take this multidisciplinary approach.

Another major area that should be focused on is embedded software which is becoming a really important field as the industry goes into other domains. So, I think the current job description is changing from a person who has the core skills into more of a cross-section of different fields.

From a Sri Lankan context, we need to figure out how to move away from a traditional mindset and see how to apply automation and electronics to the unique local problems such as in agriculture and food processing. I believe that automation is the key now.

With the occurrence COVID-19 pandemic, what new opportunities are seen in the industry?

I believe that COVID-19 has shown us the importance of targeting sustainable solutions. I think that sustainable solutions such as renewable energy and green power generation will become more important going into the future. However, I don't use the word sustainable just to refer to green solutions but as a sustainable ecosystem and building sustainable relationships. I also think that the digital economy is becoming crucial and that the pandemic has opened up access to the digital landscape more than ever before.

When it comes to the export market, is there a Unique Selling Point that Sri Lankan companies can offer and is there a specific niche that should be targeted?

Instead of speaking about specific fields, I think it is important for Sri Lankans to figure out their human side and how that fits on the market. For example, one time, the CEO of the global Nagarro operation said that Sri Lankans are perfect for caring and for giving to others. I think we should use this quality and our own unique DNA when targeting the market, instead of trying to duplicate the skills of other nationalities. I also believe that when exporting and in any other field, we should build trust, be complete, and make sure that the products are of high quality and maintain the concept of sustainability.

What is your view on collaborations between the industry and academia?

Right now, I think that industry-academic collaborations are growing, especially in your department and Dr. Ranga and I also have a pretty close relationship. The industry just wants solutions to problems. It is not relevant from what field or department these solutions come from, so different academic fields can collaborate to arrive at these solutions.

What are the major considerations that need to be taken into account and any alterations needed when bringing the university projects and prototypes to industry-ready products?

What we are showing in a prototype is the proof of concept of applicability for some hypothetical or near-real situation. I think design thinking is an important subject when it comes to developing prototypes.

In addition to the functional requirements, non-functional requirements such as affordability, cost of production, security, manufacturability, cost of maintenance need to be put into the affordability equation and be brought into equilibrium with the expectations. I also think we should establish a local market and for this, we should have empathy for the market and the requirements of consumers. When designing something, you should not worry about patents but about actually focusing on one right feature that people are willing to pay for and are satisfied with.

Finally, in addition to what we discussed so far is there any additional advice you would give a recent undergraduate entering the industry?

I would like to share one other thing when entering the industry. You need to focus on continuous learning. I would use three words, "Use more time", to learn and develop yourself and interact with the industry to see the future trends. During your continuous learning journey, you need to keep learning new skills and apply them and reflect on their impact. You need to challenge conventionality to achieve breakthroughs and apply your learning to these breakthroughs. From Day 1, you also need to find the art of achieving financial stability, not by being stingy but by spending responsibly, as instability will affect your accelerated growth and learning ability.

Self Driving Technology: Future of Transportation

by Sadani Jayawardena

Imagine an era in which you can entirely rely on an autonomous vehicle to travel safely to your destination, and simply get down with no worries about parking. This does not sound like a dream anymore. Self-driving has always been among the trending topics for both research and industry for decades.

Partnered with Creative Software (Pvt.) Ltd, University of Moratuwa has embarked on a research project focusing on driverless car technology. The aspiration is to introduce a level 4 autonomous car that can operate independently of any human interaction. The main objectives of the programme are strengthening local research and development capacity in artificial intelligence, and forging even closer ties between industry and academia. The project team consists of final year undergraduates led by Dr. Peshala Jayasekara with the Head of the Department, Dr. Ranga Rodrigo.

The project focuses on three main components: i) state estimation and localization, where the vehicle needs to be localized on a given map ii) perception, which deals with detecting and identifying static and dynamic objects, iii) motion planning, which enables the vehicle to locomote according to a mission plan while adhering to traffic rules and avoiding obstacles. All three components should work in unison to achieve the final desired autonomy.

State Estimation and Localization

In this phase of the project (Figure 1), it is expected to provide uninterrupted estimations of position, velocity and orientation of the vehicle with respect to an earth-fixed coordinate frame. The project mitigates the main drawback observed in current state-of-the-art work: the dependency of the estimation on pre-generated highly detailed maps. As a result, the solution would be scalable and feasible even for countries like Sri Lanka, where it is hard to maintain such high detailed maps due to the inconsistencies prevailing in the environment. In the current developments, an Error State Extended Kalman Filter has been implemented, and is used for dealing with asynchronous, multi-rate sensory inputs. It is integrated with backward smoothing and stochastic cloning functionality. Stereo cameras and LiDAR sensors are used as sensors providing relative measurements. The functionality of the system has been tested using the KAIST Urban dataset, under which, the estimator was able to provide positional estimations at a rate of 55Hz with a root mean square error of 1.5m. This was conducted for a simulated Global Navigation Satellite System (GNSS) measurement with additive white Gaussian noise of standard deviation of 4m. The structure of the estimator has been carefully designed to allow maximum flexibility to facilitate future developments.

Perception

Visual perception is a pivotal component in a self-driving system to recognize its surrounding environment. This includes detection and identification of regulatory elements as well as detection, tracking and trajectory prediction of dynamic objects. The research under two categories is carried out separately to come up with effective solutions to address the challenge.

"Once you trust a self-driving car with your life, you pretty much will trust AI with anything"

- DAVE WATERS -

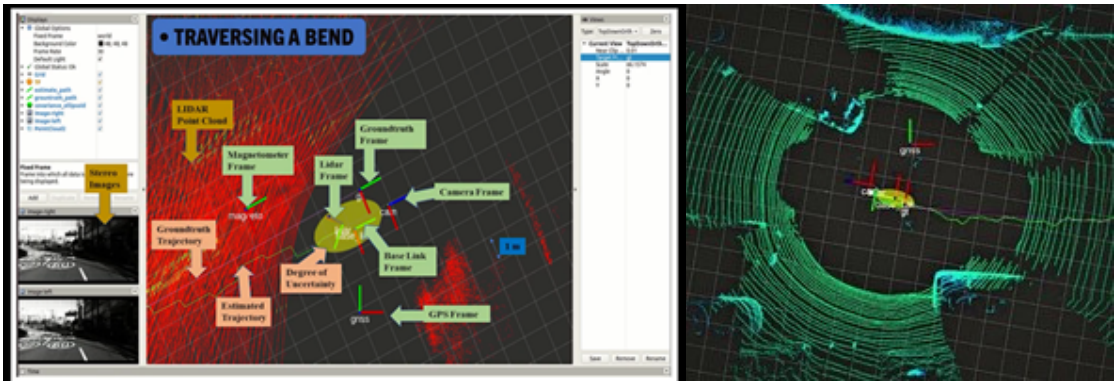

Figure 1:
State Estimation and Localization

Road Sign, Traffic Light and Static Object Detection

The focus of this element is to develop robust detection algorithms for traffic signals, traffic lights, lanes, and road markings (Figure 2). The possibility of a real-time implementation of this subsystem in a resource-constrained computational environment is also tested simultaneously. To achieve above functionality, separate detection frameworks have been developed for each object. The traffic sign and traffic light detection pipeline constitute a state-of-the-art object detector model to detect the superclass of each traffic sign and traffic light. Furthermore, a separate classifier model is used to individually recognize each class. For fast and efficient lane detection, an end-to-end deep learning-based network architecture is implemented with two post-processing techniques.This approach has led to further increase in accuracy of detection. The road markings detection framework includes extracting the road area through inverse perspective transform and employing an object detector model to detect the road markings in each image. While using the publicly available CULane dataset for lane detection experiments, the team has also created two benchmark datasets in the Sri Lankan context for traffic signs, traffic lights and road markings.

The trained detection models are optimized through TensorRT conversions and quantization for the implementation on an Nvidia Jetson AGX Xavier as the embedded system. The optimized models are integrated to produce a complete ROS package, which visualizes the detection results and publishes them through ROS topics in real-time.

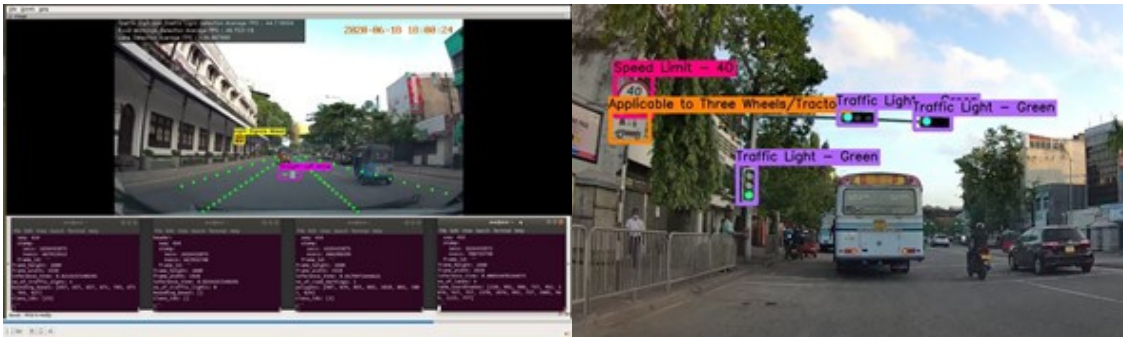

Figure 2:
Road Sign, Traffic Light
and
Static Object Detection

Detection, Tracking and Trajectory Prediction of Dynamic Objects

This phase of the project deals with all the dynamic objects in a typical driving scenario. It includes detecting three main dynamic object classes, namely vehicles, pedestrians and cyclists using image and LiDAR data as inputs. The detected dynamic objects are demarcated using 3D bounding boxes around them and the track IDs are used to identify and track each of them, separately. The proposed pipeline initially takes image data and LiDAR data that goes through the preprocessing stage. Its output is used to perform detection tasks which are followed by tracking and prediction functions at the respective stages. The results are visualized at the final stage of the pipeline and the tracking results are passed to the next frame for the continuation of the tracking task. The complete system is implemented on ROS (Figure 3). Using the KITTI dataset we have achieved real-time functionality of the system with higher accuracy for daytime fair weather conditions.

