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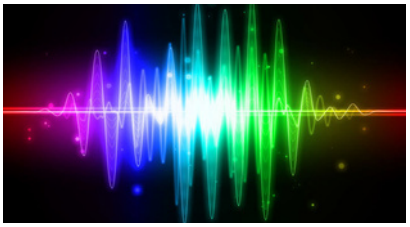

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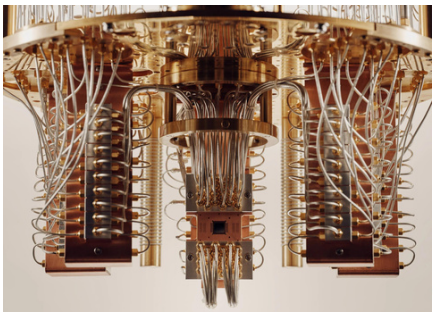

NEWS

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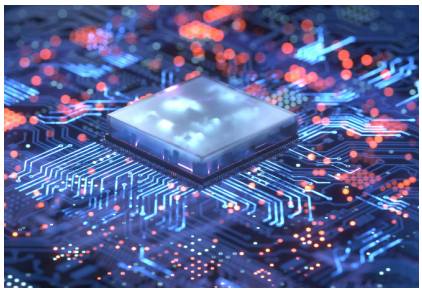

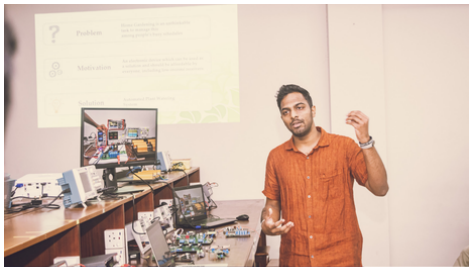

ENTC/BME OPEN DAY: SHOWCASING LIFE @ ENTC/BME

A captivating event designed to offer a glimpse of Life at ENTC for the freshers.

SPOTLIGHT

A STUDENT TO SHINE

"It is always about the impact you make than the achievements you collect. When you create impact, the achievement will follow. Never forget to be humble and open-minded "

A Chat with Alumni

by Ishani Anushka

Dr. Dulini Mendis, an esteemed alumna of the Department of Electronic and Telecommunication Engineering at the University of Moratuwa, is currently an Engineering Manager at Seer Medical, a prominent player in the Medical Devices & Software industry based in Australia. Her experience and insight into the industry are invaluable, and we were fortunate to have a fruitful discussion with her. She had a lot of valuable experience and advice to share.

1. As an outstanding undergraduate of ENTC, the inspiration you received from the department and your undergraduate days must have paved the path to where you are today. Can you tell us a bit about your memorable experiences at ENTC and give us an overall reflection on your university life?

It was a memorable experience studying at ENTC at the University of Moratuwa. ENTC attracted the best and brightest minds, creating a nourishing environment that fostered mutual learning and growth.

The department's curriculum was diverse, offering a wide range of subjects, including department-specific topics and computer science subjects. This exposure to different disciplines helped me to identify my passions and interests. In addition to academics, I also participated in various extracurricular activities organized by the Electronic Club. During my time there, the E-Carrier magazine was launched, and the club hosted multiple events, ranging from community service projects to fun activities. These events allowed us to engage with the community, work on-site, and make valuable connections. I was also in the Rotaract Club and working as an editor and one of the vice presidents, further enriched my experiences and skills beyond the classroom. Overall, my time in the ENTC department and involvement in the Electronic Club and Rotaract was incredibly rewarding.

2. A lot of our readers would be interested in knowing the job description of a biomedical engineer from experienced engineers themselves. Could you tell us a bit about what you do at Seer Medical Australia and also what your Ph.D. covered?

My interdisciplinary Ph.D. in computational neuroscience at the University of Melbourne was focused on biomedical engineering and covered both engineering and biology. Specifically, I worked on a project which aimed to analyze how networks of neurons grown on microelectrode arrays reacted to different epilepsy drugs and determine whether drugs that worked similarly evoked similar activity in those networks. This project was incredibly interesting, and I had the opportunity to conduct lab work myself, which was a new and exciting experience for me as someone who had primarily focused on computational work. While studying for my Ph.D., I actively participated in many technological workshops organized by the University of Melbourne. In one such workshop, I met another research student who joined a medical technology startup called Seer Medical, and he later invited me to join their company. At Seer Medical, we focus on at-home EEG-ECG-video monitoring for epilepsy patients where we make the wearables for extended monitoring, software to process and view EEG and video data as well as machine learning algorithms that detect periods of abnormal activity. I was initially involved in developing the cloud platform for managing EEG and video data. Today, I am proud to work as an engineering manager for this innovative company.

3. How did you get into the neural engineering field? Can you tell us your experience in that particular field?

At the beginning of my Ph.D. journey, my neuroscience knowledge was limited. However, I was determined to find a suitable research project and stumbled upon a fascinating topic related to neuroscience. Despite starting from scratch, I dedicated myself to learning and expanding my knowledge in the field throughout my doctoral studies.

4. Biomedical engineering is one of the fastest-growing areas in engineering. But in Sri Lanka, it is not a prominent discipline. As you think, what are the available opportunities for biomedical engineers in Sri Lanka, and what are the improvements that can be made in that particular field in the country?

In Sri Lanka, the lack of manufacturing and installation of biomedical equipment is a major issue. We primarily rely on imported equipment, which is maintained under the supervision of foreign entities. The main challenge for our country is the difficulty in maintaining high-quality and specialized equipment due to limited resources. One potential solution for Sri Lanka to engage in Biomedical Engineering is to focus on approaches that are software-centric like healthcare software and solutions based on data analytics and machine learning. This approach requires fewer resources and is more financially feasible. With the rise of mobile applications and cloud products, we can address healthcare issues, enhance efficiency and improve processes.

5. With your experience in this field, what advice do you have for students who aspire to step into the neuroscience engineering field and biomedical engineering?

I believe an individual's career path should be driven by their interests and passions. Unfortunately, Sri Lanka's education system often prioritizes following popular career choices over individual preferences. However, for those who are passionate about not just engineering but also biology, pursuing biomedical engineering would be an ideal fit. This field offers ample opportunities, particularly in developed countries, making it a viable option for those looking to work overseas. Even within Sri Lanka, if one is interested in contributing to the well-being of people without being a doctor, biomedical engineering is an excellent field to consider.

6. You have had several years of experience in the industry locally as well as internationally. From the many experiences you gained back in university, what do you think helped you the most in your journey?

One of the most valuable aspects of studying at the University of Moratuwa is the opportunity to develop the ability to learn. I could say the skills gained in learning and problem-solving, how to conduct research online, and how to persevere in the face of challenges are invaluable. Furthermore, the university provides an environment that fosters teamwork and collaboration. I believe graduates who possess adaptable skills, such as the ability to learn quickly and work well with others, are more likely to succeed in their chosen careers.

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

Your motivation to pursue research plays a significant role in deciding whether to embark on a four-year Ph.D. journey, which requires steadfast commitment. Although opting for the industry might seem like an easier path, individuals possessing relevant skills and a genuine research interest may choose to pursue this route. However, it is crucial to consider the industry you plan to work in, the current state of that industry in Sri Lanka and within the world, and its growth prospects. In Sri Lanka, many individuals initially join the corporate world but then switch to research after a few years. It's worth saying that academic excellence isn't the sole determinant of success in pursuing a Ph.D. I have witnessed individuals from diverse backgrounds successfully completing their doctoral degrees. Ultimately, I could say the decision to pursue research, industry, or both is a personal one that depends on various factors.

8. Nowadays, the world has turned to many novel trends, especially Machine Vision, AI, and IoT. As an experienced engineer keeping up to date with these trends, what is your opinion on how they would reshape the technological landscape?

I believe that technology has played a significant role in making software development more efficient and productive. With tools like GitHub Copilot, software engineers can now rely on AI suggestions to help them in their coding tasks, which saves time and effort. Many other AI tools are available that make writing, problem solving and even the creation of art much easier, such as ChatGPT and DALL-E. Of course, there is a possibility that some jobs could be at risk due to the increasing use of AI in software development. However, engineers who can develop high-level architectural plans and strategies will remain in demand. With the innovations in IoT, there will be massive amounts of data generated, therefore skills relating to managing and utilizing them in scalable solutions will be important as well as being knowledgeable about privacy and security issues.

9. According to your experience, how should undergraduates prepare to succeed and establish themselves in the industry? Especially how to move forward with the above trends.

Skills in AI and machine learning are in high demand these days. Whether you're studying telecommunications or biomedical engineering, there are many resources, such as free online courses, videos, and blogs, available online that can teach you about different paths. It's important to stay up to date with the latest technologies and trends in your field. However, developing soft skills that will help you succeed in any career is equally important. As you progress in your career, your organizational skills, ability to resolve complex issues, and how you interact with others become increasingly important. I believe striking a balance between technical and soft skills is key to achieving success in any career path.

10. It is evident that women's engagement in engineering is relatively high now compared to the earlier days. And there are programs such as women in STEM scholarships to encourage that as well. So with your experience in both academia and industry, were there any special opportunities or hardships you experienced as a female engineer?

It's heartening to see now there are special STEM scholarship programs, internships, and mentoring opportunities available specifically for women in engineering. Many developed countries now have quotas for gender diversity, which means that there are more opportunities for female engineers. However, while it may be easier for women to get their foot in the door, it can still be challenging for them to advance to top-level positions. Many women abandon their career ambitions due to parenting and household responsibilities. Even for women who can continue working in challenging careers, there are often biases that prevent them from moving up the ladder because their capabilities are undervalued, particularly in management or executive positions. While considerable progress has been made in recent years, there is still a long way to go before true equality is achieved for women in engineering.

11. To wrap up this inspiring discussion, it would be ideal if you could provide some valuable advice for our budding engineers who are at the doorstep of the industry. What advice would you give to the next generation?

I believe one of the most important things when pursuing a career in engineering is to be passionate about what you're doing. It's crucial to enjoy your work and be constantly learning new things. It's also important to be open to opportunities and not be afraid to explore different fields. If you have the chance to try something new and exciting, take up the challenge and see where it leads. In addition, it's crucial to maintain connections with your colleagues, seniors, professors and professionals from the industry. Finally, volunteering and doing internships can be incredibly valuable experiences that can give you exposure to different companies and fields. This can help you better understand what you want to do in your career and provide you with valuable skills and experiences that will be useful in the future.

