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From ENTC to Harvard

ENTC
Electronic and Telecommunication Engineering

EC

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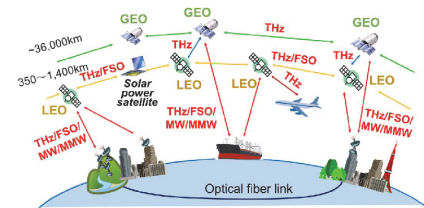
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A Chat with Alumni

by Chamindu Sauranga

Rasantha Hettithanthrige, a proud alumnus of the Department of Electronic and Telecommunication of University of Moratuwa is currently the Chief Technology Officer at Mobitel, the National Mobile Communications Services Provider. We were able to engage in a fruitful discussion with him to discuss his over 30 years of experience in the Mobile Industry. As a person who has been instrumental in rolling out mobile technologies in Sri Lanka, he had a lot of valuable experiences and advice to share.

You are definitely one of the leading personalities in the industry and, understandably, your university experiences have shaped who you are. Could you tell us any of those memorable experiences and provide an overall reflection of your university career?

I must say that I was quite an average person at the university and school. I knew that I thrive in team environments rather than as an individual performer. So, one of the early decisions I made was to stay in the hostel/boarding places as it helped me to work with my peers rather than on my own. I always felt that discussion leads to better clarity and enables us to improve ourselves. This stance helped me to get into my corporate life smoothly, as we have to engage as teams in most of the instances during our careers. I also engaged in sports such as wrestling, weightlifting, tennis and swimming. I am also a colorsman for all 04 of those sports. Our 04-year degree took us 07 years to complete as we were in university during very turbulent times from 1986 to 1992. We did our best to resist disruptions to student life and did everything possible to continue our academics amidst all the chaos.

You have a leading position at one of the most reputed companies in Sri Lanka. How did you start your corporate journey? What helped you reach such heights on the corporate ladder?

The general tendency by the time I graduated was to join established government sector institutions. However, I took a decision to join a private company called 'Datanet' which ran an advert for employment in weekend papers. They were in the process of establishing the second cellular network in the country. I followed my instincts and joined this team to work on establishing Cellular Networking. I consider myself as a person willing to take calculated risks. I was not hesitant to forego the trend of joining state-owned establishments to ensure job security. In 2003, I joined Mobitel as they were rolling out its Global System for Mobile communication (GSM) network. It was a loss-making company at the time owing to the late adoption of GSM networks and adopting wrong Digital Technology. Today I am very proud to say that we are a 50 billion rupee company with an annual profit margin of Rs.7 billion. So, I can say that my journey in Mobitel has been very satisfying.

A fresh engineering graduate today has a choice of joining the industry directly or pursuing higher education. What would be your recommendation for them? What factors should one consider when making that decision?

I believe in continuous education. Be it through formal channels such as post-graduate studies or even learning through industry experiences, learning is an essential skill for an engineer to have. It is also important to diversify your knowledge portfolio. An engineer is expected to perform a versatile role on many occasions. So polishing up your management and corporate skills will add immense value to the technical expertise you already possess. Always observe the market, understand the skills it demands and shape your learning accordingly. Always remember, 'timing is of essence'. It is not sufficient to just have a brilliant product, you need to introduce it to the market at the right time. Of Course, if you have the drive to expand the body of knowledge in a given field, you should join academia. You may join us in the industry later if you desire, as your input is immensely valuable in industry applications.

You joined the telecom sector at a time when it was trending with all the new technology adaptations. Similarly, what are the trending fields in the industry today from your perspective as a seasoned industry professional?

In Sri Lanka, we have traditionally done technology adaptation. The revenue streams that companies had through these mechanisms are now diminishing. So, we need to look at more efficient technologies and advancement of existing technologies to better align with the business goals. This is where the technical expertise of engineers with business acumen will be in high demand.

Data-driven business models are also on the rise and considered as a main solution to the issues faced by most of the industries. The advantage of this model is the scalability of business which is much higher as opposed to a traditional business model. Therefore, data scientists are also highly sought after in today's industry. When we look at the telecom industry, multiple opportunities are available in the areas of regulation, management, corporate planning, treasury management etc. apart from the core technical areas. Any fresh engineer who wants to join the telecom industry should horn his or her software skills as disciplines of Telecom and Software are already on the merge.

COVID-19 has caused a lot of chaos in the socio-economic landscape and has also disrupted the business climate. How has it impacted your industry from your point of view?

Mobile Industry has benefited from the general shift towards the online culture. But in a general sense, for a company to maintain its operations through such difficult times, a certain level of preparation and anticipation is needed. We as a company invested in developing the online skill set within our employees since before COVID because we believe it is more productive for employees to have the option of remote work. Without that prior preparation, it would have been near impossible to maintain our operations that serve over 8 million subscribers, 24x7. Sir Arthur C. Clarke once famously said "Communicate, don't commute". Even today, we believe the remote work culture must exist along with the usual operations in a company. A large part of the responsibility in implementing this fall with the management as well. They need to be agile and flexible. Management needs to stop pursuing petty things such as employee attendance and instead focus on whether the business goals are achieved through well-established KPIs.

Looking at the success you have achieved in your career, it will be beneficial for young engineers to learn the principles and the work ethic you practiced. Can you share any such guidelines that you incorporated into your life?

I always believed that if a task was given to me, I needed to complete it to a standard that is a notch higher than what was expected of me in terms of triple constraints of Budget, time and quality. We should always be open to learning new things if a task requires us to do so. It should be considered not as a burden but as an opportunity to enhance your skills while completing a task. Another very important principle I stood by is to always do my job and also a bit of my boss's job. This helps you get a glimpse of what the next step in the corporate ladder looks like and it enables you to equip yourself to take up the additional responsibilities if the company requires you to do so.

To wrap up this inspiring discussion, it would be ideal if you can provide valuable words of advice for the young engineers at the doorstep of the industry. As a successful industry personality, what would you advise the next generation?

Whatever you do, do it with vigor and do it with enthusiasm and try to give the best shot at it. Understand and immerse yourself with the work culture of the company and adhere to a strict work ethic. And also, do not hesitate to help out a fellow colleague. You can never have a self-centered journey in the industry and most companies actively discourage such behavior. If you prove your worth by willingly tackling unstructured problems and are willing to engage in continuous learning, the industry will reward you with a bright career.

Future with Machine Learning at Edge

Content by Dr. Subodha Charles & Written by Dhanuja Jayasinghe

Figure 1: Object detection in an Edge Device
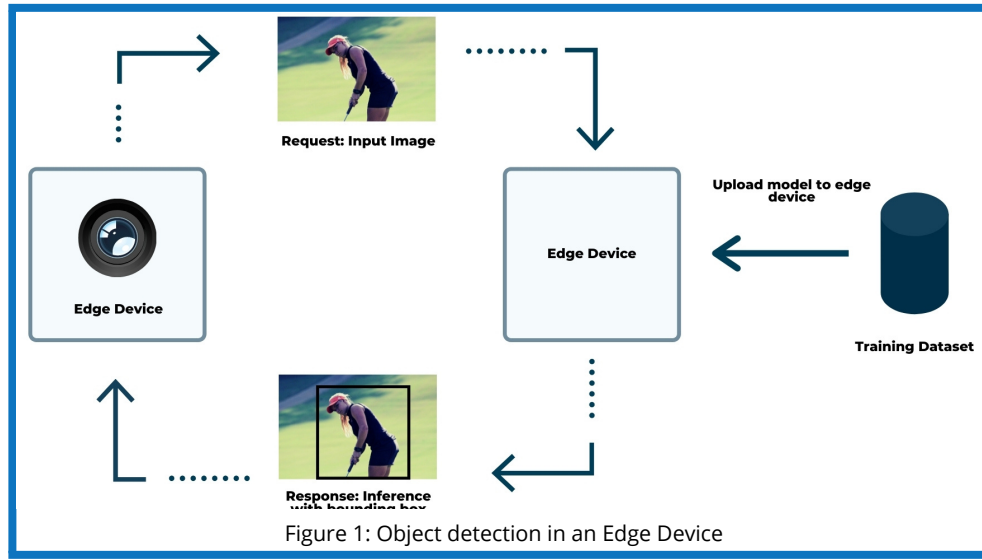
The advancements in fields like Machine Learning, Embedded technologies and IoT infrastructure during the last decade have resulted in a major shift in how we process and analyse data. Edge Machine Learning (Edge ML) is at the forefront of these emerging technologies. In Edge ML, devices at the edge of the network process data locally using ML algorithms, instead of relying on cloud servers. This results in less network congestion as well as increased data security.

