MARCH 2025
ISSN 2989-0470 (ONLINE)
ISSN 2012-7111 (PRINT)

E CARRIER

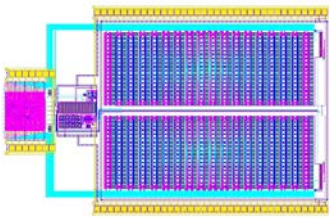
THE OFFICIAL MAGAZINE OF ENTC

ENTC
Electronic and Telecommunication Engineering


Champions
SPARK
CHAMPION
LKR 600,000
ENTC
Electronic and Telecommunication Engineering
UNIVERSITY CATEGORY
CHAMPIONS

CONTENTS

TECHNICAL

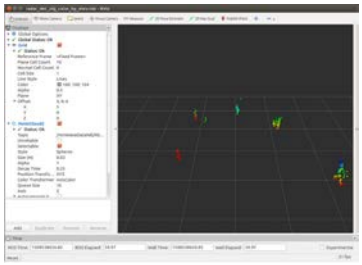


OSIC DESIGN TOOLCHAIN AND AFFORDABLE CHIP TAPEOUTS

Jump in to the exciting world of Analog IC design with open-source toolchains, enabling accessible and efficient chip development.

MMWAVE SENSORS IN NEXT-GEN APPLICATIONS

Explore novel mmWave FMCW radar sensors for high-resolution, real-time detection in automotive and industrial applications.



NEWS

AN INSIDE LOOK AT SLRC

Delve into the creative process of Odil and Kiran, the architects behind SLRC, as they share their insights, experiences, and invaluable tips for succeeding in the world of robotics competitions.

E-CARE 2024

Get to know about the E-Club's annual charity event, which empowered students through education, donations, and renovations, fostering lasting community impact.

SPOTLIGHT

CELEBRATING EXCEPTIONAL TALENT

" Dedicate your brain to what your heart truly desires, because the impossible becomes possible only when your heart and brain are in synchrony. "

Mr. Kulendra Janaka

by Chathura Weerasinghe

Mr. Kulendra Janaka (KJ), a proud alumnus of the Department of Electronic and Telecommunication Engineering (ENTC), currently leads as the Head of Product Management and Business Analysis at LSEG. With an impressive career spanning over 18 years, he has been instrumental in shaping financial technology solutions, including his contributions to the transformation of the London Stock Exchange's trading system. His wealth of experience and deep industry knowledge will provide valuable perspectives on fintech, product strategy, and leadership. Let's get started!

Can you start by introducing yourself and giving us an overview of your role as the Head of Product Management and Business Analysis at LSEG?

I'm Kulendra Janaka, but most people call me KJ. I am the Head of Product Management and Business Analysis at LSEG. In our team, product management and business analysis are closely integrated into a unified function. We have around 70 business analysts and product managers whose primary responsibilities include working and collaborating within LSEG and providing software for our external/third-party clients. Their role involves gathering requirements, pitching and enhancing our products, and overseeing and helping with the overall implementation to ensure they align with business needs and deliver optimal value.

Your career journey has been extensive, with significant milestones and transitions. Can you walk us through how you started in the industry, the key roles you've taken on, and how you progressed to becoming the Head of Product Management and Business Analysis at LSEG?

I've been a career business analyst. I started after my internship, with what is now known as MillenniumIT ESP as a sysadmin. That is where I got a feel about working with customers and providing them with solutions. I am very thankful that MIT thought of giving me a chance to directly work with the customers even though I was an intern. After my degree I joined MillenniumIT, the software branch, as a business analyst in late 2006 and worked there for about eight years. During that time, I worked on many projects, starting off with a US interdealer-broker, LSE as well as a few more regulated exchanges. To bring an important point to note, the current trading system in use at the London Stock Exchange was actually developed by Sri Lankans from here, and I am very proud to have been part of that transition around 2010. I continued my role there until about 2015. That is where I learned most about building products for financial markets,. Then I moved to hSenid Business Solutions for a different kind of role, as their Chief Operating Officer and stayed there for about one and a half years.
In mid 2016, I rejoined LSEG , for the role of Chief Product owner, which is essentially a product owner for other product owners. The project/product implementation we had was so big (nearly 120 people working) that we needed that kind of a hierarchy. Both the COO role at hSenid as well as the Chief Product Owner role at LSEG helped me to understand what it is to operate at scale. A couple of years later, I moved into product management, and now I'm heading the Product Management and Business Analysis team.