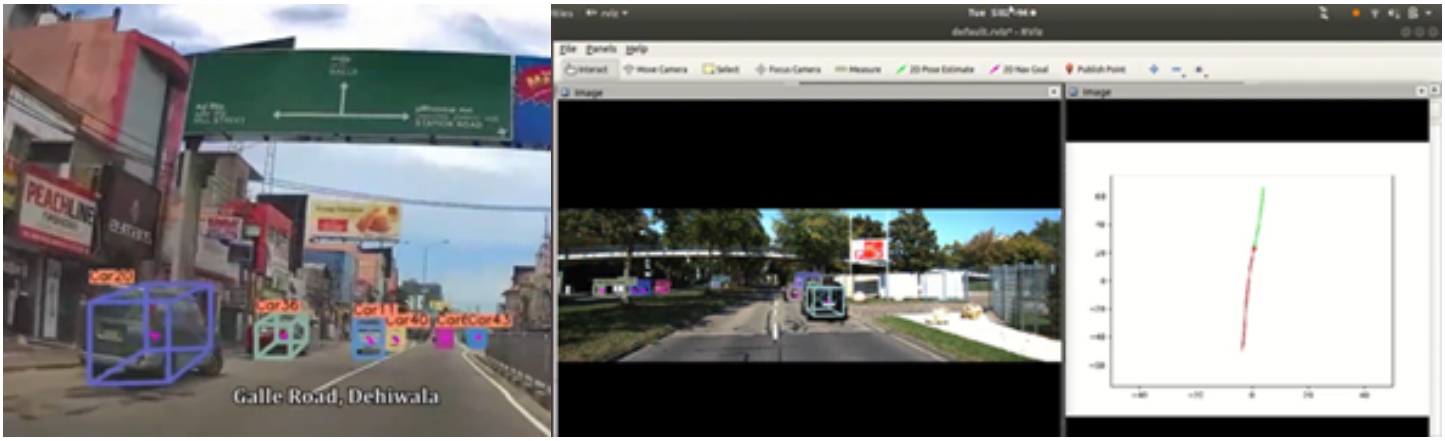

Figure 3: Detection, Tracking and Trajectory Prediction of Dynamic Objects

Motion Planning

The focus of this phase is to generate suitable trajectories for self-driving to handle both structured and unstructured driving environments. The implemented decision-making system is a unison of several subsystems. The global planner plans the global path from the user location to a specified destination using Dijkstra's algorithm. The behavioural planner handles different scenarios encountered by the vehicle based on a state machine. The lattice-based local planner creates dynamically feasible safe and comfortable paths along the global path. The collision checker checks for collisions in these paths and selects the best path using a geofencing based algorithm. The velocity planner creates a velocity profile for this path and outputs a trajectory. The main controller follows this trajectory and completes the process using PID Control and NMPC (Non-Linear MPC) for longitudinal and lateral control, respectively. Parking was implemented separately using an optimization-based collision avoidance (OBCA) based approach that generates feasible maneuvers.

Figure 4: Behavioral and Local Planning, and Maneuvering

The state machine and local planner have been developed to a state that can tackle regular structured scenarios. It includes lane-keeping, keeping a safe distance with the vehicle in front, overtaking, auto parking, giving way to pedestrians/cyclists on or entering a crossing, giving way to vehicles entering a road, and self-driving the car in a dynamic-obstacle-free environment such as a racing track. Simulation tools are used to demonstrate handling both structured and unstructured scenarios. An Ackermann steering-based robot is used to exhibit handling a set of selected structured scenarios.

The future of vehicle autonomy has a bright aura. In a few more decades all the ambiguities of self-driving would fade away making autonomous vehicles ubiquitous and indispensable in our lives.

Robots That Can Walk

by Shalutha Rajapakshe

At present, wheeled robots take a prominent place in the category of mobile robots utilized by humans. The reason behind this dominance is because of the high speed, simple locomotion mechanism and the low-cost build of the wheeled robots. However, it should be noted that in order to move, wheeled robots require continuous paved surfaces. Furthermore, they can't navigate well over obstacles and terrains such as rocky terrains, surfaces with low friction, etc., which is one of the main drawbacks identified in wheel robots. Legged robots were introduced to address these drawbacks and also to introduce more advantages. Legged robots are capable of traversing on any kind of surface and they even can step over obstacles if needed. Legged robots can be categorized using the number of limbs they comprise of:

1. Monopod Robots

Monopod robots (Figure 1) only consist of a single-leg and are also referred to as one-legged robots. They are generally designed to work in a hopping behavior and they balance themselves by changing their center of gravity while performing hops.

2. Biped Robots

Two-legged robots or biped robots consist of two legs and their development is mainly aligned with Humanoid robots which are designed to imitate human behavior. Biped robots are dynamically stable but require highly complex algorithms to control and maintain the balance. Some famous biped robots we can see in the modern world are; Boston Dynamics's Atlas (Figure 2), Honda's ASIMO (Figure 3), and Toyota's T-HR3 (Figure 4).

"Will robots inherit the earth? Yes, but they will be our children"

- MARVIN MINSKY -

3. Multi-legged Robots

Multi-legged robots encompass all the robots which consist of more than 2 legs. Among them, special attention and focus have been given towards the Quadruped robots which have four legs, and Hexapod robots which have six legs.

3.a Quadruped Robots

Quadruped robots (Boston Dynamics SPOT - Figure 5) are one of the most popular types in the legged robot world which follow the walking patterns of 4 legged animals. They are fast, have higher static stability, and are commonly designed to walk in 2 different walking patterns.

1. Moving one leg at a time
2. Moving alternative leg pairs

3.b. Hexapod Robots

These spider-shaped robots (CSIRO's Zee Hexapod - Figure 6) are also a biologically inspired robot type that consists of six legs. As they have six legs they have greater static stability when standing and higher dynamic stability when moving. Using their extra legs, these hexapods can easily manipulate objects in the surrounding environment, which is known in the scientific community as legipulation. Different walking gaits or walking patterns have been implemented in hexapods for proper navigation and are currently a famous topic in the legged robotics research community. From here onwards we will focus on Hexapod robots and their behavior.

Hexapods' legs can take several configurations like 3 Degrees of Freedom (DoF) and 5 DoF depending on the requirement. For easier comprehension, let's take a look at a 3 DoF leg of a hexapod.

By looking at the figure 7, we can identify that there are 3 links named Coxa, Femur, and Tibia. The Coxa joint(J1) is attached to the body of the hexapod and can rotate around a vertical axis while the other two joints (J2, J3) can rotate around a horizontal axis. By varying the joint angles of these 3 joints which are θ_c, θ_f, and θ_t, the hexapod can move its leg from one place to another and perform navigation or any other activity.

Knowledge in robot kinematics plays an essential factor in describing the foot tip's position and orientation of a legged robot. Robot kinematics is about studying all possible motions that can be achieved using a robot. Kinematics can be divided into two categories which are forward kinematics and inverse kinematics.

Forward kinematics help us identify the foot tip's resultant position and orientation when we are given the joint angles. On the other hand, inverse kinematics help us obtain the joint values when the required foot tip's position and orientation are given. Forward kinematics gives one unique solution while inverse kinematics can result in multiple solutions. In the real world, the most used kinematic type is inverse kinematics which is also the more complex one to solve. Walking patterns in legged robots are known as gaits. Some of the famous walking gaits used in Hexapods are summarized below. Before looking into them, it is important to discuss the two stages of the walking of a legged robot; which are the stance phase and the swing phase. In the swing phase, the leg traverses from an initial position to a goal position through the air, while in the stance phase the leg endpoint is contacted with the ground.

1. Wave gait - In the wave gait, only 1 leg is in the swing phase while the other 5 legs are at the stance phase. Therefore, this is the slowest gait pattern.
2. Ripple gait - In the ripple gait, two legs from the opposite sides are in the swing phase with a 180 degree offset while the other 4 legs are in the stance phase. This gait is faster than the wave gait since two legs are moving at a time.
3. Tripod gait - In tripod gait, three legs are at the swinging phase while the other 3 legs are at the stance phase. Initially, the front and rear legs of one side and the middle leg of the other side of the hexapod will be moved while the other three legs are in contact with the ground. When the moving legs reach their goal positions other 3 legs will start moving while the previously moved legs will now be in contact with the ground.

Boston Dynamics, NASA, CSIRO's Robotics and Autonomous Systems Group, ANYbotics, Agility Robotics, and PAL Robotics are some of the most famous and leading companies in the world that carry-out legged robot-related research. Even though the design and the controlling complexity of legged robots remain as challenges, it is safe to assume that it will be a common sight to see lots of legged robots in various applications in the near future due to the inherent advantages they provide.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

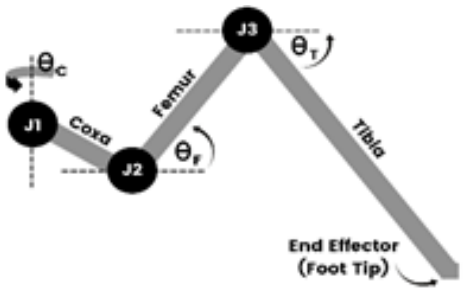

Figure 7

Introduction to Bluetooth Mesh Networks

by Ajeeth Chandrasekaran

What is Bluetooth Low Energy?

Bluetooth has already been established as one of the predominant standards in the short-range wireless networking field. Its ease of connection establishment, satisfactory data rate within a short- range, and the availability in almost all modern-day smartphones and laptops have made it one of the remarkable innovations in this era. With the arrival of the Internet of Things (IoT), low-power applications have gained popularity among embedded system enthusiasts. Bluetooth Special Interest Group (Bluetooth SIG) has announced Bluetooth Low Energy (BLE) as a power-efficient protocol along with Bluetooth version 4.0. BLE has 40 channels, in which each channel comprises 2MHz bandwidth. The channels are numbered from 0 to 39 where the channels 37, 38, and 39 are called advertisement channels and the rest are called data channels.