How Edge ML Works

There has been an explosive growth in the IoT infrastructure during the last few years. The estimated number of active IoT devices as of 2021 was 12.2 billion and this number is expected to grow up to 27 billion by 2025. Most of these devices rely heavily on cloud servers to process the vast amounts of data collected by them and it is putting a lot of strain on the existing network infrastructure. This is where Edge ML steps in. Edge ML devices will analyse the data collected at the source to decide which data needs to be sent to the cloud for further processing and which data can be processed locally. Most of the data collected at the source are superfluous and devices can use embedded ML algorithms to extract important data. This ability of real-time processing of data in Edge ML can be critical in medical, industrial and defence applications.

Benefits and Applications

There are numerous benefits in implementing ML in edge computing. As mentioned above, by reducing the amount of data outsourced to the servers, Edge ML helps to reduce network congestion. Data security has become a buzzword in recent years and cloud servers are highly vulnerable to data breaches. But with Edge ML, the amount of data that is sent to the cloud is reduced, which in turn increases the data security. Also, doing the processing at the end device ensures the real-time availability of outputs/decisions to the user. These features have resulted in Edge ML being already implemented in a wide variety of applications which include intelligent forecasting of energy demand, predictive maintenance in manufacturing, medical devices with AI capabilities, environmental management and virtual assistants. Amazon Echo is a good example of Edge ML. It uses locally implemented ML algorithms for voice recognition while relying on the cloud for tasks like finding a song requested by the user.

Challenges and the Future

Most devices at the edge are resource constrained. Therefore, implementing ML algorithms on edge devices with power, processing and memory constraints is going to be a challenging task. However, there are several open-source development tools for embedded ML applications such as the Deep View ML tool suite, Glow ML compiler and PyTorch framework readily available. The IoT revolution gave connectivity to billions of devices and sensor nodes with the idea of connecting them to a central cloud framework for data processing and decision-making. But recent years have seen a paradigm shift from cloud-based architecture to an architecture with intelligence at the edge. Devices with embedded ML at the Edge are driving this new technology revolution ensuring low latency, high performance and increased privacy and security.

The technologies around ML, embedded systems and IoT are evolving fast and the shift from cloud-based intelligence to intelligent edge networks seems to be inevitable. The new embedded ML development tools, efficient microcontrollers and ML algorithms optimised for an edge are going to make this process even faster.

Terahertz Communications

by Vishagar Arunan

Over the past years, frequencies used as carriers in telecommunications have been increasing drastically to meet the bandwidth requirements. New engineering fields related to telecommunication progressed towards wide-range radio bands like millimeter-wave (mmWave) frequencies to meet and withstand the above evolving demand. On the other hand, the discovery of optical wireless communication leads to higher data rates, an increase in security as well as avoidance of interference related to the transmission medium. While the world is moving through the development of the 5G era, many technological advancements have been proposed such as massive MIMO (Multiple Input Multiple Output) and full duplexed millimeter wave communication schemes. Now with the refinement of the terahertz (THz) frequency band, numerous opportunities have evolved to offer abundant future-proof applications.

This Beyond 5G technology breaks up the barrier and opens up the gateway of high data rate transmissions up to 10 Gbit/s per user even in remote areas which are even difficult to access. Furthermore, THz communication is expected to enable a seamless connection between high-speed networks such as fiber optic links as well as personal wireless devices like laptops, mobile phones and tablet-like devices. Also by fully ensnaring the digital networking industry, it facilitates many public services including the transportation sector on traffic control and autonomous driving and remote health monitoring services. These cyber-physical systems describe the true colors of what is known as the "Tactile Internet " challenging the capability of systems beyond 5G. More importantly, terahertz bands also can be employed in close communications which are also known as whisper radio applications which include wiring harnesses in circuit boards and nanosensors and wireless personal area networks.
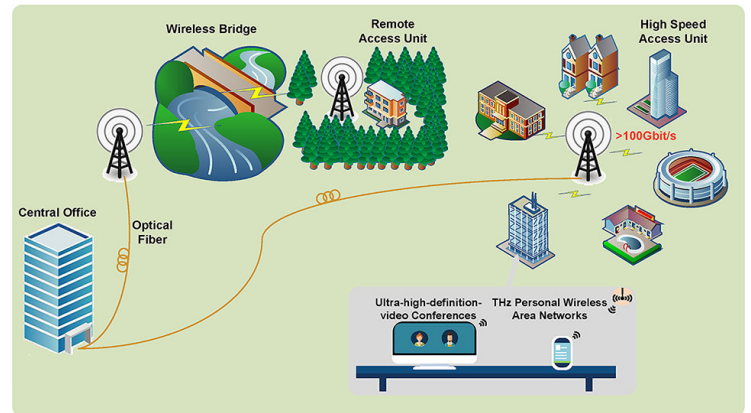
Wireless data traffic has been witnessing unprecedented growth and expansion in the past few years. In particular, mobile data traffic and video traffic are anticipated to have sevenfold and threefold increases respectively. The THz frequency band promises extensive use of bandwidth which theoretically reaches up to THz, ending up in a potential capacity in the order of terabits per second. Analysis of the THz band indicates that these frequencies also possess a set of advantages in comparison to optical frequencies. Although these bands are considered for uplink communication predominantly, they also permit non-line-of-sight propagation and act as a good substitute under inconvenient climate conditions such as fog, dust and turbulence.

In 2008, the IEEE 802.15 established the "THz Interest Group" as a milestone of standardizing research initiatives in this field. A group named "The task group 3d(TG3d)" was formed in 2014 to modify the 802.15.3 metrics to target 100 Gigabits per second for switched point-to-point links. As for recent progress, nano-fabrication technologies facilitated the progress of semiconductor devices which include Gallium, Arsenide and Indium electronics as well as various silicon-based technologies. Recently the authors presented an innovative proposal for an innovative silicon architecture that permits scalability, to allow signal synthesis and enable the shaping of THz waves in a single microchip.

A historic breakdown for science and technology is anticipated by the utilization of THz wireless communication. The THz frequency band 0.1 – 10 THz provides a vast array of applications to meet the communication demand and the market requirement beyond 5G Networks.
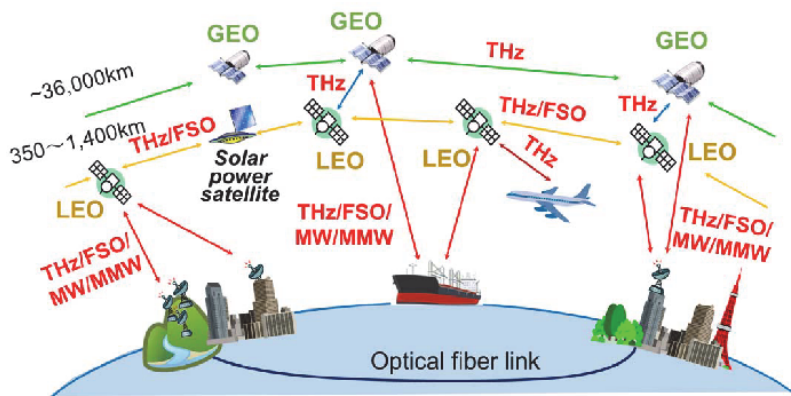
Memory Management in C++

by Supun Kuruppu

(Continued from the article of "Memory Management in C++" in the June 2022 issue of the E-Carrier magazine)

Heap Memory

The Heap memory is a part of the memory arrangement of a C++ program. However, it doesn't have any relation to the heap data structure. Heap memory is a pile of memory locations that are available for the programmer's use. Therefore, it is also known as a free store of memory. Initially, when the program starts, a default size of memory is allocated as the heap memory, but it is not fixed to that initial size. As the program progresses, if the programmer requests more heap memory than what was initially allocated, the program will request more memory from the operating system. Therefore, the heap memory can grow during runtime. Hence, it is also referred to as dynamic memory.