Sparse Signal Processing

Content by Dr. Sampath Perera & Written by Oshan Yalegama

What are Sparse Signals?

A sparse signal is a signal which has a representation in some domain where the number of non-zero elements in that domain is significantly lower than the signal length . In other words, these signals can be represented digitally with a high degree of accuracy by relatively few non-zero coefficients. Many of the signals occurring in nature related to human life are sparse. In signal processing, this constraint can be exploited for a diverse range of applications using the concept of compressive sensing, which reconstructs the sparse signal from a reduced set of measurements. This field is of much interest among researchers and engineers due to the algorithms and applications involved and the continuing expansion of the boundaries of its capabilities.

What are the Algorithms?

To this end, we consider the following data acquisition model.

$$y = Ax + z$$

Here, the observation vector of length k is given by y and x is the sparse signal of length m. Our objective is to estimate x from the noisy measurements y. The matrix A is a linear operator (also known as Dictionary), that maps the vector space $\Re m$ to vector space $\Re k$ with m k. The additive observation noise is given by z. Since x is sparse, that property can be utilized to estimate x as follows [Nat95],

$$x = argmin \|x\|_0, s.t. \|y - Ax\|_2^2 \leq \epsilon.$$

In the above equation, the L0-norm of a vector is represented by $/\!/ \cdot /\!/ 0$ and it is equivalent to the number of nonzero elements in the vector. Also, the the noise bound is given by ϵ. The above optimization problem is non-convex and NP-hard [Nat95]. The most common approach to tackle above NP-hard problem is replacing the L0-norm with L1-norm (absolute sum of elements) [CRT06a] and the new transformed problem is known as basis pursuit denoising (BPD) [CDS01] or least absolute shrinkage and selection operator (LASSO) [Tib96].

Further, under reasonable conditions, an NP-problem could be solved numerically. Some examples are the direct search method, matching pursuit approaches [MZ93], base pursuit approaches, and thresholding approaches like iterative soft thresholding algorithm (ISTA) [DDDM04] and fast ISTA [BT09].

It is worth considering how the demand for real-life applications means that very efficient algorithms are needed for time critical applications. This also includes developing new algorithms which are capable of obtaining signal reconstructions from even fewer data and which have a better tolerance to noise and signal non-sparsity.

What are the Applications?

The applications in sparse signal processing are numerous, including signal processing, image processing, computer vision, machine learning, and data compression. It is useful not only in compression but also in cases where obtaining a complete number of samples of a signal is either expensive, inconvenient, or even impossible. The incomplete signal can be used to reconstruct the original sparse signal. Applications of this nature include image and audio reconstruction and in Radar signals, and ECG signals.

Images can generally be assumed to be sparse in their two-dimensional discrete cosine transform representation. The pixels of an image may be corrupted due to noise. These corrupted pixels can be detected and removed. The image can be reconstructed later using the reduced set of measurements. This is possible by exploiting the sparsity property of common images. The reconstruction of a corrupted image by using the gradient algorithm is shown in the figures below.

Figure 1 :
Original image

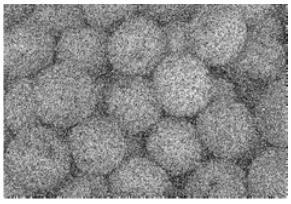

Figure 2 :
Corrupted image

Figure 3 : Reconstructed image

Image is adapted from “A Tutorial on Sparse Signal Reconstruction and its Applications in Signal Processing” by Ljubiša Stankovic, Ervin Sejdic, Srdjan Stankovic, Miloš Dakovic, and Irena Orovic

In Inverse Synthetic Aperture Radar(ISAR), a two-dimensional Fourier transform of the received signal is used to construct the image of a target body. The image is a highly concentrated two-dimensional function. It has peaked at the target range and cross-range positions of the body. The number of non-zero pixel values in the image is much lower than the total number of pixels present. Hence it can be considered sparse. Therefore, any unavailable or corrupted data can be compensated by reconstructing the signal from received error-free data. The usage of a reduced set of radar signals to reconstruct the original radar signal is shown in Figure (4).

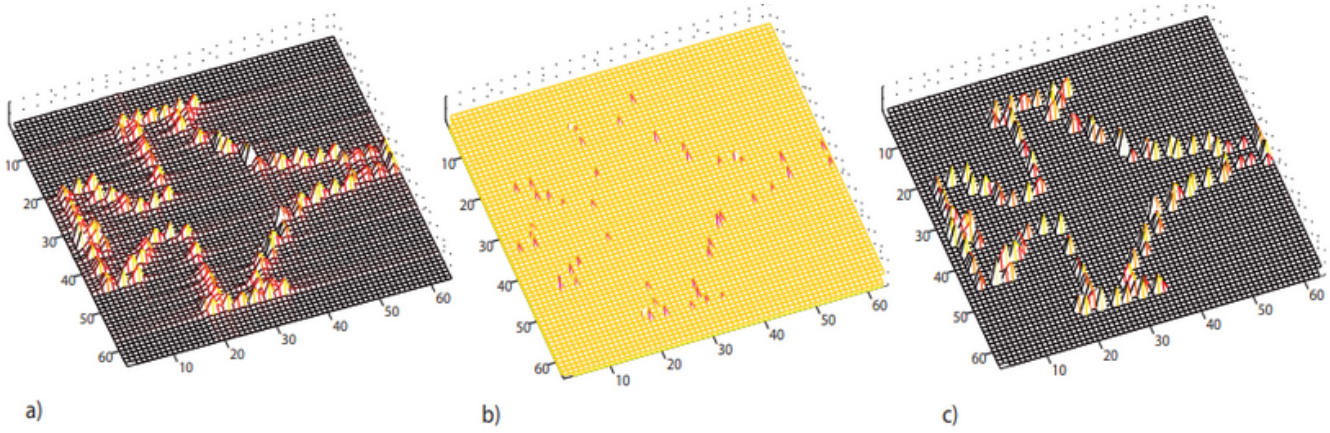

Figure 4 : A single iteration based algorithm applied to the simulated radar signal: a) 2D DFT of the full data (signal) set ; b) Initial 2D DFT of the signal with 25% of available samples, c) 2D DFT of the reconstructed signal. Image is adapted from "A Tutorial on Sparse Signal Reconstruction and its Applications in Signal Processing" by Ljubiša Stankovic, Ervin Sejdic, Srdjan Stankovic, Miloš Dakovic, and Irena Orovic

Where to next?

Even though many such applications and algorithms have been developed, there are many unsolved questions existing in this field. For example, there is a need for computationally efficient uniqueness tests and optimal testing strategies. The context behind compressive sensing has also been changed in newer models as the constraints involved in sparse signal reconstruction are relaxed to allow inaccurate data measurements. Examples included modifications for dealing with wideband analog signals and reconstruction methods that adapt as new measurements are obtained.

Compressive sensing is especially exciting due to its interdisciplinary nature. There are many papers considering multiple aspects such as algorithm development, theoretical problems and possible applications. The discoveries and inventions made in the fields of applied mathematics, pure mathematics, and engineering act together to propel the frontiers of compressive sensing forward. The field continues to be of great interest as more applications and algorithms are yet to be discovered.

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Graph Signal Processing

by Vishagar Arunan

Introduction

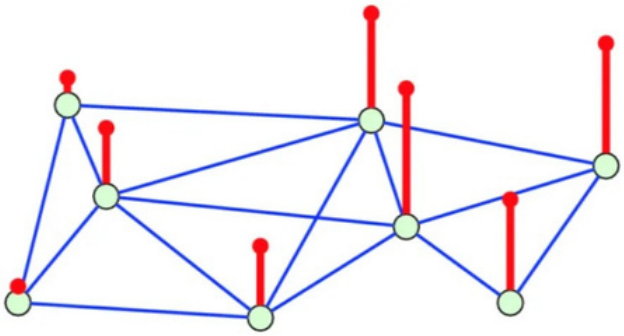
Signals are everywhere. In the present world, signal processing is likely to be changing into information processing with the introduction of new research trends like Topological signal processing, Graph signal processing, Data-driven approaches for imaging systems (including neural networks), Data-driven beamforming techniques for 6G and Beyond communication systems, latest video compression standard VVC and some new ones to many models like multimodal speech recognition. Thanks to some ground-breaking inventions such as the Fast-Fourier Transform, linear filters, and Kalman filter, which are distinctive to open the pathway of such overwhelming trends. Here, we are going to do a brief discussion on Graph signal processing.

First of all, what is signal processing? Why is it considered to be one of the pioneering fields for research? The answers to these questions lead us to the following discussion. The representation, analysis, and manipulation of signals are dealt with within the field of engineering and applied mathematics, known as signal processing. Any quantity that carries information is a signal, including time-varying voltages, sound waves, and images. Signal processing's objective is to extract information from signals and portray it in a more practical and understandable manner. Filtering, Fourier analysis, compression, and feature extraction methods are used to achieve this. Numerous industries, including telecommunication, voice and image processing, control systems, and biomedical engineering use signal processing in various ways. Signal processing uses mathematical techniques and models to analyze and alter signals to extract useful information, enhance signal quality, or decrease the quantity of data required to describe the signal. As the requirements and capacities of different application areas evolve, new approaches are continually being created in the sector.

Graph Signal Processing

Data is everywhere in massive quantities in the present technological world. Almost every aspect of our day-to-day life is recorded at one or many different kinds of levels. Our personal health data are recorded and processed through health monitoring devices and apps, various types of financial and banking data, our web searches, our social networks, and our mobility by traffic patterns. Each of these data is being recorded by any means. The complexity of such networks and interactions means that the data now resides in more irregular and complex structures. So to process these kinds of complex data into precise, meaningful information, we need new tools.

In Simple words, Graph signal processing (GSP) can be briefly described as a branch of signal processing, concerned with the study and control of signals defined on graphs. The interactions between the signal samples in GSP are modeled as graphs, which may subsequently be examined using graph spectral theory, graph filters, and other graph-based processing methods. In order to handle signals with underlying structures such as those that emerge in social networks, brain connections, and other complex systems, GSP aims to expand the capabilities of conventional signal processing techniques.