Features such as reduced header size of the protocol data unit (PDU), reduced power consumption, satisfactory data rate, and the proposed long-range mode have contributed to a wide range of BLE applications.

What is Bluetooth Mesh?

Since the introduction of BLE, many short-range networking applications have adopted BLE. However, one of the major concerns of such applications was that only star topology was supported by the BLE standard and hence, a single node failure can cause partial network failure. To address this issue, many experts proposed mesh network-based architectures.

Many research-based solutions were presented over the years depicting various strategies on message delivery, network formation, PDU development and security of the network. Furthermore, many proprietary solutions were developed by pioneers in the industry.

As a result, in mid-2017, Bluetooth SIG standardized a new standard of Bluetooth mesh. Detailed standardization documents can be found here.

Applications of Bluetooth Mesh Networks

Bluetooth mesh networks have gained popularity in recent years after their standardization and have been used in many applications such as automated irrigation systems and plant lighting, localization and tracking of BLE devices, smart parking lots and home/building automation.

Bluetooth Mesh Architecture

The Bluetooth mesh works on top of the BLE core. Figure 1 shows the layered protocol stack used in Bluetooth mesh.

Type of Network Nodes

The devices connected to the network are called nodes. A node can be a BLE-enabled beacon, a peripheral device, a smartphone, or a laptop. These nodes will use their BLE capability to send and/or receive messages throughout the network. Bluetooth mesh standardization has defined several types of nodes in a Bluetooth mesh network along with their designated functionality. Figure 2 shows an example mesh with different types of nodes.

1. Relay Nodes - relay messages in the network via managed flooding where the messages are relayed to only the nearby nodes.
2. Friend Nodes - line-powered nodes which cache messages to be delivered to low power nodes upon request.
3. Low Power Nodes - these nodes wake up from the sleep state only when there is a message that needs to be transmitted/ received.
4. Proxy Nodes - responsible for adding devices which do not support advertising bearer via the Generic Attribute Profile (GATT) bearer to the network

Adding new nodes to the network is called provisioning and the network device that can provision new nodes into the network is called a provisioner. The provisioner does not know the details of devices that are not connected directly to it. This ensures privacy inside the network and enables the construction of subnets.

Security

In Bluetooth mesh, security is an important feature as it makes the technology more robust and reliable. All messages are encrypted at two layers of the protocol stack using the AES-CCM mode. The two layers are; Upper Transport Layer and Network Layer.

The network layer also adds another layer of security by a process called “obfuscation” to prevent replay attacks where an attacker tries to passively store messages and send them again to flood the network with duplicates. This is prevented by introducing a 32-bit sequence number that is different for every relay of the message. This method is reinforced by using an 32-bit initialisation vector index (IV index) alongside. It is updated in a pre-programmed manner. With this feature, every encryption of the message would be different from each other and duplicates can be easily discarded.

Conclusion

Bluetooth mesh can be identified as a novel solution for wireless networking applications that need to go beyond the conventional star topology based architectures. With the increase of low-power network applications in IoT, Bluetooth mesh has become a critical technology. Remarkable interoperability, backward compatibility, and increased security make the technology reliable and widely accessible.

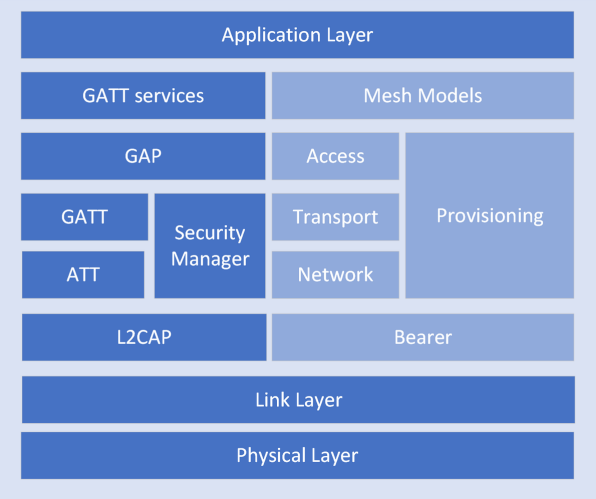

Figure 1: Bluetooth Mesh architecture

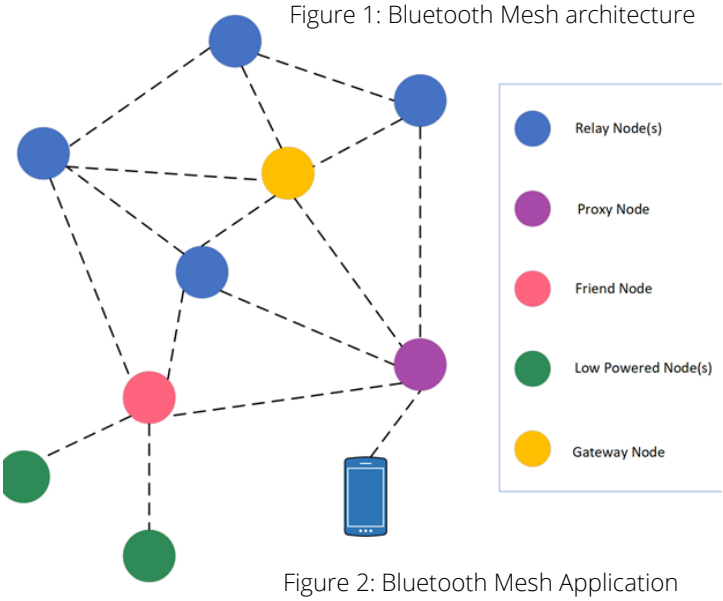

Figure 2: Bluetooth Mesh Application

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by Dilmi Caldera

PG. Dip. /M.Sc. in Telecommunications

Undergraduates explore their areas of interest while pursuing a Bachelor's degree, and many will want to dive deep into those specific areas that will assist their career path following graduation. At present, a Bachelor's degree is unofficially considered to be the basic qualification to enter the engineering job market. A Master's course offers the opportunity to improve critical thinking, analytic ability, problem-solving skills, time management, and written and oral delivery of results that could be directly applied in careers. Additionally, this allows you to exhibit evidence of persistence, determination, intellectual prowess, and the ability to handle challenging environments; all of which are sought-after qualities for manager and director positions. Moreover, postgraduate studies ensure one's ability to study a field they are passionate about and to obtain a sense of accomplishment. Most importantly, this can act as a stepping stone for a PhD.

Despite many established higher education institutes, the Department of Electronic and Telecommunication Engineering of the University of Moratuwa is well recognized for postgraduate studies with many years of excellence in teaching and research. As a result, it is reputed as one of the most sought-after departments for postgraduate studies in Sri Lanka. The department offers two postgraduate taught M.Sc. courses and research-based M.Phil. and PhD degrees. The department is equipped with nine laboratories, one PG laboratory and three industry-sponsored laboratories with thirty dedicated faculty members with qualifications from leading universities around the world. Postgraduate courses at ENTC support active international collaborations with industry and reputed universities.

M.Sc. in telecommunication at the University of Moratuwa plays a leading role with a multitude of benefits for its participants. The course is delivered by both internal and external resource persons who are not only nationally and internationally acclaimed experts in telecommunications but also who have extensive experience with publications and noteworthy projects in this area. This can be seen as one of the greatest assets with regard to this particular course. M.Sc. in Telecommunications at ENTC also enables a flexible duration comprising two modes of delivery. The part-time option, which is the most popular, takes two years, while the full-time option can be completed in one year.

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PROFESSOR - DIGITAL TRANSMISSION TECHNIQUES, UNIVERSITY OF OULU, FINLAND

DR. MADHUSANKA LIYANAGE
ASSISTANT PROFESSOR, UNIVERSITY COLLEGE DUBLIN, IRELAND

DR. SURESH SURESHKUMAR
SENIOR EXPERT, MOBILE COMMUNICATIONS, NOKIA SIEMENS NETWORKS, FINLAND

Beyond the Bachelor's Degree

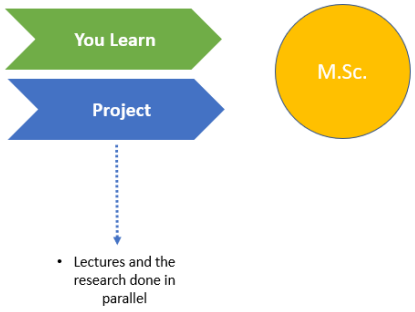
ENG. RUCHIRA YASARATNE
MANAGER - CORE NETWORK PLANING & OPERATIONS, DIALOG AXIATA PLC