The process of allocating data in the heap memory is different from that of the stack memory. One important difference is that the heap memory doesn't store objects in contiguous memory locations. When the programmer allocates data in the heap memory, the program initially scans the free list which holds the unoccupied memory addresses in the heap memory and lends available memory that is at least as large as the requested memory size. If the programmer requests memory that is greater than what is currently available in the heap memory, the program needs to request the operating system for more memory which is computationally intensive. Therefore, allocating heap memory is substantially more computationally expensive than using stack memory.

Another important detail in heap memory allocation is that the programmer needs to manually free the allocated memory locations after its use. In the case where it is not performed, it is termed a Memory Leak. Accumulation of such memory leaks can lead to application failures due to the unavailability of more system memory (Heap overflow) or a vast slowdown in performance due to constant requests for more memory by the program.

Demonstration

- Allocating space for an integer on the heap with the value 5.

```
int* val = new int;
*val = 5;

delete val;
```

The **new** keyword along with **int** datatype returns an integer pointer to the memory location on the heap where the integer will be saved.

The **delete** keyword with the pointer to the heap memory location, where the object (data) is saved will free the allocated memory locations in the heap.

- Objects (data) on the heap memory outliving the scope that it has been defined in.

```
Example* func(){
    //Allocating an example object in the heap.
    Example* pexample_obj = new Example;// pexample_obj:
0x12bf5cf2680

    • return pexample_obj;// pexample_obj: 0x12bf5cf2680
}
```

```
Output:

Example object is created
```

```
int main(){
        Example* obj = func();// obj: 0x12bf5cf2680

    • delete obj;// obj: 0x12bf5cf2680
        return 0;
}
```

```
Output:

Example object is created
```

```
int main(){
        Example* obj = func();// obj: 0x12bf5cf2680

    •   delete obj;// obj: 0x12bf5cf2680
    •   return 0;
}
```

```
Output:

Example object is created
Example object is deleted
```

The Example object does not get deleted when the program goes out of the "func" function's scope. It only happens when programmer explicitly deletes it.

It takes several assembly instructions to allocate or deallocate space for an integer in heap memory.

Stack Memory vs Heap Memory

The Stack memory and the Heap memory differ in the memory allocation methodology. The following is a comparison of the two sections in the memory.

```
int* val = new int;

push 4
call ??2@YAPAXI@Z ; operator
new
add esp,4
mov DWORD PTR $T4[ebp], eax
mov eax, DWORD PTR $T4[ebp]
mov DWORD PTR _val$[ebp], eax
```

	Stack	**Heap**
Size	Small and fixed memory size	Size expands dynamically
Lifetime	Objects (data) exist only within the scope. Once the program goes out of scope, data in that scope is automatically deleted.	Objects (data) exist until manual deallocation by the programmer
Efficiency	Allocation and deallocation are extremely efficient	Allocation and deallocation are comparatively computationally expensive
Deallocation	Objects (data) are automatically deallocated, once the program goes out of scope	Objects (data) need to be manually deallocated by the programmer

The programmer needs to decide whether to allocate data in the stack or the heap based on the requirements. The Stack memory allocation and deallocation are extremely efficient. Therefore, in all possible scenarios, data should be placed in the stack to ensure optimal efficiency in the program. However, if the programmer requires the created objects to outlive their defined scope, then they should allocate heap memory. Moreover, if the data is large, they should also be allocated in the heap memory because the stack memory is limited and fixed in size.

Embedded Machine Learning for Edge Computing Short Course

by Dulini Himeka

The power of edge computing along with Artificial Intelligence (AI) has grown, making a huge improvement in the capabilities of edge devices. Machine Learning (ML) for edge computing is a concept that brings ML models or AI applications into the edge devices of a network. Rather than carrying out ML computations in the cloud or at a centralized location, it's much easier to be carried out at the edge of the network, closer to the specific data locations. Rapid growth of fields such as the Internet of Things (IoT) has increased the demand for improved edge device capabilities.

Considering the growing demand and future potential in this area, the Department of Electronic and Telecommunication Engineering of University of Moratuwa partnered with Skill Surf to offer a short course on "Embedded Machine Learning for Edge Computing". This is an online course held during weekends. Enthusiasts from all over the country had the chance to get registered for the course till 10th of September, 2022. No prior experience was strictly required. The course aims to train the participants to develop and deploy real-world ML applications. A proficient panel of lecturers conducts the online sessions every weekend. Though the sessions' mainstream language is English, explanations by other mediums are being carried out upon the requests of the participants.

The course commenced on the 24th of September, 2022 and had a couple of sessions so far. In the first week, a general introduction to the course including the projects and logistics was given. Participants were made aware of the recent technologies and related opportunities, which sparked their flame of interest. The overview of the embedded AI market and the keynote speech by an industry specialist on "The Future of Embedded ML and Real World Deployment" gave valuable insights on the learnings to be followed. During the second week, students were introduced to machine learning and deep learning aspects. They had a few colab sessions giving hands-on experiences on deep learning using Pytorch. At the end of that week's session, an assignment with the answer discussion took place which helped the participants to self-assess their development on the topics covered.

This course will continue for a total of 8 weeks. During that period the participants will be trained on deep learning models at the edge and will be familiarized with embedded software and hardware platforms at the edge. Basic knowledge will be given about carrying out extreme edge ML solutions, along with deploying a model in Arduino Nano/STM32 for testing purposes. Finally, they will have a step-by-step implementation of two real-world ML applications. These will ultimately help in uplifting the participants' knowledge of ML while giving them the best hands-on experiences in practicing its applications.

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Course Outline:

- Introduction to machine learning with hands-on examples.

- Overview of embedded systems suitable for edge computing.

- Building and training deep learning models to be deployed in edge devices-pipeline for platforms (Jetson Nano, TensorRT).

- Familiarizing with the embedded software and hardware platforms at the edge.

- Process of deploying extreme-edge ML solutions.

- Deploying a trained model in STM32/Arduino Nano for testing and evaluation.

- Step-by-step process to train, validate, deploy and test two real-world ML applications on embedded hardware platforms.

From ENTC to Harvard

by Sandani Jayawardena

Six students in the graduating class (17 batch) of the Department of Electronic and Telecommunication Engineering and Biomedical Engineering, **Jathurshan Pradeepkumar, Kithmini Herath, Mithunjha Anandakumar, Ramith Hettiarachchi, Udith Haputhanthri** and **Hasindu Kariyawasam**, joined Faculty of Arts and Sciences at Harvard University as Post Baccalaureate Research Fellows to work on Computational Imaging and Computational Biology. Below is a brief conversation we had with them.

Can you tell us a bit about your new positions which you all started at Harvard?

We recently started as Post Baccalaureate Research Fellows in the Faculty of Arts and Sciences at Harvard University.
Our research at Harvard will be focused on computational imaging and computational biology. Under the computational imaging aspect, we're particularly working on a new microscopy design framework named, differentiable microscopy, which is a new concept introduced by the lab we're working with, the Wadduwage lab. Under computational biology, we will be working on problems related to protein folding and protein design with SoLab.

Do you think that the foundational knowledge you received from your bachelor's degree is sufficient to tackle the research problems you are currently working on?

Looking back, we think we made the right choice by selecting ENTC and BME to pursue as our majors. Our department provided us with the necessary theoretical knowledge which enabled us to tackle any kind of problem in different domains. At the time of learning, we may have not realized the importance, but now we realize that the foundational knowledge we learned is the steppingstone to solving complex problems. Also, we are fortunate that ENTC has produced good graduates over the years who are currently in top institutions all over the world and who in turn help us whenever we need guidance in a particular area.

Heartiest congratulations on your new roles! What made you interested in the areas you are currently pursuing? Working at the intersection of biology and engineering?

During our undergraduate years, we were fortunate to work with our faculty on various research projects that involved bio-signal processing, medical image processing, computer vision and machine learning avenues. These research problems seemed challenging. Yet, it was fascinating to see how a potential solution will benefit communities and how it will advance progress in those respective avenues. As we progressed through our undergraduate years, with the guidance that we got from our department, faculty and past graduates, we were able to publish our work in good conferences and build collaborations with researchers in various countries as well. We think today we are here because of this invaluable guidance and exposure we received from the department

What would be your advice to young undergraduates?