Let's go back to your university days. Can you share your experience navigating this academic phase, how you decided on your field of study, and how those early experiences influenced your career path?

Sure, I'd be happy to. I was actually part of the first few batches after the A/L syllabus changed from Pure and Applied Maths to Combined Maths (if I remember the second batch). Honestly, I never really believed I'd make it to University of Moratuwa. I thought even if I did get in, it would be difficult for me to get into Computer Science or Electronics since I thought I'd only be ranked around 600 to 650. But somehow, I got into Moratuwa and even had the option to choose my field.Of course I am now working in the software field, but I think those things that I learned in the Electronics degree really helped, especially when it comes to systematic thinking and system designing.

Throughout your career, you've made significant transitions, notably into financial technologies. Was there a turning point or a pivotal moment that solidified your passion for product management in this field?

Honestly, I've never really been into that idea of a fixed, all-consuming passion. It seems a bit overrated these days. Back then, we didn't have all the social media hype about having a passion from the start. For me it was much more simple, I knew that while I did ENTC, telecommunications wasn't my forte. Something like radar/recon or electronic system design would have worked but we didn't have a lot of openings like that in Sri Lanka those days. On the other hand what drove me to being a sysadmin for my internship was that I was able to get solutions to people by being the person between technology and customers. When the interviews from the same company opened up in the software side of their business, I just went for it. I liked what I was doing there and started exploring what things are there for me to do, that's how I ended up being a product

manager.So throughout my career, what was important to me was to feel that I was doing something useful and value adding, that I guess you could say what my passion was.

There's a common belief that software jobs come with high levels of stress and long working hours. Based on your experience, how do you perceive work-related stress in the software industry, and how do you personally approach work-life balance?

A lot of people say that software jobs are extremely stressful. I've also had stretches where I barely got five hours of sleep. But I see that as more of physical stress than something to do about work-life balance. The reason I say that is this, even at that point, I had never felt this is enough and I should start looking elsewhere. I have done that when I was bored out of my work, never because of having work.

One reason I see work that way is probably because I love the work I do. I have a good set of friends at work who keep me intellectually stimulated. We have discussions about interesting things we do at work even when we have lunch. That's a very normal thing for us and we want to share what we do because we like that work. Then sometimes they turn up with answers to the problems we are trying to solve; because they would explain how they solved similar problems. So for us we never really turn off from work. I mean if you are an analyst, can you actually turn off from analyzing?

So I don't view work and life as opposites on a single scale; instead, I think of them as two different dimensions. You can have a lot of work at hand and still enjoy life if you like the work you do.

But having said that, that is me. That is how life has worked out for me and it doesn't mean that you need to look at life the same way. So if you feel that your work is affecting your life, relationships and that you are having health or other problems, you should look for different options. There is no reason why someone else not having a work-life balance problem automatically means it shouldn't be a problem to you.

The role of a BA is often seen as ambiguous compared to more defined roles in software development, such as developers. how would you describe its true scope and complexity?

Yes, the Business Analysis role can be a bit of a mystery. If you consider software development, there's now a reasonably good understanding of the depth and breadth you can achieve in that field. For example, you might work as a full stack developer, which covers a lot of technologies to some-level of depth, or you could become a specialist in a certain technology or framework, with a lot of depth but only in that area. People generally know when you say that you are a full-stack developer or a front-end or a back-end developer what you can do.

However, the business analyst role varies significantly across companies. If you are in a product based company vs. a services based company the roles might be different. In a product based company a BA will spend a lot of time on research and analysis on the product and the domain itself while in a services based company that domain expertise will most likely be with the client.

The BA's role in that type of an operation would be to ensure that best practices are followed so that that expertise flows down to the development and testing teams. In a product based company, the BA role is literally the proxy to the product manager and a lot of time needs to be spent gaining that domain expertise. So what you do as a BA can vary a lot depending on what type of a company you work for.

But at the end of the day, a business analyst is a person who is sitting between the client and the internal team. Their role is to ensure smooth flow of information, be a proxy of the client to the internal team and be the person the client can rely on to ensure they get what they want.

Looking back at your own undergraduate days, what is one piece of advice you would give yourself regarding the skills to focus on developing outside of the technical coursework?