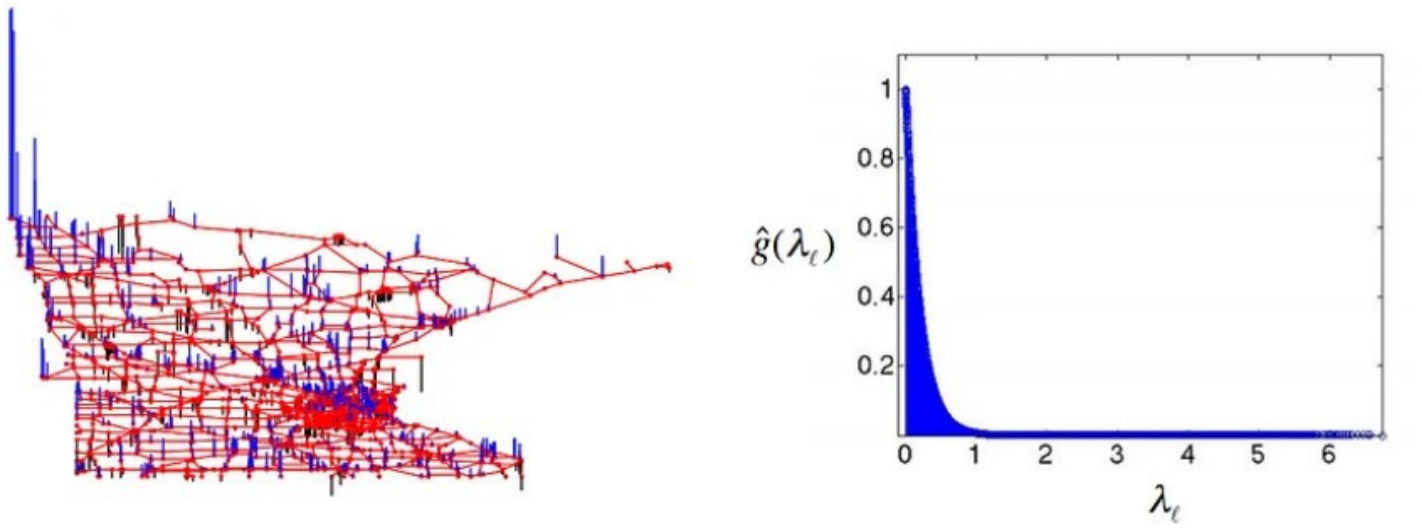
Graph Signal Processing. (Source: https://link.springer.com/chapter/10.1007/978-3-030-03574-7_1)

For example, let us consider a state which has 8 cities. Suppose we need to represent the number of automobiles in each city. As shown in the figure, we can represent this information as a graph. Each light green vertex represents a city and its location in the state. The route between the two connected cities might be interpreted as the boundaries separating the cities. The number of vehicles, a scalar value, is represented by the red vertical line. Therefore, as the red line rises, so does the city's automotive population

Graphs offer the ability to model such complex data and interactions between them. The data can be modeled into nodes and edges. Graph signal processing introduces exploration and analysis of such nodes and edges by adding attributes and modeling those as signals on a graph. For example, the temperature in a given city on a given day in a weather network. Representing such data into graphs requires us to extend classical signal processing concepts and tools such as Fourier

Transform, Filtering, and frequency response to data residing on Graphs. It also leads us to tackle complex tasks such as sampling in a principled way.

Classical signal processing signals can stem from various domains. However, the underlying graphs can tell a fair amount about those signals through their structure. Different types of Graphs model different types of data and complex networks. Such graphs include Erdos-Renyi graphs, ring graphs, random geometric graphs, small-world graphs, and scale-free graphs. As in classical signal processing, graph signals can have properties such as smoothness that needs to be appropriately defined. They can also have spectral representation. In particular, the Graph Fourier Transform allows us to develop intuition gathered in the classical setting and extend it to graphs; we can talk about the notions of frequency band limitedness, for example, we can filter graph signals. They can be sampled, we can denoise graph signals, learn their underlying structure, and model them.



Minnesota road graph in vertex domain (left) and in graph spectral domain (right)

Additionally, there is a lot of promise for Graph Signal Processing to be used in sensor networks, smart grids, medical neural networks, the internet of cars, and other areas. Graph Signal Processing techniques are frequently implemented on the network using a single processing center in a centralized fashion. The centralized processing solution offers the benefits of being simple to implement and flexible when scheduling resources.

However, when the scale of the network grows, the centralized approach's computational complexity quickly rises, necessitating more expensive gear. Additionally, the network as a whole may become paralyzed if the central node is attacked from the outside.

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Quantum Computing:
Where We Are and The Path Ahead

by Hansa Marasinghe

Quantum computing is a relatively new area that uses laws of quantum mechanics to build inner processing components of computers. The main difference between classical and quantum computers is that quantum computers use qubits rather than bits. A qubit could be 1,0 or both at once! (weighted combination of 1 and 0) while bit only could be either 1 or 0. In classical computing, bits are represented in various ways, such as high and low voltages, on and off states of transistors, charged and discharged states of capacitors, and many more. Similarly, qubits can be implemented in different ways. [1] Trapped ions (the first qubits were built using trapped ions in the mid-1990s) and superconducting circuits (used by IBM quantum) are the most used. Neutral atoms, defects in atom lattice (nitrogen impurities in a diamond lattice as an example), photons, and semiconductor molecules also can be used.

But why are quantum computers faster than classical computers? [2] The statement that "quantum computers are faster than classical computers" is only partially accurate. When dealing with complex problems, quantum computers are way faster than classical computers. But there can be instances where classical computers are more efficient. For example, consider where we have to figure out different ways protein molecules can fold. Classical computers try to find them using brute force algorithms. But even a protein molecule consisting of 100 amino acids could theoretically fold into trillion ways such that classical computers cannot practically solve this problem at a reasonable amount of speed. Quantum computers use different algorithms, which create multidimensional solution spaces where patterns linking individual data points emerge. In the case of the protein folding problem, the solution is the pattern that connects data points which takes the least energy. Since quantum computers use this multidimensional approach, they are way faster than classical computers.

Another leading aspect of quantum is encryption breaking. [3] In 1994, mathematician Peter Shor published an algorithm that has the potential to break most of the current cryptographic systems. Even though this algorithm poses a critical threat to many cryptographic systems, there is a drawback. It requires a quantum computer with millions of stable qubits. Current quantum computers only consist of a few hundred stable qubits. So current cryptographic systems are secure for now. Classical computers could not crack these public key encryption schemes like RSA because it requires a lot of time to do the calculations involving large prime numbers. Quantum computers use different algorithms to search number spaces parallelly to find these large prime numbers.

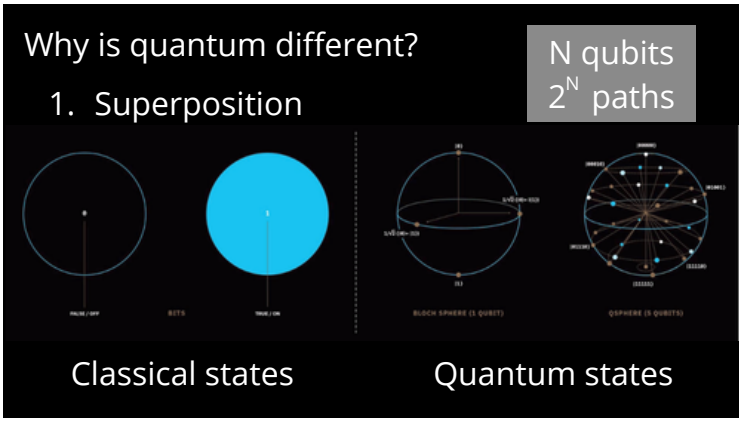

Figure 1: The Need, Promise, and Reality of Quantum Computing. (Source: https://bit.ly/3KS43fD)

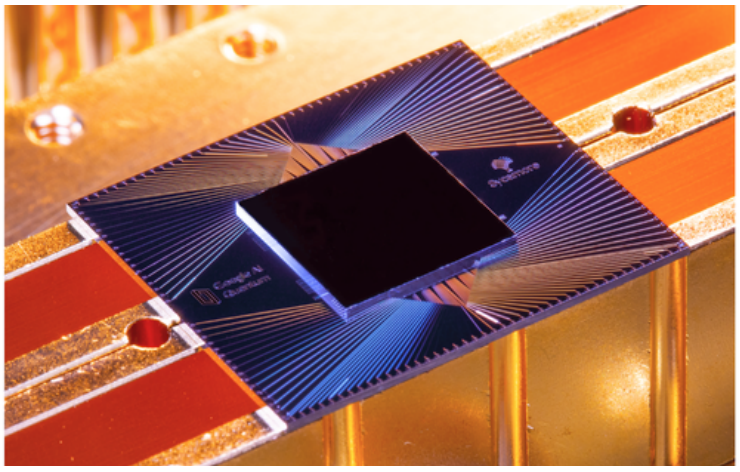

Figure 2: A processor for Google's Sycamore quantum computer. (Source: http://bit.ly/3mumBJd)

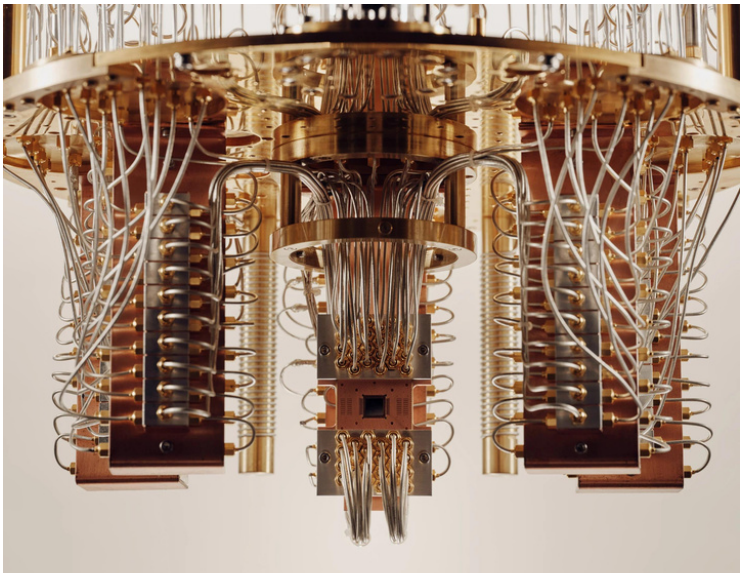

Figure 3: The "chandelier" inside a quantum computer is designed to cool its processing chip to a temperature lower than outer space. (Source: http://bit.ly/41gw1ab)