This might be a piece of subjective advice. Try to find an area that seems very important to you. An area which the world needs, you are good at and you love doing. You may have lots of areas that you love working on and it could seem like "how can I focus on a particular area?". So during the undergraduate years, try to explore a lot (through competitions, both local and international, hackathons, module projects of the university, self-initiated research or projects, collaborations, etc.). This will help you find the field you love the most.

Gold Award Winners in the Region and Silver Award Winners from the World

by Namina Wijetunga

"Never be afraid to dream big" – Pahan Mendis (Leader – Team AP116)

Being the first team from Sri Lanka to achieve one of the top prices, Team AP116 from the Department of Electronic and Telecommunication Engineering of University of Moratuwa won the Gold Award in the Asia Pacific and Japan (APJ) region and the global Silver Award in InnovateFPGA Design Contest 2021/22. With the guidance of Dr. Ajith Pasqual as a faculty advisor and Mr. Abarajithan Gnaneswaran and Mr. Kithmin Wickramasinghe, Pahan Mendis, Chathuni Wijegunawardana and Pamuditha Somarathna from our very own department represented the Team AP116.

InnovateFPGA is a global competition for those who are interested in innovating using Intel FPGAs (Field Programmable Gate Array). With the theme "Connecting the edge for a sustainable future", the competition was launched for the year 21/22 by Terasic Inc with Intel Cooperation as the headline partner. The organisers have encouraged each team to utilise Intel FPGA Cloud Connectivity Kit, Microsoft Azure IoT and Analog Devices Plug-in boards in their projects. Team AP116 came up with the concept of "Green Machine", a smart, user-friendly yet a mini-green house system to enable users to grow and efficiently monitor and maintain the plants. This was more valuable for the people who grow vegetables and fruits on their own at home and with the capability of integrating multiple units of Green Machines together, it was very helpful for the farmers ranging from small to large scale. The parameters inside the Green Machine are monitored using a set of sensors and cameras. The data collected from the sensors and the cameras are then sent to the Terasic DE10 Nano, a development kit based on Intel CycloneV SoC (System on Chip) FPGA, for processing. Then the processed data is transferred to a Cosmos Database System on Microsoft Azure for analysis and further optimization.

After getting selected for the semi-final round along with 74 other teams in the APJ region, the team received the Intel Cloud Connectivity Kit with Terasic DE10 Nano Development board and 3 plug-in boards from Analog Devices to develop the project. After submitting a detailed design paper and a demo video in April 2022, they got selected to the regional finals. After going through a virtual Q&A session with a panel of judges representing Terasic, Intel, Microsoft and Analog Devices, Team AP116 was crowned with the Gold Award in the APJ region.

The Grand Finale was supposed to be held at the Intel Innovation Campus in San Jose, California, USA with 10 other teams around the world but due to the increasing number of COVID cases in California, the finals were held virtually. With further innovative improvements, Team AP116 presented their project during the virtual finals held in June 2022 and faced a Q&A session again. Receiving the highest enthusiasm from the panel of judges, Team AP116 won the Silver award showing their highest colours and making the Department of Electronic and Telecommunication Engineering of University of Moratuwa proud yet again.
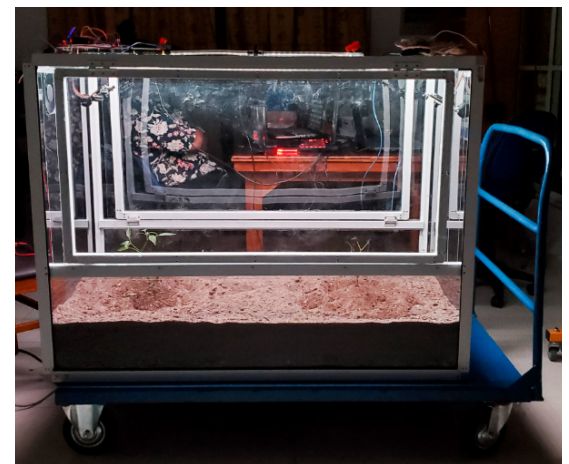
Best Participant Award at the IEEE International Future Energy Challenge 2022

by Sanjana Kapukotuwa

Undergraduates at the Department of Electronic and Telecommunication Engineering have always been keen on showcasing their talents whenever the time permits. This year, a team of students from our department and the Department of Electrical Engineering, participated in the IEEE International Future Energy Challenge 2022 and was selected to the grand finals for the first time in Sri Lanka.The team from University of Moratuwa consisted of Prof. Udayanga Hemapala, Dr. Subodha Charles, Mr. Thilina Ambagahawaththa and Mr. Iresh Jayawardana as advisors and Pahan Mendis (Team Leader), Chathuni Wijegunawardana, Pamuditha Somarathne, Punsara Mahawela, Ransara Wijitharathna, Supun Kuruppu, Biyon Fernando, Hiruni Wijewardena, Limalka Sadith, Nikeshi Kumarasinghe, Nawanjana Yesith, Geshan Sudasingha, and Dineth Mudalige as undergraduate members.

The task for this year's challenge was to design a "Smart, Efficient and Light Solar Microgrid Inverter". After successfully submitting the project proposal as the first step, the team was selected for the semifinal round along with 13 other teams from prestigious universities all around the world where they had to present the progress of the hardware development and its performance in a 15-minute presentation, followed by a Q&A session with judges.

The team which at first consisted of only 7 people, was then expanded since they needed more hands on deck for the hardware development and testing. For this, the initial design in the proposal was revised in some aspects. The DC Boost Converter was modified into a LLC DC-DC converter. It was proposed to use a three-phase choke filter, instead of the previously decided LLC filter. These design decisions were taken after much research and analysis. The team worked hard in the 4 months until the semifinals, where they were selected to the final round. In the next 3 months leading up to the finals, the team members made sure to further improve their design to meet the expectations in the testing. Hence more attention was given to the LLC DC-DC Converter Design and the Inverter Design.

Unfortunately, by the time the team had obtained their visa to visit the USA for the finals, the inflation hit the country. Therefore, the team was unable to obtain hardware components for the design on time and also physically attend the finals. The organizers of the competition were kind enough to understand the situation. So, the team was given a chance to present their progress in a 20-minute video, which was played in front of the audience at the grand finale. Kudos to the Team UoM for executing a massive project in the middle of an economic crisis with hours of power cuts and rising inflation. We congratulate the team for winning the best participant award and wish them good luck for more achievements in the future.

Prof. Udayanga Hemapala Dr. Subodha Charles Mr. Thilina Ambagahawaththa Mr. Iresh Jayawardana

Pahan Pamuditha Punsara Ransara Nikeshi Dineth

Chathuni Supun Limalka Hiruni Biyon Nawanjana Geshan

Two Research Publications in the Prestigious Journal of IEEE Transactions on Information Theory, 2022

by Dinithi Silva

Marking another significant achievement in the research history of ENTC, Mr. Pasan Dissanayake and Dr. Prathapasinghe Dharmawansa have been able to publish two research papers in the prestigious journal of **IEEE Transactions on Information Theory, 2022**, considered to be the number one journal in the field of information and communication research. It is an exceptional achievement bringing a new-found resolution for not only ENTC researchers but also for Sri Lankan researchers as well.

The research paper titled **"Distribution of the Scaled Condition Number of Single-Spiked Complex Wishart Matrices"** statistically characterizes the scaled condition number (SCN) of single spiked complex Wishart matrices by deriving its density functions. Understanding the behavior of correlated Wishart functions is of utmost importance for wireless communications and statistics. This paper utilizes powerful random matrix theoretic techniques and the novel density of the SCN to statistically characterize the receiver operating characteristics of the detector. The analysis has been extended to the asymptotic regime in which the number of antennas of the detector and the samples diverge at the same rate so that their ratio remains constant. It turns out that, in this asymptotic regime, the statistical power of the SCN-based detector can be approximated by the Tracy-Widom distribution corresponding to the complex matrices. Moreover, numerical results have revealed that those asymptotic results compare favourably with their not-so-large dimensional counterparts.