One of the things I've realized is that being able to work with people is an important factor in a career. By this, I don't mean just playing along to survive in the workplace—I mean actually being able to collaborate with others.

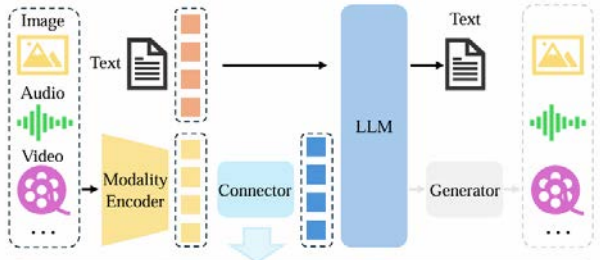
You can be really brilliant, but if you can't work with a team, your output will always be limited to just your individual brilliance. Others won't be able to build upon your ideas, and the overall impact will be smaller. Additionally, not everyone in a team has the same skill level. People bring different perspectives and strengths, so what you consider an important skill may not necessarily be what another person contributes. However, their skills are still crucial for the team to function effectively.

It's essential to understand that teams are made up of different people with different skills, and being able to work in such an environment is what truly matters. Now, a clarification: this doesn't mean that underperforming individuals should just be allowed to "hang on" without contributing. Rather, it means actively working together to build a stronger team. If someone isn't contributing at all, that issue should be addressed through discussion and problem-solving. However, it's also important to recognize that their contribution might not look the same as yours, and that's okay as long as it benefits the team as a whole.

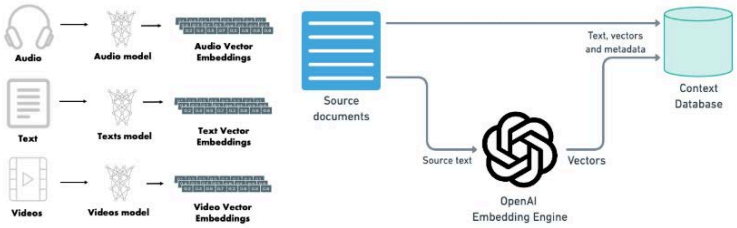
Beyond Vector Spaces: Understanding the True Scope of AI

by Hasitha Gallella

Artificial Intelligence is fundamentally built upon vector spaces, embeddings, and tokenized representations. While vector-based operations enable efficient computation, AI is much more than just vector spaces. Modern **Multimodal Large Language Models (MLLMs)** integrate embeddings of vision, audio, and text, making them capable of understanding and generating data across multiple domains. This article explores how embeddings, tokens, and feature extractors form the foundation of AI models like **ChatGPT, DeepSeek, LLaMA, LLaVA,** and **OpenVLA** while discussing the **JEPA-type learning frameworks** that enhance AI's reasoning and adaptability for the future.



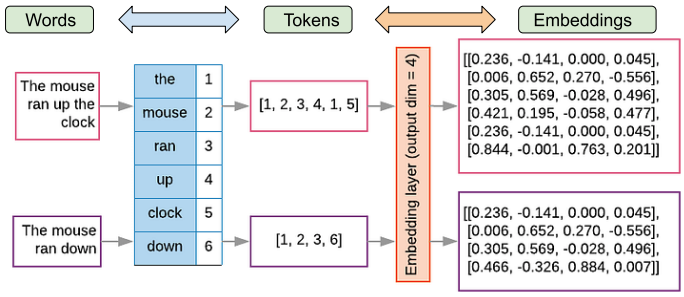
Source: A Survey on Multimodal Large Language Models, Yin et al. (2024)



Models like ChatGPT first convert all data types into feature vectors (embeddings).

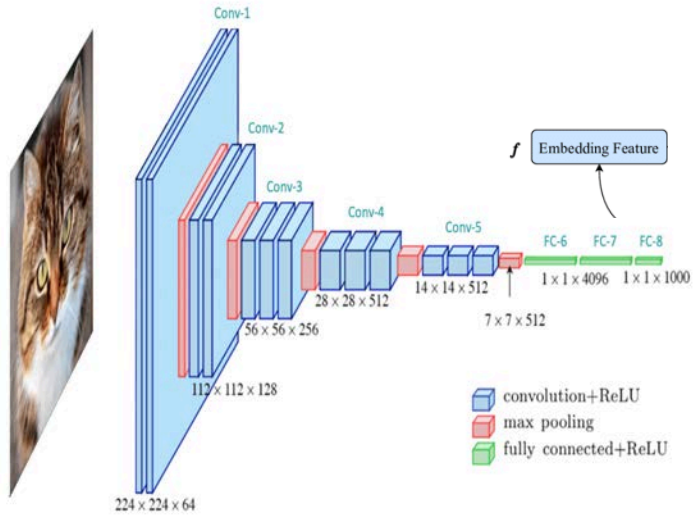
What Are Embeddings and Tokens?