DR. ABHAYA SUMANASENA
CONSULTANT, REAL WIRELESS, UK

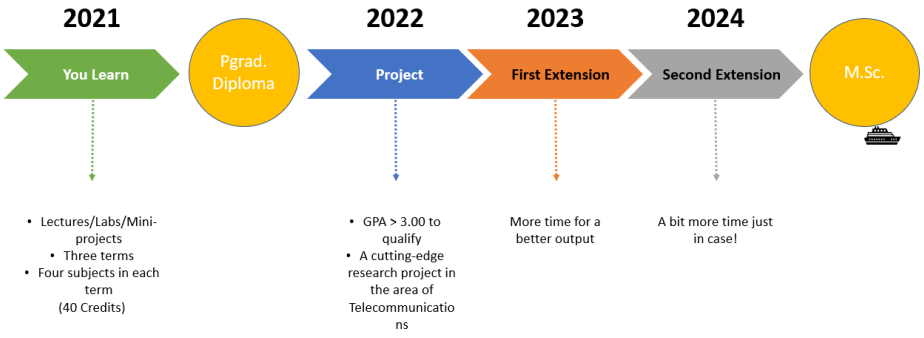
DR. SANJEEWA HERATH
RESEARCH ENGINEER, HUAWEI TECHNOLOGIES, CANADA

MR. VIRAJ SILVA
MANAGER, SYSTEMS DESIGN & STRATEGY - PACKET CORE, T-MOBILE, USA

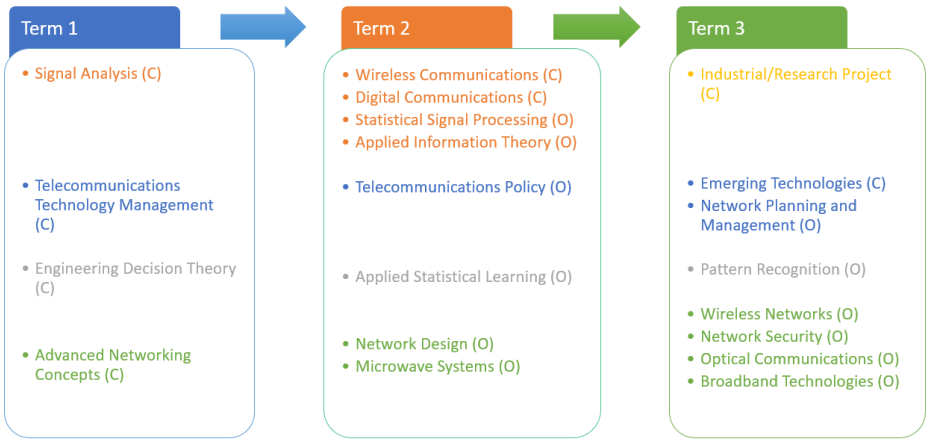
Course at a Glance: Full time



Course at a Glance: Part time



Curriculum: Term Wise Breakdown



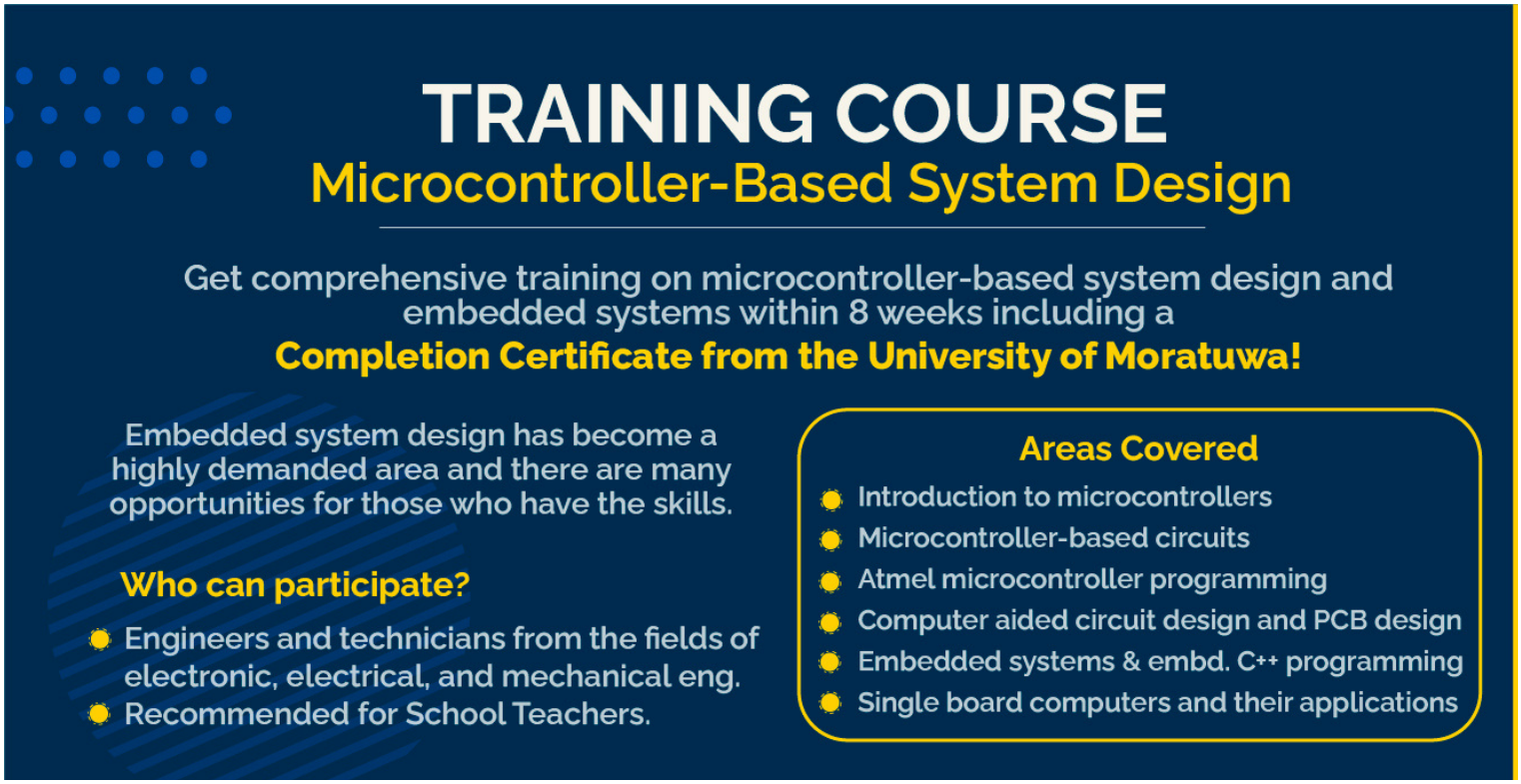
The course comprises a well-designed curriculum to cater diverse needs of the participants. This includes industry-focused features and diverse areas of specialization, which will allow the participants to choose between the subjects depending on their preference while focusing on interdisciplinary skills. In addition, it provides special care in balancing the workload by allowing the participants to attend the course on weekends. All these features of the curriculum make this course more convenient, unique, and effective. Moreover, the participants will also benefit from a cutting-edge research project under the guidance of an expert in the field.

The modern advanced delivery methods of this course consist of traditional face-to-face lectures and/or online lectures. In addition, this is benefited with an attractive course fee structure using an instalment-based payment method and an experience of a lifetime on par with leading universities around the world. Therefore, it could be comprehended that an M.Sc. in Telecommunications at ENTC, University of Moratuwa is an ideal option for your postgraduate studies.

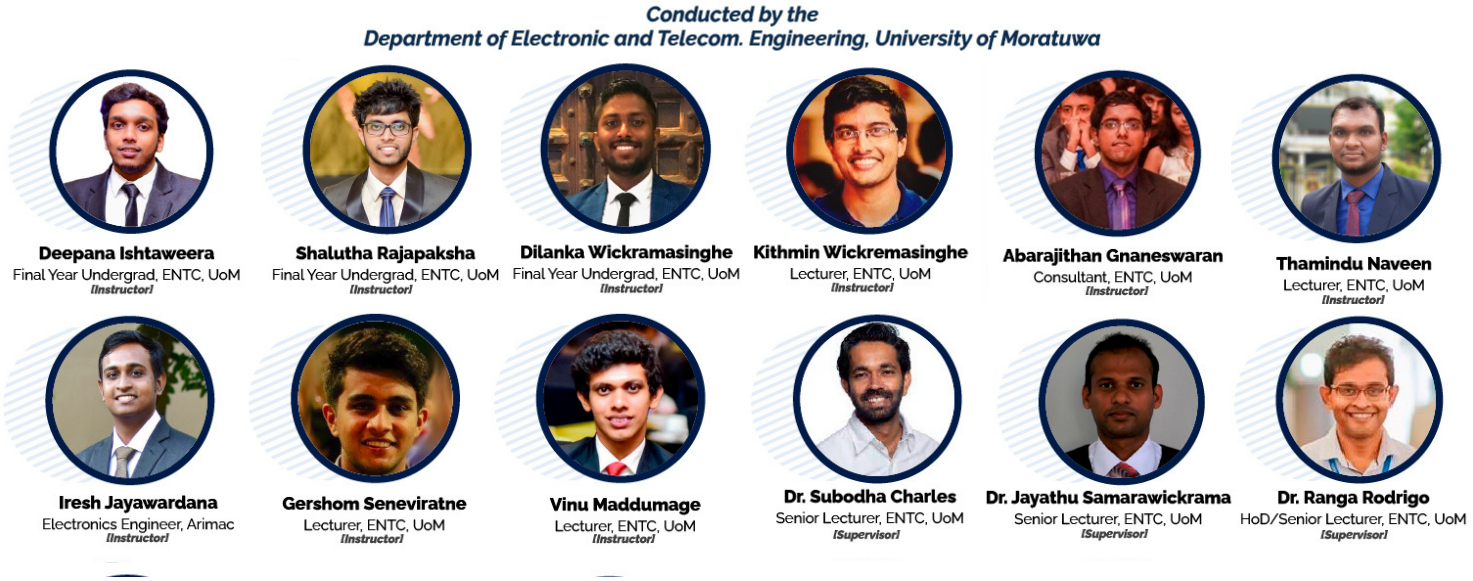
Our Curriculum

Communications Theory and Signal Processing
Signal Analysis
Wireless Communications
Digital Communications
Statistical Signal Processing
Advanced Stochastic Processes
Applied Information Theory
Data Science and Machine Learning
Engineering Decision Theory
Applied Statistical Learning
Pattern Recognition
Telecom Management and Technology
Telecommunication Technology Management
Telecommunications Policy
Network Planning and Management
Emerging Technologies
Communication Systems and Networks
Network Design
Advanced Network Concepts
Network Security
Broadband Wireless Systems
Wireless Networks
Optical Communication and Networks
Microwave Systems
Research
Individual/Research Project Dissertation (For MSc.)