"Eigenvectors of Single-spiked Complex Wishart matrices: Finite and Asymptotic analysis" is the second paper accepted at TIT2022 presented by the same authors. The paper investigates the finite-dimensional distributions of the eigenvectors corresponding to the extreme eigenvalues(i.e. minimum and maximum) of single spiked complex Wishart matrices. These spikes arise in various practical settings in different scientific disciplines. In particular, the focus is on the distributions of the squared modulus of the eigen-projectors(i.e., projection of the spiked vector onto the leading and least eigenvectors) of single-spiked Wishart matrices. This metric is commonly used to infer information about the latent spiked vector using the eigenvectors of the sample covariance matrix. This paper leverages the powerful contour integral representation of unitary integrals and orthogonal polynomial techniques to derive closed-form expressions for the densities of the above metrics. A somewhat surprising stochastic convergence result pertaining to the above metrics has also been established. Finally, the same analytical framework has been extended to derive the corresponding destines for real and singular Wishart scenarios; however, with closed-form solutions limited to a few special configurations only.

Migara Ratnatunga Trust Award for Industrial Training 2020/2021

by Ishan Fernando

Kalana Abeywardena, an immediate graduate of the Department of Electronic and Telecommunication Engineering of University of Moratuwa, won the Migara Ratnatunga Trust Award (1st place of Category A) as the best Electronic and Telecommunication Engineering trainee for the year 2020/2021 at IESL induction and graduation ceremony on the 17th June, 2022.

Migara Ratnatunga Trust Award is an appreciation for the high achievers of the level 3 compulsory industrial training module in the engineering undergraduate degree program. The award is based on the evaluations done by the university training division among all state universities.

Kalana completed his six months of industrial training at the School of Computer Science of the University of Sydney, Australia as a visiting research student under the supervision of Dr. Suranga Seneviratne in 2019. During the training, he had engaged in two projects. One is creating a cyber security framework to address phishing attacks on websites using computer vision and artificial intelligence. The other project is processing light field signals to improve the signal power using depth filters and artificial intelligence. He also worked as an undergraduate assistant in a summer program organised by the University of Sydney for international students from China.

Honorable Mentions

by Dinithi Silva

Nima Wickramasinghe together with his mentor Mohamed Athif from the Department of Biomedical Engineering, Boston University has written a research paper, titled **"Multi-label Classification of Reduced-lead ECGs using an Interpretable Deep Convolutional Neural Network"** which has been accepted to be published in the journal Physiological Measurement as a special issue paper.

Nuwan Bandara presented his paper on **"Ensemble Deep Learning for Automated Dust Storm Detection using Satellite Images"** and got accepted at the International Research Conference on Smart Computing and System Engineering (SCSE 2022), organized for the fifth consecutive time by the Department of Industrial Management, University of Kelaniya, Sri Lanka.

Ashen Dulanjana, Muditha Deshan, Treshan Ayesh and Shivanka Priyashan representing University of Moratuwa, at the e-Yantra Robotics Competition 2021-2022(eYRC) organized by eYantra, IIT Bombay, were placed 4th out of 260 teams in the Berryminator theme.

Yohan Abeysinghe participated in the International Mathematics Competition for University Students organized by the University College London under the supervision of Dr. Bimali Jayasinghe and received honorable mentions.

e-Yantra 4th place team

Outstanding Speakers of ENTC

by Hiruna Vishwamith

Communication skills are a basic need of a society and using these skills to become a great speaker adds a lot of benefits to anyone's career. Therefore, the Department of Electronic and Telecommunication Engineering offers the Communication Skills module in semester 2 as a creative and compulsory learning opportunity. It consists of delivering 3 speeches, creating a personal mission statement, a curriculum vitae, a business letter, a synopsis, an abstract, and a critique, where undergraduates can freely address any non-controversial topic. The above mentioned 3 speeches are gradually developed through the key points required when giving a proper speech such as visual aids, presentation, body language and verbal inflections. The Department of Electronic and Telecommunication Engineering priorities communication skills and this module helps the students master the basic skills required to speak freely in public as an engineer. So, everyone in the department considers this module a critical as well as a fun module.

Six first-year undergraduate students scored 100 marks in their first speeches for the Communication Skills module. They are Ms. A.M.V.M. Amarasinghe, Ms. P.B.K.S.G. Kapukotuwa, Mr. K.A.W.T. Kodituwakku, Ms. U.A. Tillakaratne, Ms. K.D. Wijeratne and Ms. S.A. Indrapala. Congratulations to all the above-mentioned undergraduates.

The wonderful speech given by Ms. Selani Indrapala emphasized that life is truly magical while pointing out that only a smaller number of adults are genuinely happy.
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Isn't it magical?
Selani Indrapala

I've always thought of snow globes to be magical. But as this snow globe just lies here in my hand, is it truly magical?

Dear Lecturer and my fellow colleagues,

Let me ask you a question. How many of you fear death? Looks like a few of you do. But when I was small, I didn't fear dying. I grew up in a world where I loved watching Harry Potter. And Albus Dumbledore had this quote. "Death is but the next great adventure". And so, death didn't really scare me.

Until one day, death came knocking at my door. Right after my A/Ls, I was wrongly diagnosed with a viral flu when in reality I had dengue. By the time the correct reports came in, I had internal bleeding, I couldn't walk, my eyes were bloodshot, and I was immediately admitted into the ICU. The doctors tried their best to save me, and I did survive, but what followed after that were weeks of complications. Worst of all, I was diagnosed with secondary pneumonia. And as I laid there in my ICU bed, I overheard a doctor say, "but what if she dies?". And I froze. I saw my entire life flash before my eyes. There was much more left for me to do. I had to make a name for myself, be successful in my career, get married, have kids, grandkids... There was much more left for me to experience.

Thankfully, I survived but that moment made me realise what the biggest blessing of life is. And that is life itself. We all have been blessed with this magical gift of living. But how many of us actually use this gift? According to a study conducted by NORC at the University of Chicago in 2018, only 31% of adults claim to be truly happy. Les Brown, the former Ohio state representative and a brilliant motivational speaker, once asked, "what is the richest place on the planet?" And his answer, "the graveyard. Because it is here that you will find all the hopes and dreams that were never fulfilled." Do we really live our entire lives to take our dreams to the graveyard when we die? Each and every one of us has the ability to make our lives a magical one but instead we choose to waste it.

How many of you can say with utmost certainty that you have taken that first step to make your lives magical? Harry Potter wasn't written overnight. Apple, Microsoft, Facebook and Tesla weren't empires built overnight. J.K Rowling, Elon Musk, Bill Gates and every other celebrity lives a magical life today because they took that first step years ago.

Our lives will not be magical just because we live it. Our lives will only be magical if we do something about it. A snow globe isn't magical if it just sits there. It is only magical when it is shaken.

Ms. Kasuni Wijeratne gave a parallel speech pointing out that, "only our mind judges and limits us, when we think other people are better than ourselves.

Improving ourselves beyond our limits
Kasuni Wijeratne

Would you like it if you met you? We meet so many people every day, and we keep asking ourselves whether we like that person or not. But have we asked that question from us?. I know some would say yes, that they'll love to meet someone like them and some would say that they like other people better. If you feel like this, consider what makes those other people you admire seem unique. Do you have to be like them to like yourself?

Ladies and gentlemen, how did you first feel when you had to give this speech? Did you feel like it's not your thing? That you don't have the skills to write or deliver speeches. But here we are. You need to realise that it's your mind that limits you. Those limits reinforce your actions negatively, which makes you do less, which will then, in turn, support your beliefs that you are incapable of doing it. So why not use it to our benefit. When you engage in something, believe that you can do it if you try your best. This will, in turn, help you to get better at it. And we might not be in our comfort zone, but we are breaking barriers that we had for ourselves.

Now here comes the next question. How can we improve ourselves?. I'll share one of my experiences with running. I could not run even 1km when I started, and now I can run 5km after two months. And did I do this alone.No.Our seniors ran alongside me, motivating me

when I thought I couldn't take another step. And there were many runs where I failed to keep up with the rest. So from my experience, change and improvement don't happen overnight. You have to give your constant effort and always try to improve from what you were the day before. And sometimes, you find it hard to believe in yourself.