An **embedding** is a **vector representation** of data that preserves important **semantic information as numbers,** while reducing complexity. These embeddings exist in a continuous space, unlike discrete tokens. **Tokens**, on the other hand, are the discrete representations of data that AI models process like whether it's words, image patches, or audio frames. Simply **embedding space is infinite** and **token space is a finite** one limited by a "number of all the words" like parameter.

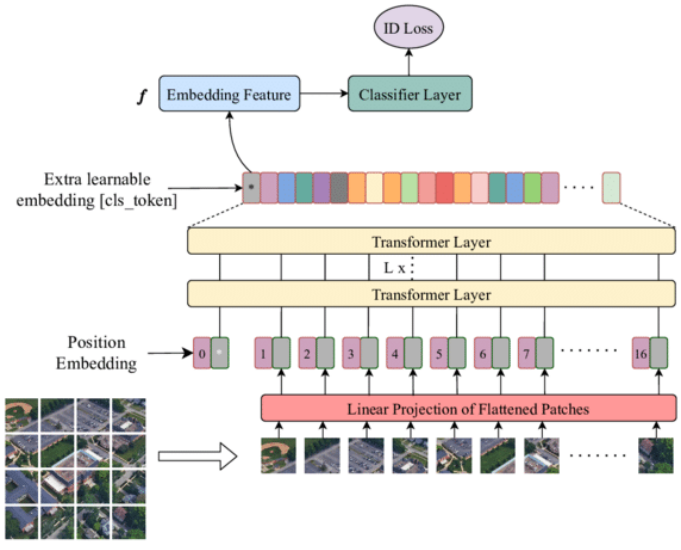


Words are first tokenized, and then each token is mapped to an embedding.

In image-based models, embeddings are generated from feature extractors like **Convolutional Neural Networks (CNNs)** and **Vision Transformers (ViTs)**. CNNs process images by applying filters that detect edges, textures, and hierarchical patterns through convolutional layers, capturing spatial dependencies. ViTs, in contrast, divide an image into patches and apply self-attention mechanisms to understand global relationships between different regions. These methods transform raw image data into numerical feature vectors, which we call as vision embeddings.



VGG-16 (CNNs)

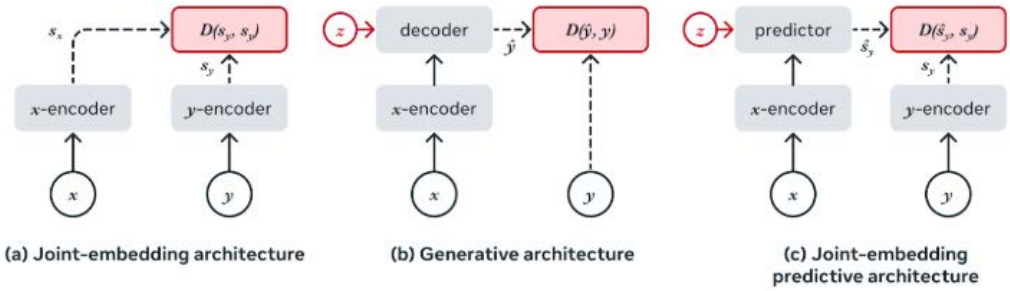


Vision Transformers (ViTs)

Image embeddings usually come from a layer before output layer of a CNN, or the CLS token embedding of a ViT, representing overall image features

Feature Extractors: Learning Representations for AI

Representation learning is a fundamental aspect of AI that enables models to extract meaningful features from raw data like images, text, videos, and audio. To generate embeddings, we use **feature extractors**, also known as **encoders**. Feature extractors process inputs and encode them into structured embeddings, which serve as compact representations for downstream tasks. Depending on the training method used in encoder models, they can be categorized into three main structures;



(a) Joint-embedding architecture (b) Generative architecture (c) Joint-embedding predictive architecture