Microcontroller Course



In the modern world, microcontroller-based system design has become a highly demanded area leading to plenty of opportunities for experts in this field. Recently, the Department of Electronic and Telecommunication Engineering of the University of Moratuwa successfully organized a comprehensive training course on **Microcontroller-Based System Design** conducted by an experienced panel of resource personnel. The course can be seen as a valuable opportunity as it is not only limited to the undergraduates of the University of Moratuwa but also available to the general public. This paved the way to a great learning opportunity for an audience of engineers, technicians from the fields of electronics, electrical and mechanical engineering, school teachers, and university undergraduates. It was conducted via Zoom for a period of eight weeks, commencing its first session on the 17th of July 2021 and the participants were awarded a valuable completion certificate from the University of Moratuwa.



IEEE Signal Processing Cup 2021

by Varuna Gajoashan

Ms. Amashi Niwarthana

Mr. Harindu Jayarathne

Ms. Kithmini Herath

Mr. Pamuditha Somarathne

Mr. Ramith Hettiarachchi

Mr. Tharindu Samarakoon

Mr. Tharindu Wickremasinghe

Mr. Thieshanthan Arulmolivarman

Supervisor
Dr. Prathapasinghe Dharmawansa

Team T-Cubed, a team of second and third-year undergraduate students from the Department of Electronic and Telecommunication Engineering, University of Moratuwa under the supervision of Dr. Prathapasinghe Dharmawansa achieved first place at the 2021 edition of the IEEE Signal Processing Cup (SP Cup) competition at the International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2021. ICASSP is the annual flagship conference of the IEEE Signal Processing Society which is the world's premier association for signal processing engineers, academics, and industry professionals. Due to the current pandemic situation, the competition was held from the 6th to the 11th of June 2021, virtually, where it was organized in Toronto, Canada.

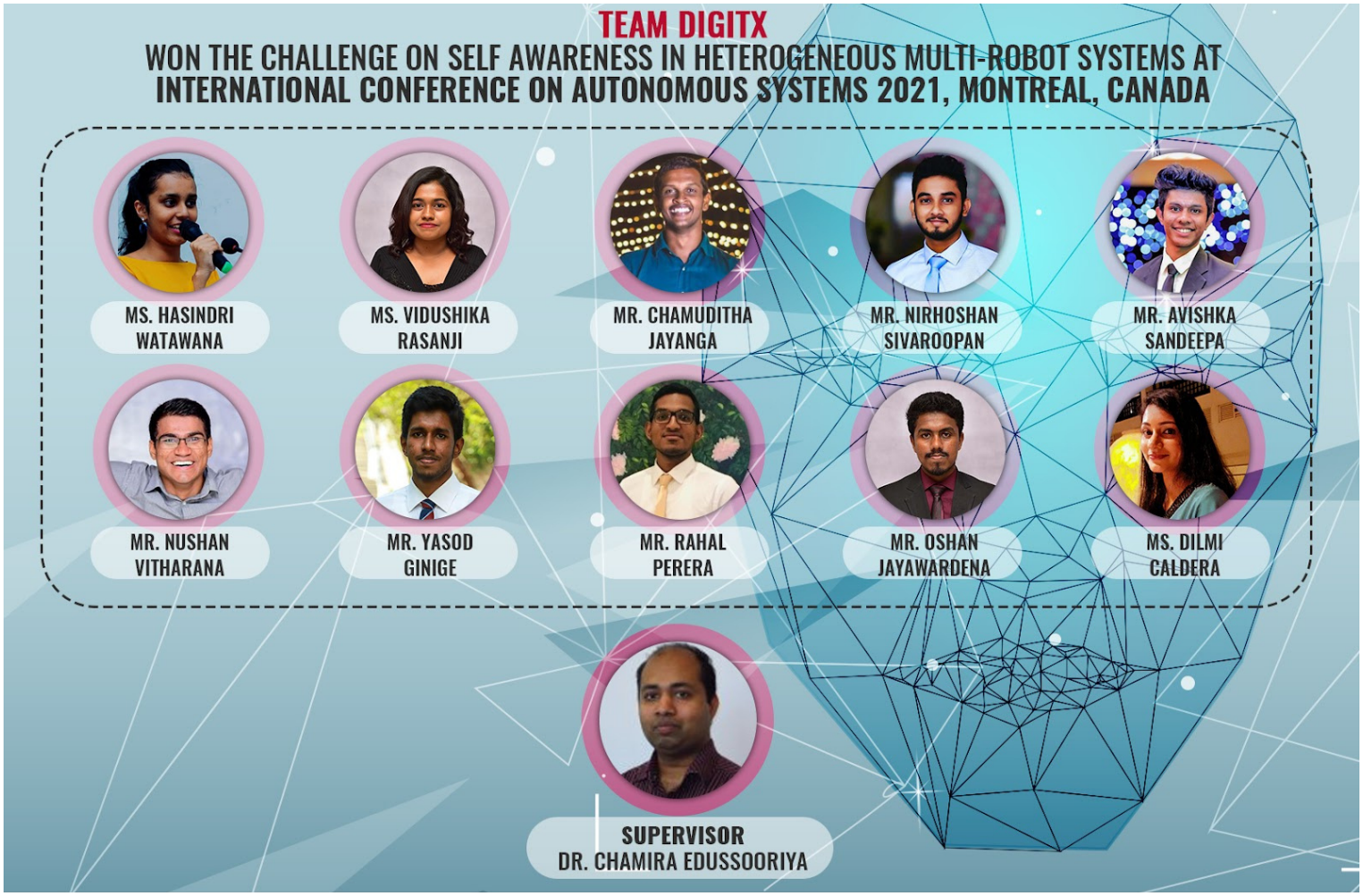
The challenge was to develop a control algorithm to configure the behavior of an Intelligent Reflecting Surface (IRS) for wireless communications. Team T - Cubed developed an effective algorithm by maximizing various statistical signal processing and mathematical optimization techniques and was able to successfully secure first place in the final round amidst a pool of about 50 teams in the competition with nearly 300 students from all over the world.

This can indeed be seen as a great achievement on behalf of the department, and elevates its image and standing within the signal processing community in the world, and Team T-Cubed has shown its talent to come out on top in this highly challenging event.

"Accept the challenges so that you can feel the exhilaration of victory"

Champions of IEEE ICAS 2021 Challenge

by Nerththiga Neminathan



The undergraduates of the Department of Electronic and Telecommunication Engineering have achieved numerous victories not only in the local context but also at the international level. The team DigitX, formed with ten undergraduates and supervised by Dr. Chamira Edussooriya achieved a 1st place in ICAS 2021 challenge organized within the first International Conference on Autonomous Systems, in cooperation with IEEE Signal Processing Society and IEEE Intelligent Transportation System Society. While the competition was held in Montreal, Canada the participation was done virtually from 11th to 13th August 2021.

The challenge was on self-awareness in heterogeneous multi-robot systems and it was required to develop an unsupervised algorithm for anomaly detection through self-aware autonomous systems. The expected solution should automatically detect anomalies in the navigation of the ground and aerial systems using sensor-based data and could work in embedded architecture with low computational capabilities and limited power resources in real-time.

The team succeeded in developing an unsupervised algorithm using techniques like state-of-the-art signal processing, auto-encoders and recurrent neural networks for time series data signal processing to detect anomalies according to a given dataset. They developed this solution based on data from IMU, LiDAR sensors and cameras in the autonomous system.

This is one of the proud moments not only for the department but also for the country in the field of signal processing. Our heartfelt wishes for the supervisor Dr. Chamira Edussooriya and our undergraduates Hasindri Watawana, Vidushika Rasanji, Chamuditha Jayanga, Nirhoshan Sivaroopan, Avishka Sandeepa, Nushan Vitharana, Yasod Ginige, Rahal Perera, Oshan Jayawardena and Dilmi Caldera of team DigitX. Furthermore, our sincere gratitude extends towards the mentors of the team; Mr. Bhavan, Mr. Gershom, Mr. Suman and Mr. Vinu for their support and guidance throughout this challenge.

IEEE Video and Image Processing Cup 2021

by Kajhanan Kailainathan

IEEE being the world's largest technical professional organization and the prestigious reputation of the IEEE Signal Processing Society attracted enthusiastic academics from across the globe to the IEEE Video and Image Processing Cup held at the 28th International Conference for Image Processing (ICIP) 2021, presented by the IEEE Signal Processing Society. Team NFPUndercover, consisting of members Jathurshan Pradeepkumar, Udith Haputhanthri, Mohamed Afham, and Mithunjha Anandakumar, four final year undergraduate students representing the Department of Electronic and Telecommunication Engineering, University of Moratuwa, became the 2nd runners up in the competition. This team was tutored by Mr. Ashwin de Silva, a former undergraduate student of the department and currently a graduatestudent at John Hopkins University and was supervised by Dr. Chamira Edussooriya, senior lecturer of the Department of Electronic and Telecommunication Engineering.

The task is to find computer-vision based solutions to the estimation of in-bed human poses. No annotations were available for the cases where the subject is covered by a blanket in the model training, and the contestants had access to the large amounts of data where the subject was not covered. Our team came up with a robust algorithm that predicted accurate results with constraints such as heavy occlusion caused by the blankets and varying illumination conditions.

By achieving this remarkable feat team NFPUndercover have brought fame and honor to the department and the university.