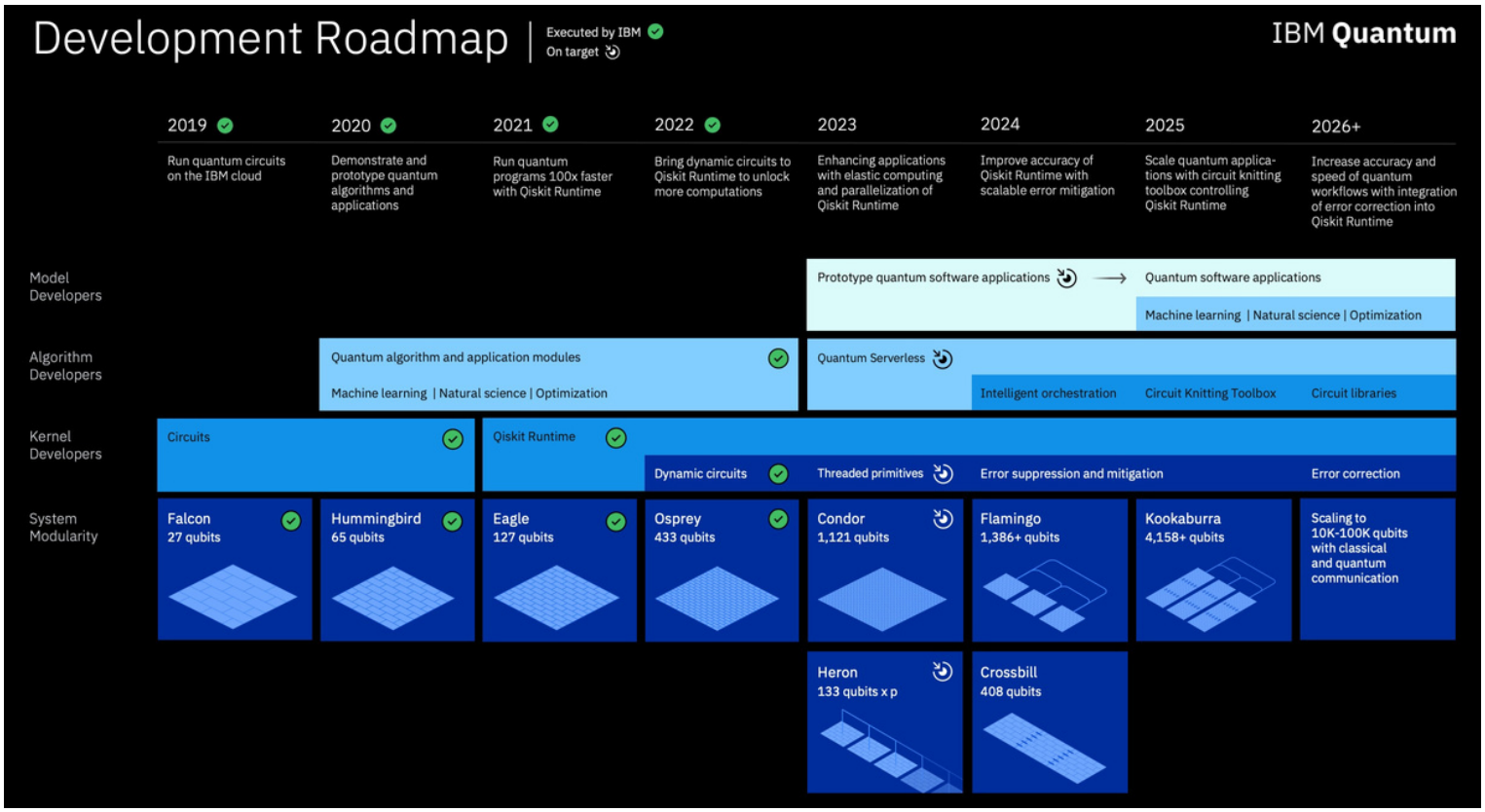

Figure 4: IBM Quantum Computing. (Source: https://www.ibm.com/quantum/roadmap)

There are several companies involved in quantum computing. Xanadu, a Canadian company recognized for exploring photonic quantum computing, Toshiba's Quantum Key Distribution program, which is working to secure network communications, and Righetti, which is experimenting with superconducting qubit technology, are some. Also, well-established tech companies such as Intel, Amazon, Google, and Microsoft have separate quantum computing research divisions. Since becoming the first to offer cloud-based quantum computing, IBM has done many developments in quantum computing. Their quantum computing roadmap shows many advancements.

[4] In 2022, IBM updated its development roadmap to present an ambitious plan for scaling quantum systems beyond old limitations. Up to date, they have been able to hit planned milestones on time., and they are planning to do so in the future too. In 2022, they unveiled the 433-qubit Osprey processor, just one year after breaking the 100-qubit barrier with a 127-qubit Eagle chip. And this year, they are on track to deliver the 1,121-qubit Condor processor and control large systems. The key to solving the scalability problem is going beyond single-chip processors to multicore processors. Therefore, they are planning to introduce classical parallelized quantum computing with multiple Heron processors connected to a single control system. After succeeding in this initial step, they are planning to debut Crossbill, the first single processor made from multiple chips, in 2024. They will also unveil their Flamingo processor in the same year. This remarkable processor will be able to incorporate quantum communication links, allowing IBM to demonstrate a quantum system comprising three Flamingo processors totaling 1,386 qubits. They will be combining multi-chip processors and quantum communication technologies to create their Kookaburra processor by 2025. This leap forward will usher in a new era of scaling, providing a clear path to 100,000 qubits and beyond.

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Field of ASIC/ FPGA Design and Simulation

by Subitson Croos

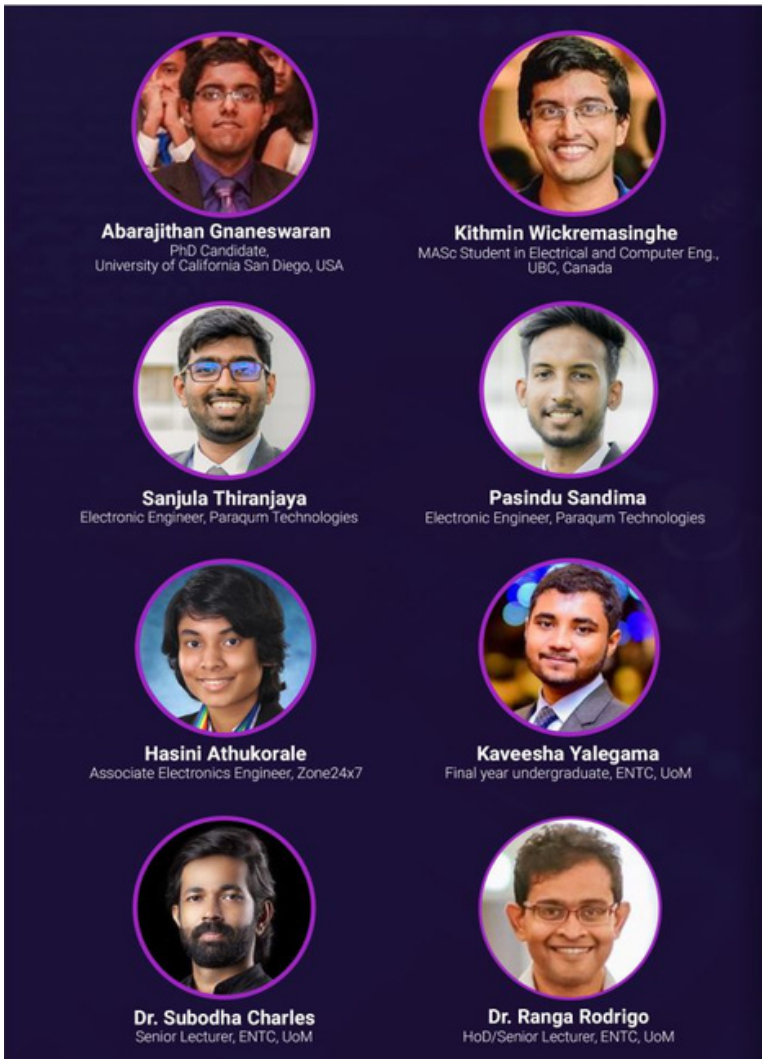
The field of ASIC/FPGA Design and Simulation has seen significant growth in recent years. System Verilog is a hardware description and verification language used for ASIC/FPGA design and simulation. It combines Verilog features with high-level constructs, making writing complex designs and verification codes easier.

Considering the growing demand and future potential in this area, the Department of Electronic and Telecommunication Engineering of the University of Moratuwa has partnered with Skill Surf to offer a short course on “System Verilog for ASIC/FPGA Design and Simulation”. This is an online course held during the weekends. Enthusiasts from all over the country had the chance to get registered for the course till the 19th of January of 2023 and the duration of the course is 8 weeks. No prior experience was strictly required. The course aims to train the participants in skills related to processor design. Though the sessions' mainstream language is English, explanations by other mediums are being carried out upon the participants' requests.

Overall, the short course on System Verilog for ASIC/FPGA Design and Simulation is an excellent opportunity for individuals interested in pursuing a career in the semiconductor industry. It provides a comprehensive understanding of System Verilog and its application in ASIC/FPGA design, simulation and verification, a valuable industry skill.

The course is happening now, completing week 3, and covers various topics, including System Verilog basics, one-bit adders, n-bit adders, and combinational ALU. Participants will also learn about the sequential counter, Functions and Lookup tables, FIR filters, Parallel to serial converter, UART transceiver, matrix-vector multiplier, converting any module AXI stream, the full system (UART+ AXIS+MVM), ASIC flow, and advanced projects. The course includes hands-on exercises and projects to help participants gain practical experience and implement their learnings.