That's when you need people to support you. And on this journey, there will be many failures. Don't let that demotivate you.
Another thing that I want to highlight is balance. Do you have to do all the things that other people do to become better? I think no. Sometimes we get pushed to pursue things we don't need but think we need. So take time and figure out what you need in life, then give adequate time to your priorities. Focus on doing the best you can in them. And don't forget about your health and your family because we tend to ignore them the most in life.

Ladies and gentlemen, I invite you all to ask yourself the question I started this speech with. Would you like it if you met you? And if you do, try to love yourself even more. And if you don't, that's fine. Don't be harsh on yourself. Think how nicely you would treat a friend if they struggle with something. Have that patience and kindness with yourself; with that in place, slowly but consistently improve. Find support and ask for help if you need it because many would be glad to help you. Find a balance in your life where you don't lose yourself among all the things we try to achieve. Finally, remember that good things take time, so be patient.

In the end, even though all the speeches are not mentioned here, all the six undergraduates did a wonderful job in delivering the speeches. We encourage them to participate in upcoming public speaking events and wish them all the best to perform even better.

Annual General Meeting of the Electronic Club for the Term 22/23

by Charuka Bandara

The Annual General Meeting of the Electronic Club of the Department of Electronic and Telecommunication Engineering of University of Moratuwa was held on Saturday, the 25th of June 2022 at the ENTC 1 hall, to celebrate the end of another successful year. The Head of the Department, Dr. Ranga Rodrigo was invited as the chief guest. We bid farewell to the former Electronic Club members from the 17th batch. Certificates were awarded to the past office-bearers of the club, to acknowledge their part in the success of the Electronic Club in the previous year.

Honorable mentions were awarded to the seniors of the 17th batch as a nod to appreciate their impressive work. The former Executive Committee passed on the torch to the 18th batch for the term 22/23. Chandima Weerathunga as the President, Chathumi Navodya as the Secretary, and Nisal Jayamuni as the Junior Treasurer were nominated and seconded by our fellow Electronic Club members. The Head of the Department, Dr. Ranga Rodrigo addressed us with a reflective look at everything achieved in the Department of Electronic and Telecommunication Engineering over the last year.

A beautiful video of the Electronic Club was showcased, which took us down the memory lane. The newly appointed President, Mr. Chandima Weerathunga, addressed us and talked about the bond he shares with the club. He expressed his upcoming plans to make the club the best among all the clubs at the University of Moratuwa.

Ms. Chathumi Navodya concluded the event with a vote of thanks. We wish the past bearers exceptionally good luck as they set off to the next chapter of their lives. We look forward to another triumphant year from the newly appointed Executive Committee of the Electronic Club for the term 22/23 and hope that you'll make the ENTC family proud.

by Oshan Yalegama

Tronic Padura 2022

Tronic Padura is an event organized by the Department of Electronic and Telecommunication Engineering to provide our undergraduates the opportunity to share their musical talent and enjoy the melodies and rhythms of classical music. Unfortunately, the event could not be held in the preceding year due to difficulties presented by the pandemic. However, this year, the tunes from the upper Sentra Court could be heard from a great distance as the harmonies of instruments and voices filled the air.

Padura 2022 commenced on the 21st of September at 7:30 in the evening and was an entrancing musical experience from beginning to end. It was attended by lecturers and hundreds of undergraduates from the department and the university. The place was incredibly crowded and decorated with bright lights illuminating the venue beautifully late at night.

The audience listened eagerly to the performances of their fellow brothers and sisters from the department. Songs were sung from multiple genres, varying from modern classics to Baila, all harmonized by the rhythms and melodies of Guitars, Keyboards and Tabla. Every song was performed brilliantly by the vocalists and instrumentalists alike. It was a great pleasure to listen to them performing.

As the night went on, the time to conclude the event drew near, but the enthusiasm of the performers and audience never seemed to dwindle. After the performers shared a final performance with the audience, interspersed with the sounds of fireworks, Padura 2022 came to a memorable conclusion.

Pimora 2.1 - Ethical Hacking

"Ethical hacking is not a crime. Moreover, it is an art"
-Renganathan P.-

Pimora was initiated as the first-ever Raspberry Pi Jam in Sri Lanka which is an independently organized community event for people to come together to learn about digital making with Raspberry Pi. On the 24th of September 2022, PiMora launched its next stage in developing and expanding the community of Raspberry Pi enthusiasts in the country, this time with a focus on the mysterious world of hacking. The session spanned two days and both the enthusiasts and potential enthusiasts were privileged with the ability to witness the event on both physical and virtual platforms.

The session was conducted in the familiar ENTC1 Hall of the Department of Electronic and Telecommunication Engineering, University of Moratuwa by Mr. Yasiru Senerath, a third-year undergraduate of the department. On the first day of the session, he gave an introduction to ethical hacking, elucidating details such as misunderstandings and social opinions about the topic. He also explained the importance of learning about such a topic that is not very positively viewed by the general public. The session was not only informative but also interactive, allowing viewers to follow along with the practical demonstrations. Mr. Yasiru talked about many important topics such as communication and the basics of programming that set the foundation for the following day's activities.

The second day of the session was even more interactive and the viewers got the chance to witness live ethical hacking scenarios presented in a very intelligible way. The demonstrations included ARP poisoning, Man In the Middle and much more. Then followed an exciting practical in which Mr. Yasiru programmed an ARP poisoning detector from scratch and tested its functionality by engaging in an ARP spoofing attack.

After the second day, the session came to a conclusion, empowering another group of Raspberry Pi enthusiasts, employing them with a new skill set to explore their creativity and ingenuity.
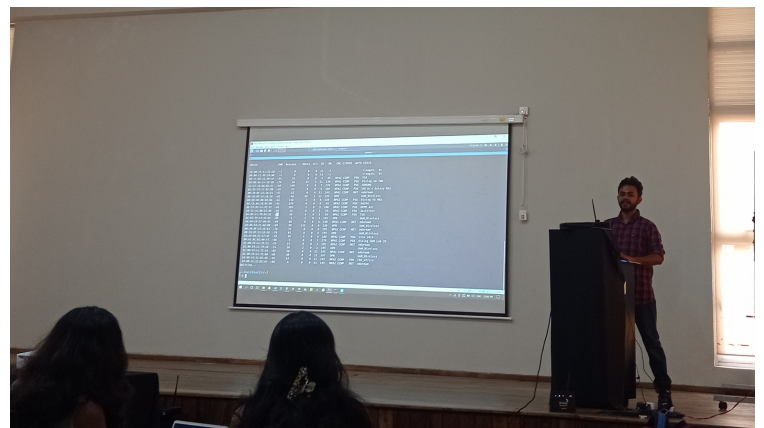
A Win-Win Relationship
## Industry Collaboration

by Devindi De Silva

Collaborative Live Music Through 5G in collaboration with Dialog Axiata PLC

Music is deemed to be an integral part of human life. Delivering quality and effective Networked Music Performance (NMP) experience is something that many have tried to tackle over the past few years. Due to latency and lack of synchronization between the users, network music performance is still considered to be challenging even with the advancement of technology, especially in the field of networking. In collaboration with Dialog Axiata PLC, a group of final-year students of the Department of Electronic and Telecommunication Engineering supervised by Prof. Dileeka Dias, Professor at the Department of Electronic and Telecommunication Engineering and Dr. Kasun Hemachandra, Senior Lecturer at the Department of Electronic and Telecommunication Engineering have taken on this challenge to address these issues. This project's scope revolves around using 5G to create an enhanced NMP experience. In other words, the goal of this project is to create a live collaborative music experience over a 5G network. Dialog Axiata PLC played a significant role in this project by providing essential resources, including the expertise of research personnel, equipment, etc. It is one of Sri Lanka's largest telecommunication providers and the country's largest mobile network operator with 17.1 million subscribers which amounts to 57% of the Sri Lankan mobile market. The main deliverables of this project are creating a collaborative music experience over a 5G network, providing remote music performance software for the users, and using appropriate time synchronization mechanisms to help the users stay synchronized.