MR. MOHAMED AFHAM

MS. MITHUNJHA ANANDAKUMAR

MR. JATHURSHAN PRADEEPKUMAR

MR. UDITH HAPUTHANTHRI

Supervisor
MR. CHAMIRA EDUSSOORIYA

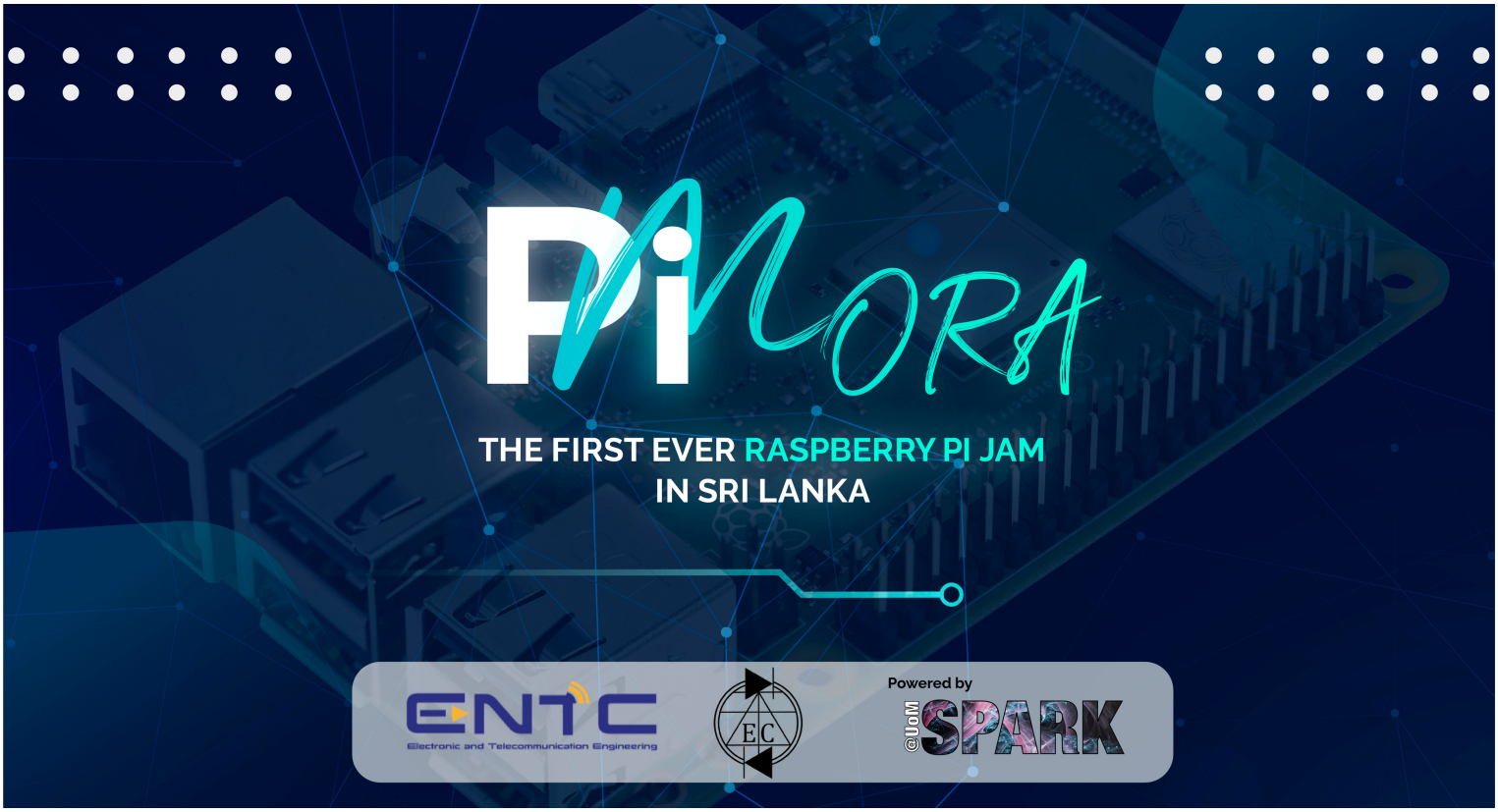
Tutor
MR. ASHWIN DE SILVA

HONORABLE MENTIONS

While the article highlights only a few achievements, there are many more achievements to be mentioned. Few such honorable mentions, which were achieved in the most recent times, are mentioned herewith. Several notable competition wins such as; IEEE SMS Winners 2020 in BR41N.IO Brain Computer Interface Hackathon at IEEE System, Man and Cybernetics Conference 2020, Intheon award winner (1st place) in BR41N.IO International Brain-Computer Interface Designers' Hackathon, Advanced PCB Designing & Fabrication Workshop and Competition (1st place), National Winner and International Audience Award Winner in ActInSpace 2020 (International space innovation contest), 2nd International Energy and Electricity (Market Business Decision Simulation Competition Champions) , IEEE PES Remote Lab Experiment Design Competition (Champions) , IESL ROBOGAMES 2020 (1st place), ICDS2021 Mini-Hackathon (2nd place) , CASS COVID-19 Special Student Design Competition at the International Symposium on Circuits and Systems (ISCAS) 2020 (2nd place), Electronic Design Competition 2021 organized by IEEE Sri Lanka Section (2nd place and People's Choice Award), IEEE IAS CMD Humanitarian contest (2nd place), Techfest 2020 (3rd place), All-lead, 3-lead, 2-lead categories at the 22nd Annual International Computing in Cardiology Challenge organized by Physionet (3rd place), Datastorm v2, Selected for regional level in 2020-2021 IEEE CASS Student Design Competition (3rd place). Top 3 Finalist in IEEE IAS Student Robot Demonstration Contest 2021 in which the final ranking is yet to be announced.Additionally, students successfully published several academic research articles such as; a publication in SLTC International Research Conference 2020, a publication in IEEE International Symposium on Circuits and Systems 2021, two publications which have been accepted in 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2021)

The First-Ever Raspberry Pi JAM in Sri Lanka

by Sachini Chandanayake



Pi Mora is the first-ever Raspberry Pi jam series in Sri Lanka. Organized by the Spark branch of the Electronic Club at the Department of Electronic & Telecommunication Engineering, University of Moratuwa, the event aims to establish a Raspberry Pi community in Sri Lanka. The initiative was taken to enhance the enthusiasm of ENTC undergraduates towards the SPARK project while building a young generation with a passion for the Raspberry pi platform. The first step of this mission has recently reached a successful conclusion after three consecutive sessions; "Beginners Level Workshop", "Talk" and "Show and Tell", with the participation of 2018 and 2019 batches of ENTC. As the guest speakers, some remarkable people with outstanding profiles from the industry shared their experiences, presenting valuable content to the audience.

The first session, "Beginners Level Workshop", was held on 29th August to give a basic understanding of the Raspberry pi platform. Its content was directed towards a beginner-level introduction to the RPi, Linux Commands, API interfaces, and a hands-on workshop based on a simple RPi project. It was conducted by Mr. Dilanka Laknath and Mr. Sahan Hemachandra. At the end of the session, the audience was also given a guided task to have some hands-on experience with an RPi application.

The second session was a high-level talk based on some advanced use cases of Raspberry Pis. The guest speaker - Mr. Kasun Jayalath shared some of his experiences related to his previous projects. The audience was able to gain some good insights about the platform.

The final session was to showcase some Raspberry Pi applications. It was conducted by a few past graduates from ENTC - Mr. Oshada Jayasinghe, Mr. Vihan Melaka, Mr. Thilina Janith, and Mr. Kithmin Wickramasinghe. They covered some of their previous project experiences during the session, including challenges they faced and how they overcame those challenges.

After three consecutive sessions, Pi Mora made a successful conclusion, bringing the audience a once-in-a-lifetime opportunity to gain knowledge and motivation from some remarkable individuals who were behind some incredible achievements. Further, it can be easily anticipated that this community will expand in the future, spreading the knowledge to reinforce the younger community to use RPis to transform their ideas into reality.

Kick-Starter on Embedded System Design

by Dineshika Karunarathna

"Kick- Starter on Embedded System Design " is a virtual skills development workshop series organized by the Electronic Club of the University of Moratuwa in collaboration with the IEEE SLInspire. At present, embedded system design can be seen as a highly demanded area in the field of engineering. This project focuses on promoting STEM education via the distribution of knowledge in embedded systems throughout the country. In addition to the undergraduates, school children, school leavers and all enthusiasts in the field can obtain the maximum benefit from this project. This project can also be considered as a step to fill this knowledge gap in the area of embedded systems.

The virtual nature of the workshop series ensures the safety of everyone and also increases the accessibility for learners from all corners of the country, and can also be seen as a great opportunity for the beneficiaries to spend their time at home effectively. Furthermore, the workshop series consists of 12 weeks on Saturdays to ensure maximum participation. The news updates and the content regarding the workshop were spread through various platforms so that a wider audience can grab the opportunity.

The workshops are delivered by lecturers and undergraduates from the Department of Electronics and Telecommunication Engineering of the University of Moratuwa.

Contents and presentations discussed in each workshop are planned properly in order to meet the outcomes. It forms a platform to apply the knowledge gained through the workshops and to introduce innovative solutions for timely social and global problems.

These topics will be covered starting from the very basics so that it gives a proper understanding and awareness for even beginners in the field, which would eventually lead to new idea generation for innovations. Main aspects of the workshop series include;Introduction to Arduino and Microcontroller programming, Embedded C++ Programming, PCB designing with EDA software, PCB verification and Fabrication. Introduction to Machine Vision with Raspberry Pi and Introduction to IoT

"Kick-Starter on Embedded System Design" can also be considered as an extension of the project "Embedded Systems Workshop for Beginners" which was conducted for 4 weeks prior to this. . Additionally, the department of Electronic and Telecommunication also conducts a Training Course in Microcontroller-Based System Design which covers a wide variety of areas in embedded system design targeting professionals in the industry.

Another vital factor contributing to the success of the series is the dedication and proper organization of the Electronic club with the collaboration of the project IEEEInspire conducted by IEEE SriLanka section. IEEE is the world's largest professional organization dedicated to advancing technology for the benefit of humanity. SLInspire is an educational services platform with the aim of providing equal access to education opportunities for O/L and A/L Students in Sri Lanka.

Sri Lankan Robotics Challenge 2021

by Dinithi Sasanthika Silva

Robots who used to be limited to the screen and science fiction have now plummeted into our reality, transforming almost every modern industry. The increasing demand for efficiency in industries has created the perfect landscape for innovations. Agriculture, space travel, manufacturing, medicine and healthcare are just a couple of places where robots have begun to make their appearance. Just in the past few decades, robots have achieved new heights all across the globe.