The course is being taught by experienced instructors who have worked in the semiconductor industry and have a deep understanding of SystemVerilog and ASIC/FPGA design and simulation. At the end of the course, participants will have a comprehensive understanding of SystemVerilog and its application in ASIC/FPGA design and simulation.



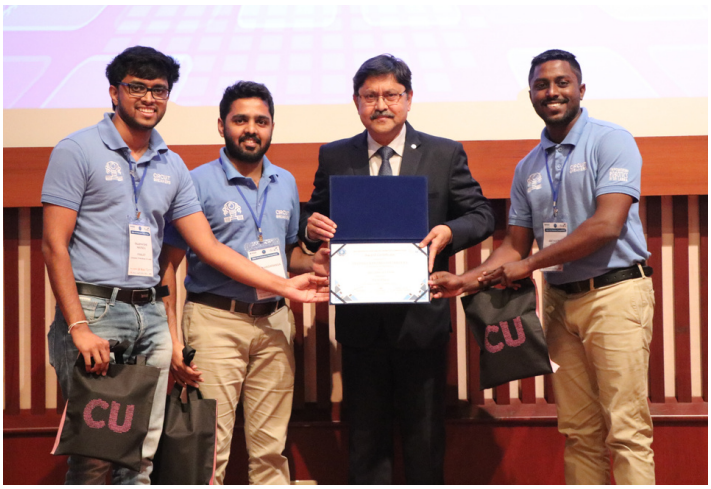
Course Outline:

- Introduction to HDLS, FPGAs, Synthesis, Verification
- Learn SystemVerilog design and simulation through seven digital circuits:
  - 1-bit full adder
  - N-bit full adder
  - Combinational ALU
  - Counter
  - Parallel to Serial Converter (State machine)
  - FIR Filter
  - Matrix-Vector Multiplier
- Best practices, gotchas & more

Team CircuitBreakers
of ENTC Wins the IEEE Region 10 Robotics Competition

by Devindi De Silva

The Department of Electronic and Telecommunication Engineering at the University of Moratuwa is proud to announce the success of Team CircuitBreakers at the IEEE Region 10 Robotics Competition, which was held on the 17th and 18th of December 2022 at the Faculty of Engineering at Chulalongkorn University in Bangkok, Thailand.



The members, Shalutha Rajapakshe, Dilanka Wickramasinghe, Sahan Gurusinghe, and Deepana Ishtaweera, were mentored and supervised by Mr. Bhanuka Silva and Dr. Peshala Jayasekara. The team developed a collaborative quadcopter and hexapod robot system for disaster response missions, where the quadcopter surveys and maps out the disaster environment while detecting victims, and the ground hexapod robot autonomously navigates to deliver medical packs and teleconferences with the victims.

The project was self-funded, with additional support from CSIRO Data 61 in Australia. The main objective of the competition was to raise awareness among young IEEE members about the importance of technology in providing solutions to real-world problems and to encourage creativity and innovation. Team CircuitBreakers' groundbreaking project exemplifies this goal, using cutting-edge robotics technology to address the critical issue of disaster response. Team CircuitBreakers emerged as the winner of the competition, beating out other teams from across the region.

The Department of Electronic and Telecommunication Engineering at the University of Moratuwa is proud of Team CircuitBreakers' achievement and looks forward to seeing their continued success in the field of robotics.

Innovative Project on Self-Driving Technology Wins Multiple Awards at National ICT Awards

by Maleesha Ruvindi

Being reputed for having top-tier innovators, the Department of Electronic and Telecommunication Engineering has achieved numerous awards for its innovations. Some innovations have been exceptional to be awarded more than once. The final year project titled "Road Sign, Traffic Light and Static Object Detection for Self-Driving" won the Student Research Project of the Year Award and the Bronze Award for Tertiary Students Projects (Technology) at the National ICT Awards – NBQSA 2022. The project was also nominated for the APICTA (Asia Pacific ICT Alliance) Awards 2022, which was held in Islamabad, Pakistan, from the 7th to the 11th of December, 2022.

The National Best Quality Software Awards (NBQSA), held by the British Computer Society for the past 24 years, provides recognition for outstanding achievements of individuals and organizations in Sri Lanka in the ICT domain. The Tertiary Students Projects (Technology) Award targets the best technical solutions proposed and implemented by undergraduates. The Student Research Project of the Year Award identifies the undergraduate project with the highest research impact.

The award-winning project focuses on the real-time detection of traffic signs, traffic lights, lanes, and road markings in a resource-constraint environment. The project includes three deep learning-based detection frameworks to cater to this requirement.

The trained detection models have been optimized using TensorRT and integrated to deploy as a complete static object detection system on an embedded system. In addition, two benchmark datasets were created, one for traffic signs and traffic lights and the other for road markings in the Sri Lankan domain. The research contributions of the project were published as three papers in IEEE International Conference on Machine Learning and Applications 2021, the IEEE Computer Vision Foundation Winter Conference on Applications of Computer Vision 2022, and the IEEE IV Symposium 2022.

Honorable Mentions

In addition to the accomplishments highlighted above, there are quite a few achievements that deserve recognition. Team ExpelliCodus consisting of Anuki Pasqual, Supun Kuruppu, and Bimsara Perera, has acquired 1st place in the IEEEXtreme 16.0 Programming Competition at the National level. They have secured a World ranking of 87 among 6376 teams.

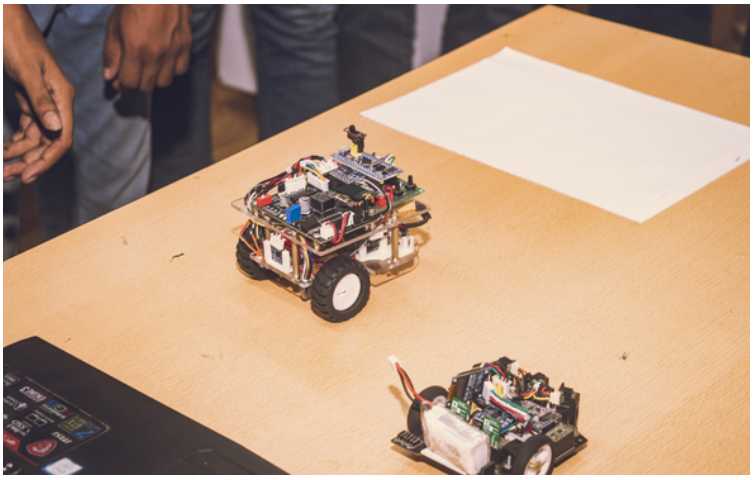
Ahamed S.A.S and Yomali Lokugama have reached the top ten finalists in the Network track - National Level of the Huawei ICT competition 2022-2023, organized by Huawei Technologies Pvt Ltd. They have accomplished 2nd and 7th places, respectively.

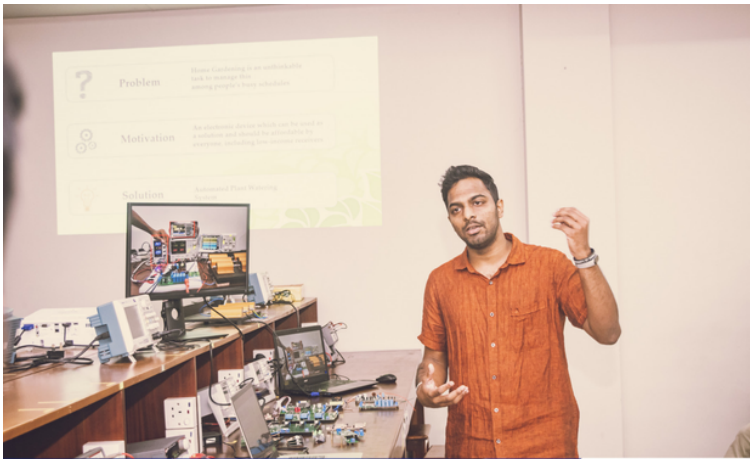
ENTC/BME Open Day: Showcasing Life @ ENTC/BME

by Mithushan Kovintharajan

ENTC/BME Open Day was organized by the Department of Electronic and Telecommunication Engineering as a guide to our first-year undergraduates who will be selecting their preferred engineering field. This event was organized to give insights into the diverse scopes, pathways, job opportunities, and life at ENTC, additionally providing them an opportunity to clarify their doubts and fears regarding the field selection. The event was conducted at the ENTC1 hall on the 17th of January, 2023.
The cherishing event was conducted in two sessions. It began with the welcome speech delivered by the Head of the Department, Dr. Ranga Rodrigo. Then brief introductions about the curriculum of ENTC and BME were provided by Dr. Peshala Jayasekara and Dr. Rohan Munasinghe, respectively. Along with them, our past students also shared their experiences through motivational videos. Dr. Subodha Charles delivered a speech on internships and career opportunities all over the world, which are available to the students of ENTC.

Moreover, students learned about the department's laboratories and were given an opportunity to glance at some of the ongoing final-year projects as well as first-year and second-year projects. They also got hands-on experience in handling some of the equipment available in the laboratories. Throughout the session, students were eager to explore the trending applications related to ENTC/BME. Through those workshops, they also lived life at ENTC. Finally, the event concluded with an eventful, fun Kahoot online game. The winners of the Kahoot session were rewarded with delicious gifts. The Open Day ceremony successfully concluded by noon and nourished the freshers.





Shuttle Fest 2022

Every year, the Department of Electronic and Telecommunication Engineering at the University of Moratuwa organizes ”Shuttle Fest”, an exciting badminton tournament. Through this ceremony, first-year students officially become a part of the ENTC family. With a keen interest in the competition, many academic staff members and students engage in this event.

The Electronic Club of the Electronic and Telecommunication Engineering department organized the shuttle fest, which took place on the 19th of October 2022 at the New Gymnasium building of the university. Teams from the department's 18th, 19th, and 20th batches played against one another for the trophy. With the sounds of the high-speed shuttle, both boys and girls displayed their hidden talents.

The event was held on that gorgeous Wednesday from 1.00 p.m. to 5.00 p.m. The ENTC family cheered on the players as they showcased their special talents. Academic staff members also took part with great enthusiasm and interest. It strengthened the close connection between students and academic staff.