RFID and Vision-based crop management and monitoring system in collaboration with Nelna Pvt Ltd

Tracking, analyzing data and task management are crucial for better quality harvest information collection. Currently, many plantations in Sri Lanka are doing this manually, which is time-consuming and error-prone. A group of final-year students of the Department of Electronic and Telecommunication Engineering supervised by Prof. Rohan Munasinghe, Professor at the Department of Electronic and Telecommunication Engineering has proposed a smart system to address these problems and further optimize the process. The project was done in collaboration with the Mango plantation of Nelna Pvt Ltd. Its plantation spreads up to 560 acres of land and harvests over one million mangoes per season. The system takes fruits and trees as monitoring units and uses technologies such as asset tracking, embedded systems, database and wireless transmission and networking to reach the objectives. The group of students was fortunate to work hand in hand with the agronomists at the CEO level of Nelna Pvt Ltd during this project time period. They were provided with immense resources and information needed to successfully complete the project. With this system, the information transparency of the mango production process can be enhanced and the orchard production management level can be improved to enhance the quality and yield and guarantee the quality of the harvest.
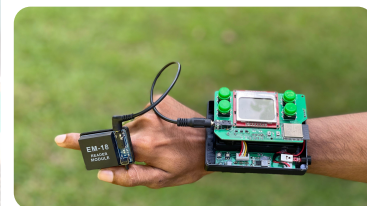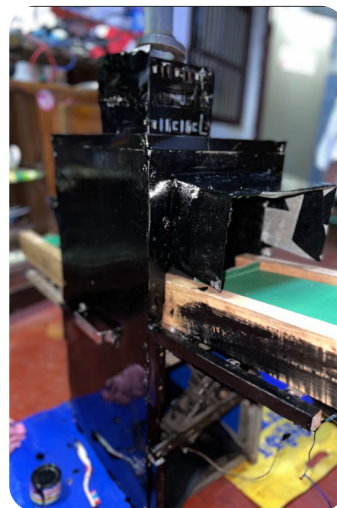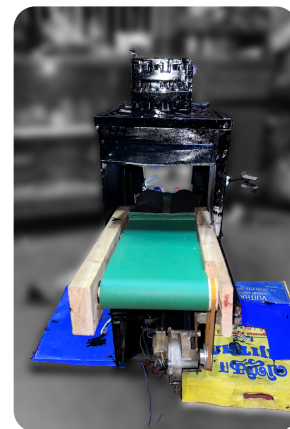
V2X Communications: An Introduction to DSRC

by Kovintharajan Mithushan

V2X (Vehicle to Everything) describes the information transferring between a vehicle and its surroundings which form the components of an ITS (Intelligent Transport System). ITSs give real-time information regarding traffic conditions, changing road conditions, warning signals and other information which improves the safety, efficiency and robustness of transportation.

A workshop on V2X Communications: An Introduction to DSRC (Dedicated Short-Range Communications) organized by, Senior Lecturer at the Department of Electronic and Telecommunication Engineering of University of Moratuwa, Professor (Mrs.) Dileeka Dias was held on 5th September 2022, at the ENTC department. Dr. Kasun T. Hemachandra, Senior Lecturer of the Department and Research Assistants Mr. Shechem Sumanthiran and Mr. Shakthi Gimhana were resource persons along with Prof. Dias. The key areas discussed in the workshop are shown in the Figure 1.
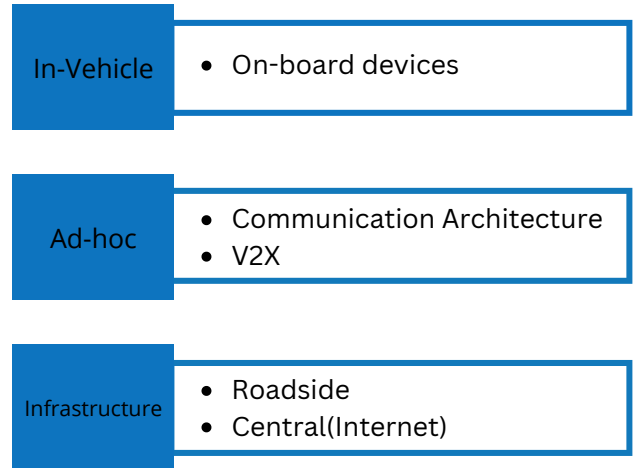
In-Vehicle	• On-board devices
Ad-hoc	• Communication Architecture • V2X
Infrastructure	• Roadside • Central(Internet)

Figure 1

The vast domain of the V2X including V2V (Vehicle to Vehicle), V2N (Vehicle to Network), V2I (Vehicle to Infrastructure) , V2H (Vehicle to Home), etc. combine to create a Vehicular Ad-hoc Network (VANET) which is highly dynamic. This VANET architecture is designed with three main domains.

Figure 2 shows a typical VANET. In a VANET, information may travel over multiple hops between vehicles. That is the challenge in this area which unlocks a wide space for research, development and innovations related to vehicular networks, autonomous vehicles and machine intelligence. V2X is mainly classified into 2 categories as DSRC (Dedicated Short Range Communications) and Cellular V2X (C-V2X). DSRC is an adaptation of Wi-Fi. V2X communications happen between on-board-units (OBUs) as well as between OBUs and roadside units (RSU). RSUs are mounted at a strategic point along the road which passes messages among V2X systems. OBUs are mounted in vehicles and pass messages among moving vehicles and the closest RSU.

A demonstration of DSRC was conducted at the workshop which showed how it enables communication and its suitability for high-speed dynamic vehicular systems. Forward Collision Warning (FCW) is the main application of the DSRC which was focused on during the workshop. Applications of the V2X systems can be classified as safety and non-safety. How safety applications decrease the probability of accidents while non-safety applications focus on traffic management, light management, etc were also discussed in the workshop. V2X communication is an effective and advanced idea. It's the future of vehicular systems. The demonstration and other statistical data which were displayed in the workshop showed how damage to life and property due to accidents can be minimized with efficient V2X communication.

Overall, the session was successfully conducted with enthusiastic participation. We express our sincere gratitude to Prof. (Mrs.) Dileeka Dias for this insightful workshop.
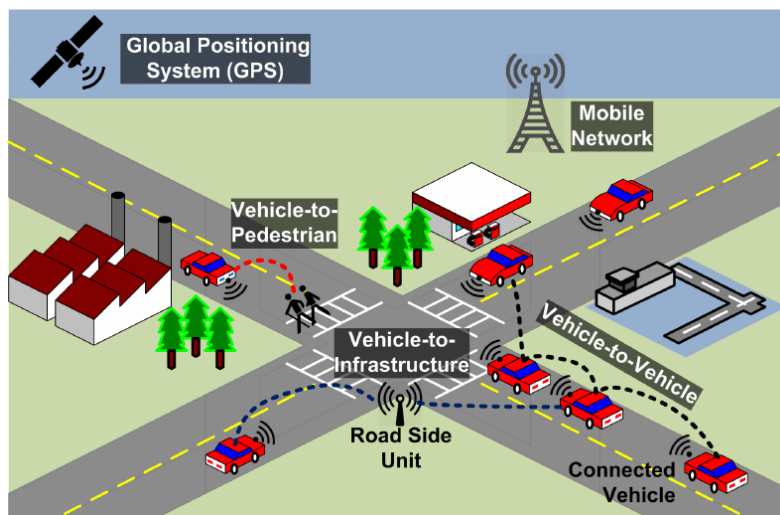
Figure 2

Spark Challenge Grand Finale

by Oshan Yalegama

A one-year-long journey ends, lighting a spark in the minds of a new generation of undergraduates as they witness the ideas of their fellow brothers and sisters brought to life on the grand stage.

The Spark Challenge 2021/2022 Grand Finale was held in the Civil Auditorium, University of Moratuwa on the 30th of July 2022. After the exhilarating preliminary round held on the 26th of July in the same week, the audience was left wondering which five out of the ten incredible teams that presented their projects that day would progress to the Grand Finale.

The much-anticipated Grand Finale commenced as the comperes greeted the audience. The participation was overwhelmingly enthusiastic. Every seat was occupied by undergraduates of every batch in the department, waiting eagerly for the presentations. The department lecturers and staff also attended the event. Excitement could be felt in the air. After Mr. Chandima Weerathunga, the president of the Electronic club delivered the welcome speech, the audience was reminded of the importance of the Spark Challenge through a video introduction.