This enthusiasm certainly influenced the rapidly growing interest in robotics among many young enthusiasts in Sri Lanka. Sri Lankan Robotics Challenge, the annual robotics competition organized by the Electronic Club alongside the Department of Electronic and Telecommunication Engineering of the University of Moratuwa, provides an international standard platform for those enthusiasts to showcase their talents. Each year, engaging their problem solving and designing skills, the participants complete challenging robotics-related tasks, with the winners being entitled to cash prizes and certificates.

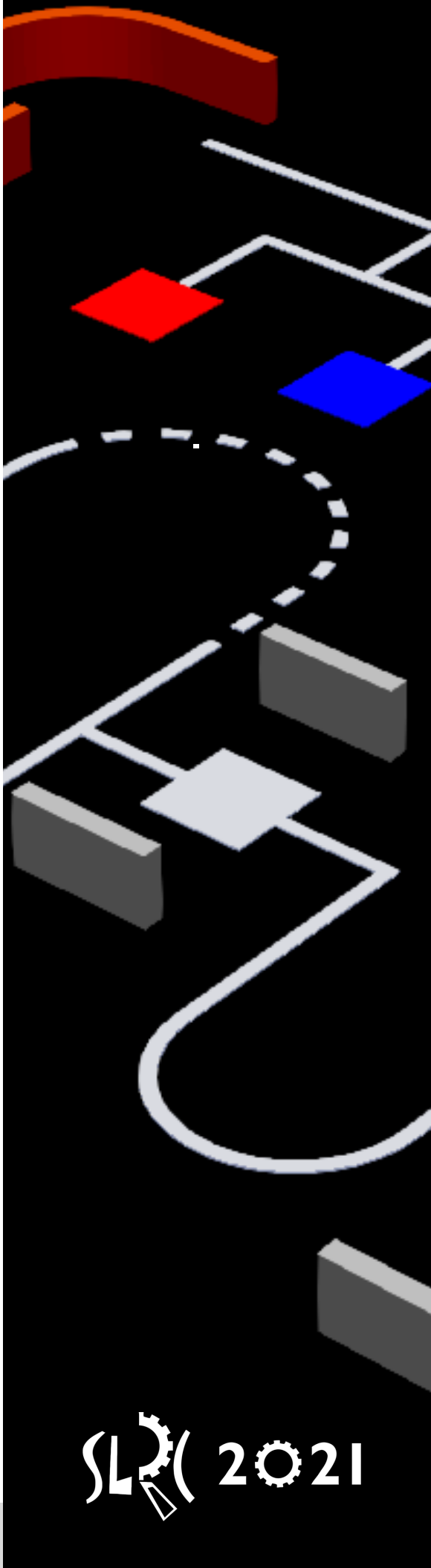
The competition has been successfully held at the university premises for 8 consecutive years. Considering the prevailing unfavorable situation in the country, the 9th iteration of the competition that took place this year was held completely virtually. This decision was taken to ensure the safety of everyone. SLRC 2021 was organized under two separate categories for school students and university undergraduates and this article focuses on the most recent to occur; the school category.

Robotics enthusiasts from schools islandwide participated in the school category competition. More than 40 teams, each team comprising of a maximum of five members, participated in this year's competition. In the first stage, many different workshops were held to familiarize the participants with the virtual robotics simulation platform - Webots.

The participant teams were then evaluated for the completion of six tasks in the first round. The first four tasks focused on using distance sensors, IR sensors, ramp detection and transmission and receiving of signals. The next two tasks were to follow curved walls using distance sensors and simulate a line following robot using IR sensors. Based on the marks obtained for completing these tasks, 20 teams were selected for the final round.

The task in the final round was to build the Seth Wayfinder robot, capable of line following, wall following, detecting pillars on the sides of the robot, and emitting signals. Starting with a null running sum, the robot detects pillars along its way and updates its running sum based on the position and distance to the detected pillars. Appropriate decisions must be made at the T-junctions of the path, based on the running sum obtained.

At the end of an intense final round and a thorough evaluation, team Death End from Ranabima Royal College lifted the trophy as the SLRC 2021 school category winners. Team Octopus from Ananda College came to a close second and became the first runner-up of the competition, while team Moir Robotics-Junior from Elizabeth Moir Senior School became the second runner-up.



A Win-Win Relationship
Industry Collaboration

by Vidushika Rasanji

As a department continuing its legacy of over 50 years, ENTC has received immense support from various parties. Among them, the industrial collaborators who have been a pillar of strength to the department should be specially highlighted.

Object Detection, Tracking, and Suspicious Activity Recognition for Maritime Surveillance using Thermal Vision
in collaboration with **Sri Lanka Navy**

The aquatic bodies cover about 71% of the Earth's surface. Today, maritime transportation is considered to carry more than 90% of the world trade in long-distance transporting methods. Due to this rapid growth in marine traffic, they are difficult to keep under continuous surveillance with ever-increasing maritime criminal activities. Many countries around the world have deployed coastal surveillance systems to protect their coastal waters up to a range of 40~50 Nautical miles. Nevertheless, the Indian Ocean Region (IOR) lacks adequate capacity for the safety and security of the region's maritime resources and also suffers from complex legal challenges such as unresolved maritime boundaries. Consequently, there has been a significant increase in maritime threats faced by Sri Lanka in the recent past. These maritime threats and challenges range from maritime crimes (e.g. piracy, terrorism, trafficking of illicit drugs and people), awareness of natural disasters (e.g. tsunamis, cyclones), and resource management issues (e.g. unlawful exploitation of living and non-living aquatic resources).
Sri Lanka Navy, the naval arm of the Sri Lanka Armed Forces, plays a vital role in IOR maritime surveillance. They have been well-known as the country's most vital defense force due to the island's geography. SL Navy performs the full range of operations, ranging from high-intensity warfighting to humanitarian assistance and disaster relief operations. However, due to the repetitive and monotonous nature of large aquatic bodies, surveillance tasks can be dull for the crew of manned marine vessels; the people involved can easily become fatigued, which results in inevitable human errors. Under the supervision of Dr. Peshala Jayasekara and Dr. Ranga Rodrigo, and with the collaboration of the Sri Lanka Navy, a final year student project has been initiated to address these challenges. The project proposes a system that is capable not only to automatically detect and track objects within the surveillance area but also to early detect a set of pre-identified suspicious activities happening within the borders. The team believes that such vision-based automation can assist SL Navy to significantly speed up the maritime surveillance process. One key feature of this project is to be able to detect both objects and activities happening at any time of the day. Hence, thermal imagery is used for the development of the models and for real-time detection. In order to stabilize the thermal camera for moving maritime vessels, a stabilization platform is also being implemented.

Real-Time Distributed Video Processing System & Software Defined Wide Area Network
in collaboration with **Paraqum Technologies**

Another significant industrial collaborator for final year projects of the 2017 batch is Paraqum Technologies, which was founded as a part of an initiative by the Department of Electronic and Telecommunication Engineering, the University of Moratuwa, to expand the Electronic industry in Sri Lanka. Paraqum Technologies provides high-end electronic design solutions for customer specifications at affordable prices with high quality, including PCB design, embedded systems design, FPGA-based designs and firmware development. Their customer range varies from small companies to large enterprises, internet service providers and telecom operators. This year, they are partnering for two final year projects; Real-Time Distributed Video Processing System and Software-Defined Wide Area Network.
The "Real-Time Distributed Video Processing System" project, funded by the World Bank under the AHEAD Operation, is supervised by Dr. Ranga Rodrigo (Main Supervisor), Dr. Chamira Edussooriya, Dr. Ajith Pasqual and Dr. Jayathu Samarawickrama (Co-Supervisors). In large-scale surveillance systems, many human operators are required. Even then, analyzing and finding anomalous events in real-time is challenging. Computerized autonomous systems that use computer vision-based approaches to analyze video feeds are used in such scenarios. But these vision-based algorithms require high processing capacity for real-time video analysis. Specifically, they typically include neural networks that require a Graphics Processing Unit (GPU). Due to this nature in computer vision techniques and limitations in processing capability, the distributed architecture was proposed for the real-time surveillance system where the video streams of surveillance cameras are allocated among multiple servers. Lastly, the project "Software-Defined Wide Area Network", which Dr. Ajith Pasqual supervises, aims to create an SD-WAN testbed as a platform dedicated to testing and experimenting with SD-WANs. The testbed is modular, with each components' ability to implement and improve independently. The demonstrative implementation includes an SD-WAN spanning four internet service provider (ISP) networks and the SD-WAN edge devices running on top of four computers. Moreover, landing points in two of the ISP networks are deployed. The open-source software repository and the simulation code repository, along with the accompanying documentation, the ultimate results of the project, will be made available to the public.

Exclusively for Tech Enthusiasts

by Hirumi Randika

The Department of Electronic and Telecommunication Engineering has pioneered not only the internal academic programs but also the numerous workshops and seminars done on practical engineering aspects covering both undergraduates of the department and tech enthusiasts all over the country.

The first Embedded System design series of this year was conducted as four workshops on four weekends starting from 8th May 2021 via Zoom. The workshop was mainly directed towards the school students who desire to pursue engineering without really knowing what that entails. The series was successfully conducted, covering basic electronics and software development by building real-world products under the guidance of a panel of lecturers and final year undergraduates.

"Kick starter on Embedded System Design" is the second comprehensive workshop series that extends the first Embedded Systems workshops. It is being conducted throughout 12 consecutive weeks, starting from 28th August this year. This beginner-level workshop series was exclusively designed for school students and pre-university students. The content is delivered free of charge to participants with the financial backing of the American Center in Colombo. Resource personnel for this series included lecturers, consultants and undergraduates from the department with expertise in embedded systems.

A training course on Microcontroller-Based System Design, offered by ENTC was also conducted this year. This was a golden opportunity for engineers and technicians from electronic, electrical and mechanical engineering disciplines and school teachers looking for comprehensive training on microcontroller-based system design and embedded systems with a valuable certificate issued by the University of Moratuwa. The course was conducted virtually on sixteen days over eight weeks from 18th July to 5th September by an excellent group of lecturers.