Tronic Premier League 2022

by Venuri Amarasinghe

The Department of Electronic and Telecommunication Engineering, University of Moratuwa, holds its annual cricket tournament, the "Tronic Premier League - TPL" in which teams from all four levels, academic staff, and alumni take part in. Not only the competition itself but also the preparatory period enhances the familial ties within the ENTC family.

Students, faculty members, and graduates from the Department of Electronic and Telecommunication Engineering actively participated in TPL, which was held on the 3rd of November 2022, and was organized by the Electronic Club of the University of Moratuwa. Every minute since the event's commencement at 9.00 a.m. had been packed with cheers and excitement. The day was skillfully planned by ENTC students, including the backdrop design and pitch creation. Both students and academic staff displayed their passion and skills in the field of cricket.

The day was bursting with energy, humor, and excitement, making it an unforgettable juncture of our journey.

Opening of the K.K.Y.W. Perera Mobile Communication Laboratory

by Dhanuja Jayasinghe

The Department of Electronic and Telecommunication Engineering at the University of Moratuwa has passed many milestones in its journey spanning over five decades. The latest milestone was achieved with the opening of the K. K. Y. W. Perera Mobile Communication Laboratory on 12th December 2022. This new addition to the ever-growing research facilities at ENTC is a result of the collaboration of ENTC with SLT-Mobitel and Huawei Technologies.

The communication laboratory was named in honor of Vidyajothi Prof. K. K. Y. W. Perera, the founding Head of the Electronic and Telecommunication Engineering Department and the current chancellor of the University of Moratuwa. Vidyajothi Prof. K. K. Y. W. Perera himself graced the occasion with his presence reconnecting everyone to the rich legacy of ENTC. The ceremonial opening was attended by a number of university officials, including the Vice-Chancellor, Prof. N. D. Gunawardena, the Deputy Vice-Chancellor, Prof. D. P. Chandrasekara, and the Acting Dean of the Faculty of Engineering, Prof. Asoka Perera.

As partners in this collaborative effort, officials representing SLT-Mobitel and Huawei Technologies attended the ceremony. The representatives from SLT-Mobitel were the CTO of Mobitel (Pvt.) Ltd., Mr. Rasantha Hettithanthrige, who pioneered the establishment of this research facility, Mr. Raveendra Manawadu, as well as Mr. Rohan Fernando, Chairman of SLT-Mobitel, Mr. Lalith Mohan Seneviratne, Group Chief Executive Officer of SLT-Mobitel, Mr. Janaka Abeysinghe, Chief Executive Officer of Sri Lanka Telecom, Mr. Chandika Vitharana, Chief Executive Officer of Mobitel (Pvt.) Ltd., Mr. Saman Abeysekera, Chief Operating Officer of Sri Lanka Telecom, Mr. Prabhath Dahanayake, Chief Marketing Officer of Sri Lanka Telecom, Mr. Sudharshana Geeganage, Chief Financial Officer of Mobitel (Pvt.) Ltd., and Mr. Saman Perera, Group Chief Information Officer of SLT-Mobitel. From Huawei Sri Lanka, Mr. Tony Lee, Chief Technology Officer, Mr. Indika De Zoysa, Strategic Advisor, and Mr. Nadun Gunawardena graced the occasion with their presence. Student representatives, including the president of the Electronic Club and four student network administrators, were also present at the occasion.

One of the main goals of establishing the mobile communication laboratory was to facilitate the teaching of wireless communication and telecommunication core networks by giving hands-on experience at both the undergraduate and graduate levels. This will ensure that the students are equipped with theoretical knowledge and experience with state-of-the-art technology as they enter the telecommunication industry. The laboratory will be an ideal place for students to experiment with real-world applications and the latest technologies to gain knowledge in the field of mobile communications. Apart from teaching, the laboratory will undoubtedly become an invaluable resource for numerous research activities conducted in the department.

The establishment of the K. K. Y. W. Perera Mobile Communications Laboratory is a major landmark in the journey of ENTC, which will bear its fruits for a long time to come. The department and the university community eagerly await the fruits of this collective endeavor to advance ENTC as the frontier of telecommunication technology. Special thanks go to Dr. Jayathu Samarawickrama for coordinating the establishment of the laboratory on behalf of the department.

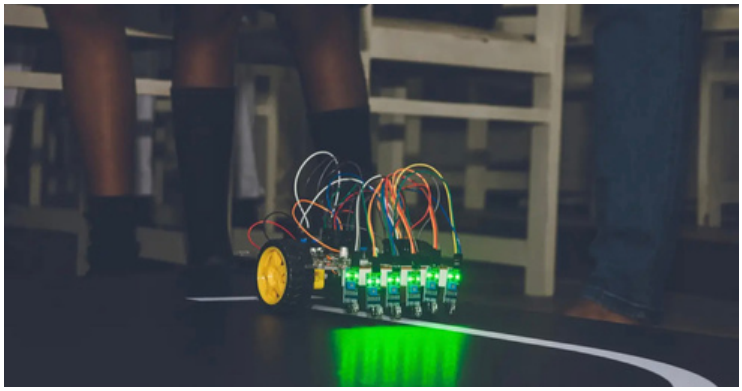
SLRC 22 - An Attempt to Empower Sri Lanka's Robotics Literacy

by Dulini Himeka

The Sri Lanka Robotics Challenge 2022 is an exhilarating event that brings together youthful inventors from all parts of the country to showcase their ingenuity and skills. This event serves not only as a competition but also as an opportunity to learn, improve, and foster one's interest in robotics.

The SLRC workshop series had two main parts. Firstly, a school workshop series was held over two months from mid-October to early December to ignite a passion for robotics in school children. It consisted of eight interactive workshops, seven of which were held virtually. Those workshops provided the school students the hands-on A-Z experience in robot development. More than 500 school students from all over the country participated in these workshops. Participants were guided through the process of designing and building a simple line-following robot from scratch, and their progress was assessed through quizzes.

The final workshop, the last among eight workshops, was held at the Electronic and Telecommunication Engineering department on 7th December last year. The purpose was to give the school children some exposure to the department and some hands-on experience in robotics. They were given a chance to visit laboratories, familiarize themselves with the lab equipment and observe the impressive projects carried out by ENTC undergraduates.



Next, a virtual advanced robotics workshop was held on 28th January 2023 for university robotics enthusiasts who are interested in learning advanced techniques in robot design and algorithm development. About 200 participants, including some foreigners, attended the workshop, which delved into Robot Operating Systems.

All the recordings of the workshop series were uploaded onto the Sri Lanka Robotics Challenge's YouTube channel. Each video has received over 100 views, which is a remarkable achievement.

The motive of the workshops was to make the participants gain practical experience and knowledge in the field of robotics in order to build their capacity and confidence as young innovators. In addition to providing technical knowledge and skills, the workshops also stimulated creativity and problem-solving. Participants were always encouraged to think outside the box and come up with innovative solutions for the challenges they faced. They learned how to work collaboratively and communicate effectively, which are essential skills for success in any field.

The Sri Lanka Robotics Challenge workshops are an important part of the competition, providing a valuable platform for young people to learn, grow, and develop their passion for robotics. The organizers are looking forward to witnessing how the participants apply what they have learned and their own skills at the SLRC 22/23 competition, which will ultimately contribute to the growth of the robotics industry in Sri Lanka.

Novel Hardware Accelerated Imaging Cytometry Modality Using Diffractive Deep Neural Networks

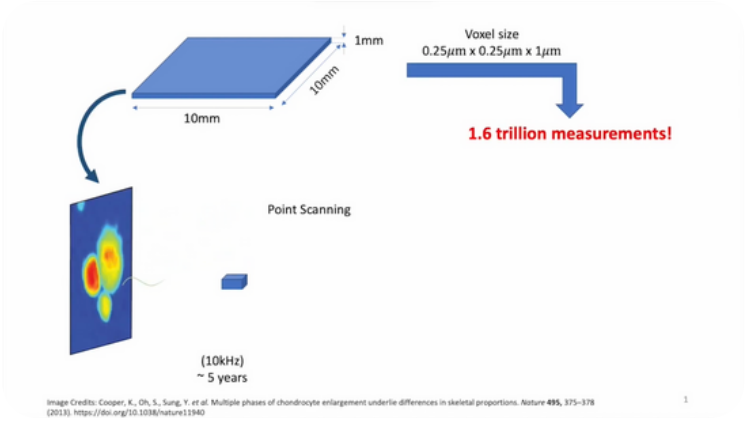
by Chamith Dilshan

The ability to visualize live cells is of utmost significance as it paves the way for numerous breakthroughs in fields such as drug discovery, cancer diagnostics, cellular signalling, genomics, and more. Therefore, advancements in live cell imaging techniques have the potential to greatly benefit humankind. Among the various microscopic methods, one promising technique is Quantitative Phase Imaging, which enables the visualization of live cells with high accuracy and precision.

In a cell illuminated by a single-colour light source, we can observe changes in the intensity and the phase of the light. While the light intensity emitted by the cell contains some information about the cell, it is difficult to discern important details about the cell morphology due to the low contrast of this information. On the other hand, the phase of the light emitted by the cell provides high-contrast details on the cell, making it more helpful to biologists than the low-contrast light intensity. This approach of quantitatively capturing high-contrast phase information about cells is known as quantitative phase imaging.

New research in this domain was carried out by a group of undergraduates as their final-year project. The team consists of Udith Haputhanthri, Kithmini Herath, Ramith Hettiarachchi, Hasindu Kariyawasam, and Dr Chamira U.S. Edussooriya as the supervisor.

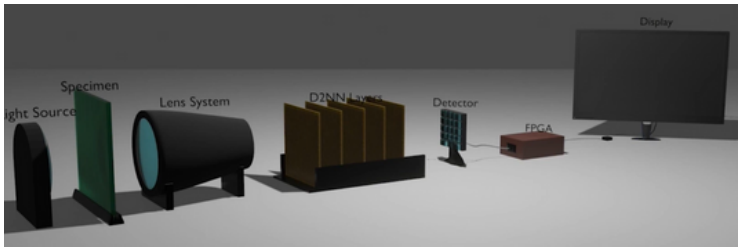
A tiny cell cube sample can be scanned in less amount of time using wide-field scanning. However, the amount of data generated requires significant storage and time to process the sample, so compression is necessary. If we could create a system that optically compresses the data, we could capture the information in minutes and solve the storage issue. The proposed method involves illuminating the sample with a light source and using a diffractive deep neural network to modulate the incoming light waves.