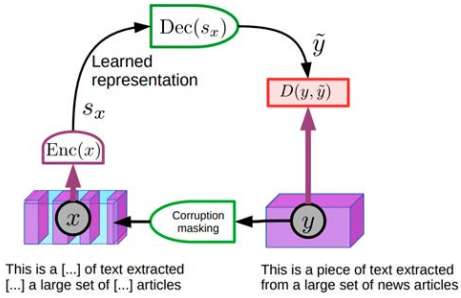
(a) Joint Embedding Architectures (JEA)

JEA-based models learn contrasting embeddings by mapping inputs into a shared embedding space, allowing meaningful comparisons. These models aim to capture relationships between inputs, assigning high similarity scores to compatible inputs and low scores to incompatible ones. Examples include:

- **SimCLR, MoCo, VICReg** (Self-supervised vision learning for image-image): Learn representations through contrastive learning without labeled data.
- **CLIP** (Image-Text contrastive learning): Aligns images with corresponding textual descriptions for cross-modal tasks.
- **Barlow Twins, PIRL** (Robust representations): Ensures representations remain invariant to transformations.

(b) Generative Architectures

Generative architectures reconstruct inputs by predicting missing, masked parts of the data. They extract high-level features and model underlying data distributions to generate new samples.



Examples include **Denoising Auto-Encoders, BERT, and RoBERTa**, which learn by masking parts of the input and predicting the missing words. These models are commonly used in tasks that require contextual understanding and representation learning rather than direct text generation.

Another category of this generative domain is **Auto-Regressive Large Language Models (AR-LLMs),** which is a complex generative structure but basically contains an encoder block and a stochastic predictor for sequential language tokens. This includes models such as Open-source **LLaMA, Mistral,** and Proprietary **Gemini, ChatGPT-3, DeepSeek-V3.** They take a different approach by **generating one token at a time** while referencing previous tokens. AR-LLMs are built on transformer architectures with billions of parameters, typically ranging from **1B to 500B**, and are trained on datasets containing **1 to 2 trillion tokens**. This structure allows them to generate text that is coherent and contextually relevant.

Despite their ability to generate clear and structured text, AR-LLMs have several limitations:

- **Factual and logical errors** due to their reliance on uncertain predictions.
- **Lack of reasoning and planning** since they generate responses based only on preceding tokens without structured world modeling.
- **No true understanding** of concepts, often functioning as **pattern generators** rather than reasoning-based AI.
- **Inability to use external tools** like search engines or calculators effectively.

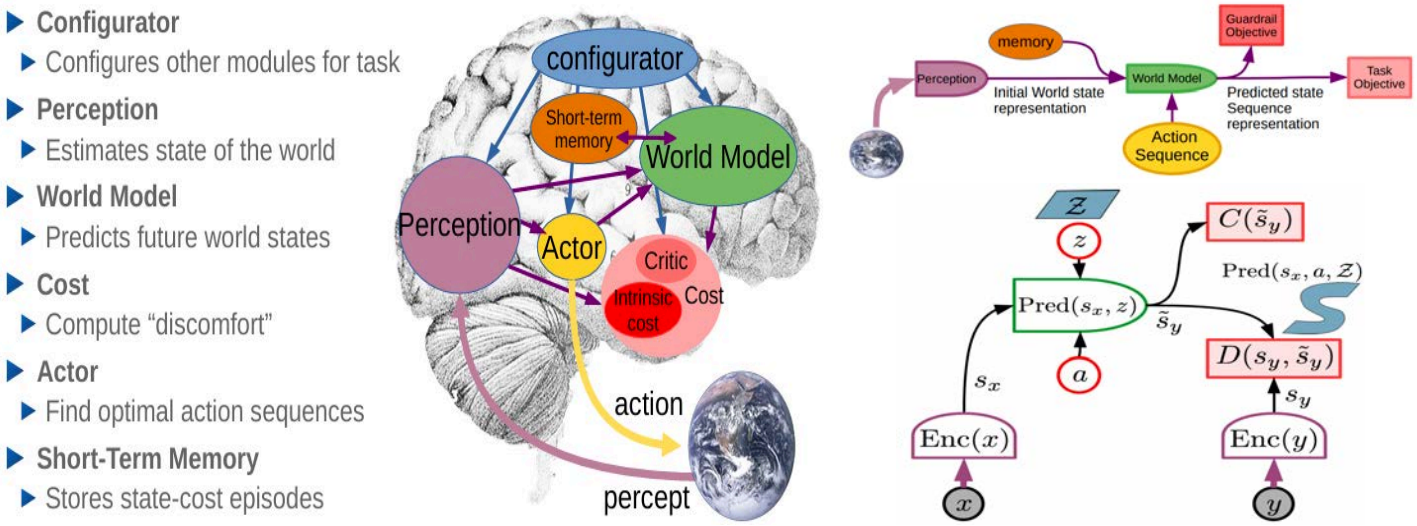
These challenges highlight the need for models that build structured representations of the world rather than just predicting the next token. Yann LeCun and other researchers identified these gaps, leading to the development of Joint Embedding Predictive Architectures (JEPA), which focus on learning structured and predictive world models for improved reasoning, planning, and adaptability