Along with the Spark Challenge 2021, an informative session was conducted for department undergraduates and anyone interested in working with RaspberryPi. The session held on 28th May started with an exciting talk on “How to make innovations using Raspberry Pi and win competitions" by Kanchana Ranasinghe, who was awarded "Most Outstanding Graduand of the Year 2015" from The University of Moratuwa. Afterwards, the main session was woven around “Raspberry Pi 3 and its applications" conducted by Kithmin Wickremasinghe, a graduate research assistant at The University of British Columbia.

Sri Lanka's first-ever RaspberryPi Jam series - "PiMora", was conducted for three days starting from 29th August 2021 with the participation of many enthusiasts. It served as a valuable opportunity for the participants to widen their knowledge and experience with the RaspberryPi platform. The series was conducted by a panel of highly experienced lecturers and guest engineers.

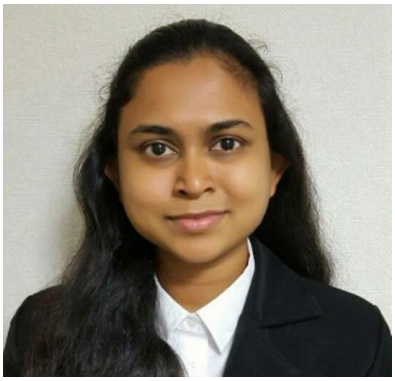
All the previously mentioned workshops and seminars conducted by ENTC were commended with much positive feedback from the audience. As a leading engineering department in Sri Lanka, ENTC is ready to bring many more events like those for the enthusiasts looking forward to such opportunities.

Farewells and New beginnings

by Diluksha Rukmal

Dr. Samiru Gayan is currently a Lecturer (Probationary) in the Department of Electronic and Telecommunication Engineering at the University of Moratuwa, Sri Lanka. He received the B.Sc. and M.Phil. degrees in Electronic and Telecommunication Engineering from the University of Moratuwa, Sri Lanka, in 2011 and 2015, respectively. He received the Ph.D. degree from the University of Melbourne, Australia in 2021. His research interests are communications theory, the internet of things and signal processing for wireless communications.

Homepage: *https://sites.google.com/view/samirugayan/*



Dr. Rukshani Liyanaarachchi is a Senior Lecturer in the department, who graduated from the Department of Electronic and Telecommunication Engineering, University of Moratuwa. She received her M.Eng and Ph.D. in Bioengineering from the University of Tokyo, Japan. Her Ph.D. dissertation was on an intraoperative laparoscopic positron emission tomography system for diagnosing lymph node metastases in gastric cancer surgeries. Her research interests are biomedical imaging, computer-aided surgery and nuclear imaging. She has produced several research publications on topics such as "Intraoperative PET-laparoscope system", "Disease detection system from heart sounds" in various top conferences and Journals. Before joining the department, Dr. Liyanaarachchi worked as a researcher at the Bio-Medical Precision Engineering Laboratory, University of Tokyo. Furthermore, she has gathered industry experiences as a software Engineer at Virtusa and as an Engineer at Ceylon Electricity Board.

Dr. Subodha Charles joined the department in January 2021 and he is currently a Senior Lecturer in the department. He received his B.Sc. specializing in Electronic and Telecommunication Engineering from the University of Moratuwa and his Ph.D. in Computer Science from the University of Florida, USA. His dissertation for his Ph.D. was on the topic "Design of secure and trustworthy Network-on-chip Architectures". Dr. Charle's research interests include hardware security & trust, embedded systems, and computer architecture. Dr. Charles has published in several top conferences and journals during his short time in academia. He has gathered industry experiences starting as a trainee associate electronics engineer at Zone24x7, Colombo, Sri Lanka, and as a graduate technical Intern in strategic CAD labs, Intel Corporation, Hillsboro, OR, USA. He has also co-founded a company-Alta Vision (Pvt) Ltd in Sri Lanka operating in the energy sector in 2013 and it is currently one of the country's market leaders in solar PV installations. Dr. Charles is a member and a long-term volunteer with IEEE (Institute of Electrical and Electronics Engineers) and has held several leadership positions within the organization.

Dr. Simon L. Kappel has rendered his services as a Senior Lecturer in the Department of Electronic and Telecommunication Engineering of the University of Moratuwa from 2018 to March 2020. He joined the department as a Senior Lecturer in October 2018 and following his departure in 2020, he works as a full-time postdoctoral researcher at Aarhus University, Denmark. Dr. Simon received his Bachelor in Electrical Engineering from the Engineering College of Aarhus and a Masters in Biomedical Engineering from the University of Aarhus, Denmark. He received his Ph.D. from the same university. His research project was on the topic "Characterization and evaluation of dry contact electrodes for ear-EEG". His research interests include analog instrumentation, signal processing, physiological transducers, EEG and ear-EEG. He has done several research publications in these areas.

Prof. Ruwan Udayanga

by Chamindu Sauranga

Having rendered his invaluable service as a senior lecturer at ENTC since 2011, Prof. Ruwan Udayanga holds a Ph.D. in Physics and Photonic Communication from the University College Cork (UCC) and Tyndall National Institute. At present, he also serves as the director of the postgraduate studies division at the Faculty of Engineering, the University of Moratuwa. Furthermore, he is the current staff advisor and senior treasurer of the Electronic Club.

Prof. Udayanga is famed for his exceptional ability to deliver academic content with a strong correlation to practical applications. This is mainly due to the vast experience he has gained as an indispensable resource person to private institutions as well as the government in recent large-scale development projects and his industry career with Dialog Telekom Plc. Prof. Udayanga has been a key figure in CCTV system design and installation in major expressway projects as well as with Sri Lanka Railway (SLR). Moreover, he extends consultancy services on CCTV and Mobile forensics to Sri Lanka Police and is also a resource person on digital broadcasting systems. With more than 35 research articles under his name and more than 1000 citations, Prof. Udayanga has also been awarded an EU patent in the field of photonics. He is an elected senior member of both the Optical Society of America and Institute of Electrical and Electronic Engineers, USA.

ENTC has immensely benefited from the expertise of Prof. Ruwan Udayanga and his continued support has inarguably contributed to the esteemed legacy of the department.

Dr. Tharaka Samarasinghe

Dr Tharaka Samarasinghe has been a senior lecturer at the Department of Electronic and Telecommunication Engineering since 2015. He is also an Honorary Fellow at the Department of Electrical and Electronic Engineering at the University of Melbourne, Australia, and holds a Ph.D. in Wireless Communications. He is a product of the Department of Electronic and Telecommunication Engineering and is also a proud recipient of the 'Prof. Dayantha Wijesekara Award for the Most Outstanding Graduand of the University of Moratuwa' upon graduation. He has a plethora of publications in recognized journals and conferences and has gained immense recognition for his expertise including the Presidential Award for Scientific Publications in 2016 and the National Research Council Merit Awards in 2015 and 2018.

He is also the coordinator for the M.Sc./ P.G. Diploma in Telecommunications course offered by Department of Electronic and Telecommunication Engineering, further encouraging the persuasion of higher studies among Sri Lankan graduates. Furthermore, he provides consultancy services to numerous government institutions such as Sri Lanka Police, Telecommunications Regulatory Commission of Sri Lanka (TRCSL) and Department of National Museums. Additionally, Dr. Samarasinghe has served as the Chairman of IEEE Communications Society and the Treasurer of IEEE Sri Lanka Section.

Dr. Tharaka Samarasinghe is a key figure behind the success of the Department of Electronic and Telecommunication Engineering in recent years and his expertise in the fields of wireless communications, communications theory and intelligent transportation systems has made him an irreplaceable asset for the department.

by Yohan Abeysinghe

Mr. Oshada Jayasinghe

“Four years at ENTC were undoubtedly the best days of my life. In addition to broadening our knowledge horizon and shaping us for the future, it gave us a lot of beautiful memories to cherish for a lifetime”

If one needs proof for the quote “Once a legend is always a legend,” look no further than the 2016th batch of the Department of Electronic and Telecommunication Engineering of the University of Moratuwa, which has its own version. Oshada Jayasinghe encompassed the perfect blend of in-class and extracurricular activities, which is key to his overall success.

The most significant factor regarding his school time is achieving island 1st at both the GCE O/Ls and GCE A/Ls in 2012 and 2015, respectively. He also won a bronze medal at the 47th International Physics Olympiad held in Zurich, Switzerland, and an honorable mention at the 25th International Mathematics Competition held in Blagoevgrad, Bulgaria representing Sri Lanka. Continuing this streak, he became the batch top at the end of his four years at the University of Moratuwa with an overall GPA of 4.18 (out of 4.2). During his university life, he took part in many projects related to computer vision, robotics, and electronics. In September 2021, he got his paper “Swiftlane: Towards Fast and Efficient Lane Detection” accepted for the IEEE International Conference on Machine Learning and Applications (ICMLA).

Anyone who follows his four years at UoM will get inspiration on how to add dynamism and color to a rather monotonous academic life. He was delighted to spend his free time with friends on a variety of extra-curricular activities. He founded and chaired the IEEE Industrial Electronics Society Student Branch Chapter of University of Moratuwa for the term 20/21. He engaged in several projects and volunteering activities being a member of Rotaract Mora, AIESEC Colombo South, and Electronic Club while playing badminton as a sport.

As for his internship, he worked as a student researcher at the Commonwealth Scientific and Industrial Research Organization (CSIRO), where he engaged in modifying and implementing the high-level controller system of different hexapod platforms. He currently works as a Data Engineer in Axiata Digital Labs, focusing on designing and developing end-to-end machine learning pipelines using big data and machine learning tools at scale. He is looking forward to starting his graduate studies in the near future. Although Oshada Jayasinghe already has such impressive achievements under his name, we can guarantee that the best is yet to come.

Four years at ENTC were undoubtedly the best days of my life. In addition to broadening our knowledge horizon and shaping us for the future, it gave us a lot of beautiful memories to cherish for a lifetime.

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"No one can whistle a symphony. It takes a whole orchestra to play it"

- H.E. LUCCOCK -