Each network layer contains optical neurons that capture phase information by adjusting the transmission coefficients. The output is optically compressed, and the intensity is captured by a detector. The feature maps are sent to a field-programmable gate array (FPGA) for accelerated reconstruction. This can then observe a high-contrast phase image of the sample. Their simulations show that this method is 64 times faster than traditional point scanning and produces a reconstruction quality of 0.860 to ssim and 27.24 psnr. Additionally, this new method is resistant to real-world detector noise.

The project was supported by a principal investigator at Harvard University, who provided guidance and feedback throughout the entire process. With their expertise, the project team was able to navigate through the complexities of the research process and achieve significant milestones. The university provided patent application support, enabling the team to protect their intellectual property and secure funding for further development. Additionally, the cutting-edge technology and equipment available at Harvard allowed the team to carry out experiments and analyses that would have been impossible otherwise. The collaboration opportunities with other experts and researchers at Harvard also facilitated the exchange of ideas and contributed to the project's overall success.
Finally, the computing power of GPUs provided by Harvard proved to be an essential asset for the project team, allowing them to run complex simulations and analyses quickly and efficiently. This enabled the team to identify and address issues in real-time, and make rapid progress towards their goals.

Overall, Harvard University's support was crucial to the project's success, and the team is grateful for the university's resources, collaborations, and expertise.



HARVARD UNIVERSITY

Collaborative Ground-Aerial Multi-Robot System for Disaster Response Missions

by Shalutha Rajapakshe

The world is currently facing a plethora of natural and man-made disasters, resulting in significant damage to infrastructure and loss of human lives. The need for immediate and effective responses to such situations cannot be overstated, as every moment counts. To address this challenge, a group of final-year students from the Department of Electronic and Telecommunication Engineering, under the supervision of Dr. Peshala Jayaseka and Mr. Bhanuka Silva, collaborated with the CSIRO Data61 Robotics and Autonomous Systems group in Brisbane, Australia. Together, they developed a system to optimize disaster response by utilizing both aerial and ground robots.

The system employs an aerial robot, equipped with a custom add-on, to explore and map an environment, while identifying targets or human victims. The ground robot then uses this map to autonomously reach the targets, inspect and interact with them, and deliver medical packs. This approach is scalable and adaptable to a wide range of different aerial robots, as the team has developed a cost-effective hardware add-on equipped with essential sensory devices. The team has conducted tests and evaluations in a custom-built indoor disaster environment and plans to extend the solution to include multi-robot mapping and exploration. Additionally, this project emerged as the Champions of the IEEE Region 10 Robotics competition held in Bangkok, Thailand in 2022.

The CSIRO Data61 Robotics and Autonomous Systems group played a significant role in providing essential resources, including the expertise of research personnel such as Dr. Navinda Kottege, Eng Paul Flick, and Eng Nick Panitz, and equipment, among others. This team, including Dr. Navinda Kottege from CSIRO, was also the silver award winner at the DARPA Subterranean Challenge held in 2021.

CSIRO Data61 Robotics and Autonomous Systems group is a leading research team that develops cutting-edge technologies for robotics and autonomous systems. Their research areas include machine learning, computer vision, navigation and control, and human-robot interaction. They have a proven track record of successful projects, including advanced robots for industrial applications and autonomous vehicles for transport and logistics. Their work aims to create innovative solutions that can address real-world challenges and make a positive impact on society.

Introduction to Quantum Computing Full-Day Workshop

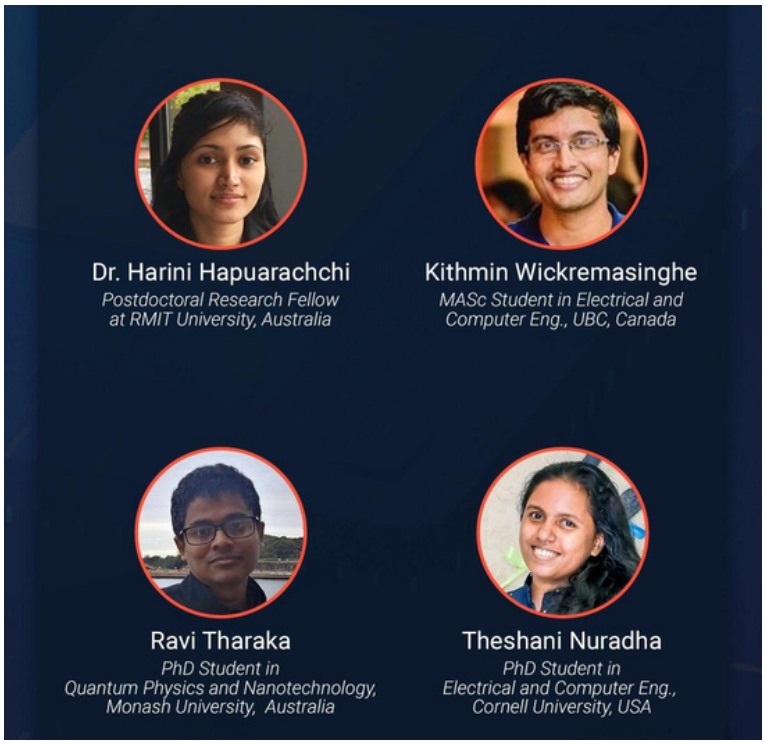
by Hiruna Vishwamith

Quantum computing has the potential to revolutionize many fields by providing massive computational power that is far beyond the reach of classical computers. Some key areas where quantum computing can make a significant impact are Cryptography, Drug Discovery, Optimization, Artificial Intelligence, and Climate Modeling. Despite these promising applications, building and operating quantum computers is still a major technical challenge, and current quantum computers are relatively small and error-prone. Nonetheless, research in quantum computing is advancing rapidly, and many experts believe that practical and scalable quantum computers may be developed in the coming decades. Given the potential of quantum computing to transform various fields of science and technology, it is widely regarded as a significant opportunity for innovation and progress.

In line with this, the Department of Electronic and Telecommunication Engineering at the University of Moratuwa, in collaboration with the Quantum Club of the University of British Columbia, organized a webinar on the 21st of January, 2023, centered on the topic of quantum computing. This event was expected to provide a platform for experts and enthusiasts to discuss the latest developments, emerging trends, and potential applications of quantum computing in various fields. The success of this webinar can be largely attributed to the contributions of the distinguished speakers who presented at the event. Dr. Harini Hapuarachchi, Mr. Kithmin Wickremasinghe, Dr. Ravi Tharaka, and Ms. Theshani Nuradha delivered highly informative and engaging talks on various aspects of quantum computing, which were well-received by the attendees. The positive feedback received from the participants is a testament to the quality of the presentations, the relevance of the topics covered, and the effectiveness of the event in fostering knowledge sharing and disseminating information on quantum computing, which is poised to contribute significantly to research, development, and industrial practices.

Moreover, the speakers provided valuable insights into the latest developments and future directions of quantum computing. The speakers offered their perspectives on the challenges and opportunities of the field, the potential impact of quantum computing on various domains and the strategies for building a vibrant and sustainable ecosystem for quantum computing research and development.

Notably, the webinar covered many important topics related to quantum computing. Specifically, the event introduced quantum gates, circuits, and computing, explored the concept of quantum bits using linear algebra, demonstrated quantum principles using polarized lights, and offered a QISKIT-based hands-on notebook session. These topics were intended to provide a comprehensive overview of quantum computing, from fundamental principles to practical applications, and equip attendees with the knowledge and skills necessary to engage with this emerging field. The diverse range of topics covered in the webinar is expected to foster a deeper understanding of quantum computing and its potential to drive innovation in various science and technology domains. Also, the event has paved the way for further engagement with this rapidly advancing field. As quantum computing continues to evolve and expand, events such as these will play an increasingly vital role in educating and empowering individuals to harness the full potential of this powerful technology.



Workshop Outline:

Session 1

- Welcome Keynote speech
- Introduction to Quantum Computing
- Quantum Mechanics and the postulates: The idea of Quantum Bits using Linear Algebra
- Quantum Gates and Circuits

Session 2

- Demonstration of Quantum principles using Polarization of Light
- QISKIT based hands-on notebook session
  - Quantum Gates and Circuits
  - Solving the Deutsch oracle problem: the simplest problem where a quantum computer outperforms classical methods
  - Quantum entanglement and Teleportation: the Nobel prize in Physics 2022

To Ignite a Spark: A Look at the Groundbreaking Work of the Spark Team

by Sanjana Kapukotuwa

The 2nd iteration of the SPARK challenge marked its beginning on the 22nd of September, 2022. Having witnessed the grandeur of last year's Spark Challenge, the undergraduates of the 20th batch in the Department of Electronic and Telecommunication Engineering seemed so motivated to take part in this that some had already formed their teams in secrecy even before the commencement of stage 1.

The first workshop was successfully held with the participation of around 100 undergraduates, where they were taught how to identify one's strengths and weaknesses. They were assigned to complete and submit a canvas about themselves as the first activity. Then the next workshop of stage 1 was held on the 25th of October 2022 at the ENTC1 hall. This was more of a fun activity session, and the teams had to take part in a game where they were taught the importance of individual contribution in teamwork. Later, the teams filled their team canvas and were given a chance to introduce their teams to the audience.

The teams then proceeded to the 2nd stage of the Spark Challenge. There, they were instructed to select their areas of interest and to build a mind map that would lead to unsolved problems in those fields. The winners of last year's Spark Challenge gave valuable advice as well as some tips & tricks for effective mind mapping. In the 3rd stage, the participants were asked to dig deeper into the problems and to identify their root causes. The problem investigation canvas was supplied as an aid to make this task easier. The 4th stage of the challenge will commence in the near future.