(c) Joint Embedding Predictive Architectures (JEPA)

JEPA models improve upon generative architectures by predicting the representation (Feature Embeddings) of missing parts of an input rather than reconstructing it pixel by pixel. Unlike generative methods that attempt to fill in all missing details of images or text, JEPA-based models aim to learn **higher-level abstractions** that avoid unnecessary focus on unpredictable noise. This method helps prevent common generative errors, such as **unnatural hand structures in AI-generated images**.

Key advantages of JEPA:

- **Predicts representations rather than reconstructing exact pixels.**
- **Avoids biases from contrastive methods**, which require enforcing invariance between augmented views.
- **Supports reasoning, planning, and adaptation**, making it useful in robotics and eventually for human-like learning algorithms.



This diagram represents the **JEPA structure** compared with how human brains work **(Modular Cognitive Architecture for Objective-Driven AI by Yann LeCun)**. It includes **Encoders** for **x** (past-present) and **y** (future) states, a **Predictor** for forecasting, Prediction Cost **D()** for accuracy, and Surrogate Cost **C()** for evaluating desirability. The **actor** selects optimal **actions (a)**, while the **latent variable (z)** is the unknown world representations. By predicting high-level world states instead of exact details, JEPA aims to capture a richer understanding of data, leading to more structured and generalizable AI models.

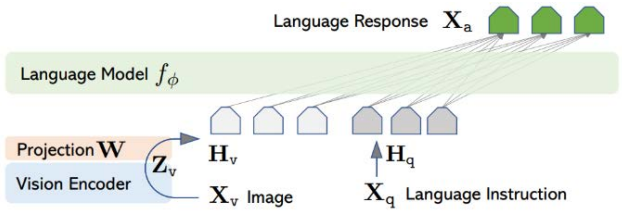
How Do LLMs and MLLMs Use Embeddings and Tokens?

As we discussed, modern AI models transform **raw inputs (text, images, audio)** into embeddings and project each input into shared vector space (LLM Embedding Space), enabling cross-modal reasoning and processing them via transformer-based architectures. The **tokens and embeddings enable models to**:

- Encode **semantic meaning** from different modalities.
- Perform **cross-modal tasks**, e.g., matching images with text.
- Generate outputs, whether text (ChatGPT), images (DALL-E), or even actions (robotic movements).

For example, **LLaVA (NeurIPS 2023)** represents **vision-language fusion** where images are converted into **vision embeddings** before being processed by a transformer in the same space as text embeddings. Similarly, **SALMONN (ICLR 2024)** introduces audio-language models, processing audio **signals as embeddings** in a shared embedding space.

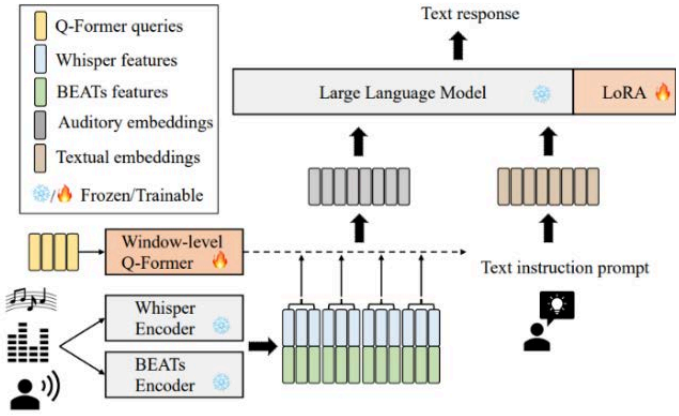
(a) Vision-Language Models: Example – LLaVA