Then, the moment arrived for the main session of the event, the pitching session. The five teams that presented were Team Axon, Team Fix-it, Team Phantom, Team Solo and Team Fusion.

Did you know that the coral population is currently in decline due to human activities and the climate crisis? This daunting problem is what Team Phantom tackled through their solution which involved a robot that automates the process of retrieving and storing coral gametes released by coral polyps. Team Axon presented CAMSAT which is a system that can continuously monitor the pediatric patients' depth of anesthesia to assist anesthesiologists to make clinical decisions. Water pollution is infamous, especially in our country, due to how it has adversely affected our country's population. Team Fix -IT proposed a solution that aims to alleviate this problem by introducing a device/application that detects and controls this. Team Solo presented their project on assessing the conductivity of urine which has crucial applications in screening chronic kidney disease. Team fusion presented their project that can implement conditions ideal for various kinds of plants to grow by using data obtained from specific areas.

As the final team left the stage, the exhilarating pitching session concluded, but not without leaving an important question buzzing among the audience, "Who will win the grand prize?".

Everyone waited with great anticipation as Ms. Dinithi Dissanayake, the former vice president of the spark branch, concluded her speech on the Spark Challenge of the previous year, and the comperes walked to the podium. "I now hold the names of the winners of Spark Challenge 2021/2022", proclaimed a compere. "Who do you think won the Spark Challenge 2021/2022" The audience screamed the team names. Then the stage thundered with applause as it was announced that Team FIX - IT won second runners-up, Team Axon won first runners-up and finally, that the champion team was Team Phantom!

After the glorious award ceremony, the keynote speaker Mr. Heminda Jayaweera delivered his speech and provided valuable insight about the importance of initiatives like those found in Spark Challenge. The competition then reached its conclusion, opening the stage for the next generation of competitors of Spark Challenge.

by Ishani Anushka

Dr. Peshala Jayasekara

Dr. Peshala Jayasekara is a senior lecturer rendering his service to the department since 2016. He received his B.Sc. (Hons.) degree at the department during his undergraduate years and M.Sc. and Ph.D. degrees in Electrical Engineering and Information Systems from the University of Tokyo, Japan, in 2011 and 2014, respectively. His Ph.D. dissertation was on "Localization Assistance for Mobile Robot Navigation using Probabilistic Pose Estimation Techniques". Dr. Jayasekara was a postdoctoral researcher at the National Institute of Advanced Industrial Science and Technology (AIST), Japan. He is the current faculty advisor of the IEEE Industrial Electronics Society Student Branch Chapter of the University of Moratuwa.

Dr. Jayasekara is one of the adept researchers in the department, who mainly works in the field of robotics. His other research interests include Localization, Mapping, State Estimation and Control Theory. He has numerous publications in various top-tier conferences and journals. "Particle filter based 3D position tracking for terrain rovers using laser point clouds" in IEEE/RSJ International Conference on Intelligent Robots and Systems, "Ceymo: See more on roads-a novel benchmark dataset for road marking detection" in 2022 IEEE/CVF Winter Conference on Applications of Computer Vision and "Deep learning of augmented reality-based human interactions for automating a robot team" in 2020 6th International Conference on Control, Automation and Robotics [ICCAR] are some of his major publications.

The Best Student Paper Award at the Australasian Conference on Robotics and Automation (ACRA) 2020 and the Student Best Paper Award at the International Conference on Control, Automation and Systems (ICCAS) 2017 were both accomplished by undergraduates in our department, under his supervision.

ENTC has immensely benefited from the expertise of Dr. Peshala Jayasekara. His continued support has inarguably contributed to the esteemed legacy of the department.

Dr. Subodha Charles

Dr. Subodha Charles has been with the Department of Electronic and Telecommunication Engineering since 2021. He is also a proud product of the Department of Electronic and Telecommunication Engineering and received 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. Charles's research interests include hardware security & trust, embedded systems, and computer architecture. During his short time in academia, he has published in several prestigious conferences and journals. Dr. Charles also serves as a reviewer for some well-known journals and international conferences such as IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), ACM Transactions on Embedded Computing Systems (TECS), Design Automation Conference (DAC) and International Conference On Computer-Aided Design (ICCAD). He began his career as a trainee associate electronics engineer at Zone24x7 in Colombo, Sri Lanka, and later worked as a graduate technical intern at Intel Corporation in Hillsboro, Oregon, USA.

Dr. Charles co-founded Alta Vision (Pvt). Ltd in Sri Lanka in 2013, which is now one of the country's market leaders in solar PV installations. As of today, the company has invested in and expanded into other areas such as construction, software, digital marketing and healthcare and is now operating as a group of companies - "Pearl Cluster" and Dr. Charles serves as the group chairman.

Apart from academia and his career, he has been a well-known committed volunteer at IEEE (Institute of Electrical and Electronics Engineers) since 2011. He has held several global leadership positions and successfully led many initiatives within IEEE to foster entrepreneurship, industry collaboration and membership growth.

His expertise in embedded systems and computer architecture and his excellence as a researcher, entrepreneur and volunteer has made him an invaluable resource to undergraduates in our department.

by Hiruni Wijewardena

Mr. Mohamed Afham

"I believe stepping into ENTC is one of the X-factors which paved the way for me to become who I am now. It was where I recognized what I'm passionate about and developed the skills to contribute in the vast research arena."

One of the best resources that drive forth the legacy of the department of Electronic and Telecommunication Engineering is its outstanding students. This spotlight blazes another remarkable student of our department, Mohamed Afham of the 2017 batch.

He was an exemplary student from his school times. Showcasing his brilliant talents in mathematics, he became the champion in the provincial-level mathematics competition consecutively from 2009 to 2013. He was a silver medalist at Sri Lankan Mathematics Olympiad in 2013 and 2014. Further taking his abilities to international levels, he became a Merit Certificate holder in the International Mathematics Competition 2014 (Daejeon, South Korea). He is also an honorable mention winner at the International Mathematics Olympiad Competition, the most prestigious mathematics competition for high school students in 2015 (Chiang Mai, Thailand). During his school time, he excelled not only in mathematics but also in physics. He was a gold medalist in the Sri Lankan Physics Olympiad in 2016 and represented Sri Lanka at the Asian Physics Olympiad in 2017 held in Russia.

He has marked many milestones in his academic life at the department of Electronic and Telecommunication Engineering. His four years at the department were filled with many achievements. Continuing his passion for mathematics he won a bronze medal at the International Mathematics Competition for University Students 2018 held in Bulgaria. He has won many national and international competitions related to machine learning and data science. He emerged as the winner of the IEEE SMC Conference 2022. He also became the second runner-up in the IEEE ICIP Video and Image Processing Cup 2021.

Afham completed his industrial internship at the Mohamed Bin Zayed University of Artificial Intelligence in Abu Dhabi, UAE. In 2022, He completed his undergraduate studies by successfully obtaining a 3.84 overall GPA (out of 4.2) while getting into the "Dean's List" in six semesters out of the eight semesters.

Among his many accomplishments, he was able to publish his research work in top conferences and journals in the world. His research on 'CrossPoint: Self-Supervised Cross-Modal Contrastive Learning for 3D Point Cloud Understanding', was accepted to Computer Vision and Pattern Recognition Conference (CVPR) 2022. His publication on 'Towards Accurate Cross-Domain In-Bed Human Pose Estimation' was accepted by ICASSP (International Conference on Acoustics, Speech and Signal Processing) 2022. He has another publication on 'Rich Semantics Improve Few-Shot Learning' which was published in BMVC (British Machine Vision Conference) 2021. He has 12 Google scholar citations (h-index:2) and also he is a reviewer in CVPR 2022 (h5-index: 356), ECCV 2022 (h5-index: 197), IROS 2022 (h5-index: 73) and IET Computer Vision (IF: 0.38).

Going beyond academics, he has served as the President of the Majlis-Ul Islam Student Society in 2021/2022. He also served as a Global Volunteer of AIESEC in Hungary in 2019. Currently working as an AI Resident at Meta, we wish him all the strength to fulfill his goals and reach more successive levels.

"Coming together is a beginning, staying together is progress, and working together is success."

- HENRY FORD -

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