The Spark Challenge is not merely the work of a few people. Many resource personnel have helped and are willing to help the blooming young entrepreneurs of our department. Dr. Subodha Charles, a senior lecturer at the Department of Electronic and Telecommunication Engineering, is one such person who conducted a workshop about his own experience in starting a business during his undergraduate period. Mr. Kalana Jayalath, a final year undergraduate at ENTC, also shared the story of Curacell Innovations, a startup that was initiated as a result of a small conversation between a bunch of friends. Both of them emphasized the value of the Spark Programme, where students are guided on the correct path of generating new ideas because they hadn't been able to obtain that knowledge back in the days when they were launching their startups. Another invaluable session was conducted by Dr. Sugath Yalegama, Director General of the Sustainable Development Council of Sri Lanka, on the significance of sustainable development goals. It was held on the 16th of November 2022 at the ENTC1 hall with 107 participants. We at ENTC are forever thankful for their support.

PiMora is a series of workshops organized by the Electronic club and powered by the Spark team parallel to the Spark Challenge. The first workshop of this season, PiMora 2.1 was held on the 24th and 25th of September 2022 at the ENTC1 hall. It featured the topic "Ethical hacking" and was conducted by Mr. Yasiru Senarath, a 19th-batch undergraduate at ENTC. Following its success, Pi Mora 2.2 workshop, conducted by Mr. Bimalka Piyaruwan, a final year undergraduate at ENTC on Computer Vision, was held on the 13th of December 2022 at the ENTC1 hall. Both these workshops were delivered in a hybrid mode, both physically and virtually. The Spark team extends their gratitude towards all the wonderful and kind people who have helped in making these programs successful.
The Spark Challenge is not a day's work. It is a year-long project which guides its participants step by step toward novel innovations with the potential to make a big impact. The Spark team encourages you to take part in this program since it is a once in a lifetime opportunity. Await more updates in the future.

by Sasini Wanigathunga

Dr. Sampath Perera

Dr. M. T. U. Sampath K. Perera is currently a Lecturer in the Department of Electronic and Telecommunication Engineering at the University of Moratuwa. He received his B.Sc. Eng. degree in Electronic and Telecommunication Engineering (first class honors) from the University of Moratuwa, Sri Lanka, in 2008 and the Master in Engineering Science (MESc) degree in Electrical and Computer Engineering from the University of Western Ontario, Canada, in 2016.

In 2022, he obtained his Ph.D. in Electrical Engineering and Information Technology from Ruhr-University Bochum, Germany. His Ph.D. dissertation was on the topic "Low-Rank plus Sparse Minimization and Supervised Learning Concepts for Wireless Sensing-based Object Identification". During his Ph.D., he worked on a research project in mobile material characterization and localization by electromagnetic sensing (MARIE). His research interests include radar signal processing, remote sensing, sparse signal processing, compressive sensing, machine learning, dictionary learning, and material characterization.

Dr. Sampath has published in several top conferences and journals during his time in academia, covering multiple areas such as wireless RF sensing, signal processing, compressive sensing, dielectric materials characterization, clutter suppression, algorithm unrolling, dictionary learning, machine learning techniques for intrusion detection, and Terahertz Time-Domain Spectroscopy (THz-TDS) distortion compensation.

He gathered industry experiences after he graduated from the University of Moratuwa, as an Associate Customer Engineer at DMS Electronics (Pvt) Ltd and as an Engineer at Mobitel (Pvt) Ltd from 2008 to 2010 and 2010 to 2014, respectively. He has a diverse range of teaching experience as a Lecturer in the Division of Electrical, Electronic & Telecommunication Engineering Technology, Institute of Technology, University of Moratuwa, Sri Lanka. In addition, he served as a Teaching Assistant in the Department of Electrical and Computer Engineering at the University of Western Ontario, Canada, and at the Institute for Digital Communications Systems, Ruhr-University Bochum, Bochum, Germany.

Dr. Sampath Perera has demonstrated a remarkable blend of academic excellence and industry experience throughout his career. We wish him the best in his future as a lecturer in the department, where he can continue to inspire and shape the minds of young engineers and contribute to the development of the field of Electronic and Telecommunication Engineering.

by Dhanuja Jayasinghe

Prof. Rohan Munasinghe

Professor Rohan Munsinghe is a distinguished professor at the Department of Electronic and Telecommunication Engineering at the University of Moratuwa. He received both his Master of Engineering and PhD degrees from the Saga National University, Japan with his doctoral dissertation focusing on Advanced System Control.

Professor Munasinghe joined ENTC back in 2005 and he has done a tremendous service to the department as a professor, a researcher and as the Head of the Department during his tenure of 3 years, starting from 2015. He also has academic affiliations with Cornell University, New York as a visiting fellow.

His research interests are in the fields of robotics, control theory, drones and UAVs, telerobotics, intelligent control, smart agriculture, just to mention a few. In fact, his expertise in the domain of robotics, UAVs and control theory has made him a go-to expert in the country for problems related to those areas. In addition, he has taken interest in the fields of wildlife and astronomy. He has publications in several prestigious international journals and magazines such as IEEE Transactions on Mechatronics and IEEE Robotics & Automation Magazine. Also his publications have appeared in multiple IEEE International Conferences on Information and Automation for Sustainability.

Apart from conducting lectures for undergraduate and graduate programs, he is currently heading the Intelligent Systems Research group at ENTC, which conducts research in multiple domains including UAVs, self-driving cars, traffic monitoring and other intelligent systems related areas. The knowledge and expertise of individuals like Prof. Munasinghe will ensure the future of ENTC as a leading centre for research and technology.

Dr. Mewan Gunawardena

Dr. Mevan Gunawardena is a senior lecturer at the Department of Electronic and Telecommunication Engineering at the University of Moratuwa who is also an alumnus of the department. He received his PhD in Electrical and Computer Engineering from Purdue University, Indiana, USA. The area of focus in his PhD was on Quantum Control.

He joined the department in 2013 as a senior lecturer where he has become an indispensable member of the academic staff. In addition, he has worked as an associate professor at the Stonehill College, Massachusetts and as a research fellow at the Williams College, Massachusetts during his stay in the US.

He has research interests in the areas of quantum optics, optical engineering, quantum computational algorithms, signal processing and he has published several papers and review letters related to these domains. His expertise is invaluable to ENTC because he is among a very few people who have expertise overlapping the areas of engineering and theoretical physics.

Dr. Gunawardena is engaged in conducting lectures in undergraduate courses related to electromagnetics, electronic devices and microwave engineering. In addition, he is also coordinating the final year projects. In 2022, he took the initiative to form a special interest group on Quantum Mechanics with a focus on Quantum Computing to prepare the undergraduates to this fast emerging field of technology which will undoubtedly change the future of digital computing.

The Department of Electronic and Telecommunication Engineering continues to thrive as a leading center for research and technical expertise because of the presence of resourceful individuals like Dr. Gunawardena.

by Namina Wijethunga

Mr. Deepana Ishtaweera

**"It is always about the impact you make than the achievements you collect. When you create impact, the achievement will follow.
Never forget to be humble and open-minded."**

According to well-known mathematics, 1+1 is equal to 2. But Mr. Deepana Ishtaweera from the 17th batch of the Department of Electronic and Telecommunication Engineering says 1+1 > 2. According to him, little things add up to big things, and even little things you do, matter a lot.

Being passionate about robotics, Mr. Deepana Ishtaweeera was an allrounder in the department. Apart from being in the **Dean's List** in all eight semesters, he has obtained the highest CGPA of 4.15 out of 4.2 in the department and has become the batch top. He has got a 4.2 SGPA in 3 semesters as well. He has received the **Gold Medal** for "The Most Outstanding Graduand of Faculty of Engineering" and the **UNESCO Gold Medal** for the "Best Academic Performance of the University of Moratuwa" for his excellent academic performance.

Marking a remarkable milestone, he entered the University of Sydney as a visiting student researcher under Assistant Professor Dr. Anusha Withana. He had published a paper titled "*So Predictable*! *Continuous 3D Hand Trajectory Prediction in Virtual Reality*" at ACM UIST'21, a top-tier conference in Human-Computer Interaction. His final year project was on "*Collaborative Ground-Aerial Multi-Robot System for Disaster Response Missions*" under the supervision of Dr. Peshala Jayasekara with the backing of CSIRO Data 61 Group (Winners of DARPA SubTerrain Challenge).

He was a proud member of "Team CiruitBreakers", a well-known team back in his undergraduate time, who won many robotics competitions, including SLRC, IEEE IAS Student Robotics Contest, IEEE R10 Robotics Contest, International Micromouse Competition by IIT Bombay, and he continued that legacy into founding **CircuitBreakers Robotics (Pvt) Ltd**. His team, "Team CodeBreakers" has achieved many awards in hackathons and coding competitions, including IEEEXtreme and MoraExtreme. He was the **Co-founder of IXD Labs (Pvt) Ltd**, a software company that creates digital products as a value addition for businesses. Apart from holding many positions at **IEEE IES** Student branch chapter of the University of Moratuwa, he was an active member of Moratuwa Toastmasters club and in AIESEC Colombo South.

Being an inspiration and a motivation to every undergraduate, Mr. Deepana Ishtaweera is a remarkable and proud graduate of the Department of Electronic and Telecommunication Engineering of the University of Moratuwa. The ENTC family wishes Mr. Deepana strength and courage for a bright future and wishes him the best of luck.

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Dr. Ranga Rodrigo
Head of the Department

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Staff Editor-in-Chief

Dr. Samiru Gayan
Coordinator - ENTC Alumni Connect

Hasindri Watawana
Student Editor-in-Chief

Thanushan Kamalakkannan
Student Editor-in-Chief

Maleesha Ruvindi
Student Editor-in-Chief

Saeedha Nazar
Student Editor-in-Chief

Vidura Karunarathna
Head of Public Relations

Heshani Munasinghe
Head of External Relations

Seniru Dissanayake
Media Coordinator

Ravidu Munasinghe
Design Coordinator

Pahansith Tharuka
Designer

Subitson Croos
Designer

Authors

Ishani Anushka
Oshan Yalegama
Vishagar Arunan
Hansa Marasinghe
Subitson Croos
Devindi De Silva
Maleesha Ruvindi
Venuri Amarasinghe
Dhanuja Jayasinghe
Mithushan Kovintharajan
Dulini Himeka
Chamith Dilshan
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“There is something special when creative people get together.”

- JOY MANGANO -