LLaVA (Large Language and Vision Assistant, **NeurIPS 2023**) is a vision-language MLLM that connects a visual encoder and a language model for multimodal processing. The architecture consists of a pre-trained CLIP visual encoder (ViT-L/14), which extracts visual features from an input image. These features, denoted as **Zv**, are projected into the language model's embedding space using a trainable projection matrix **W**, producing visual embedding tokens **Hv**. The LLM (Vicuna) then processes these embeddings alongside language tokens from input instructions **Xq**, generating responses **Xa**. This projection scheme is simple but can use advanced mechanisms such as gated cross-attention (Flamingo) and Q-former (BLIP-2) that can be explored for improved image-language alignments.

(b) Audio-Language Models: Example – SALMONN

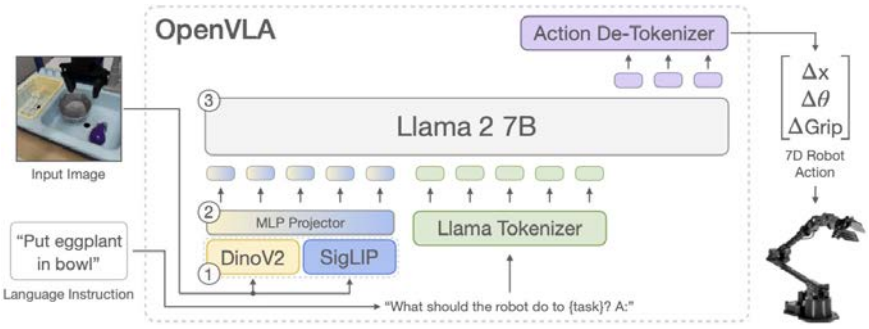
SALMONN (ICLR 2024) is a multimodal model designed to extend LLMs to process and understand general auditory information, including speech, audio events, and music. The architecture contains a pre-trained text-based LLM with speech and audio encoders, allowing it to perform various speech and audio tasks such as speech translation, auditory question answering, emotion recognition, and speaker verification. A **window-level Q-Former** fuses outputs from a **Whisper speech encoder** and a **BEATs audio encoder** into augmented audio tokens aligned with the LLM's input. The **LoRA adaptor** aligns these tokens with the LLM's output space. While the LLM and encoders remain frozen, the fusion modules can be fine-tuned to enhance reasoning and improve performance in unseen tasks.



(c) Multimodal LLMs Integrating Vision, Audio, Text, and now even Actions

It's not only text, audio, images, and videos, recent research has also introduced **action tokenization,** where robotic movements are **separated into learnable tokens**. This allows AI to **control robots with the same token-based learning methods used in language models.**

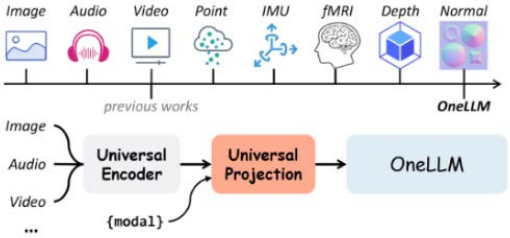
Example: OpenVLA - NVIDIA Jetson AI Lab (2024)



OpenVLA **(Vision-Language-Action)** is a good example model that extends multimodal learning to robotic control. OpenVLA converts high-level instructions into **discrete action tokens**, which represent movements like **grasping, rotating, pushing, and other robot actions**. These tokens are then de-tokenized back into continuous motor control commands, allowing real-world execution. This method bridges natural language understanding and robotic actuation, making a new path for **Physical AI**.

Conclusion: The Future of Multimodal AI

As multimodal AI evolves, researchers are finding ways to process different types of data, such as **3D point clouds, IMU, fMRI, Depth data,** without limiting to common images, audio, text modalities. Recent models like **OneLLM (CVPR 2024)** introduce universal encoders and projection modules to simplify this integration with all 8 different modalities. These methods help organize data into a single processing pipeline instead of using separate components for each modality, making the system more efficient.



OneLLM – Han et al., CVPR 2024

Beyond these advancements, the integration of action tokens and structured learning approaches like JEPA is shaping AI to be more **goal-driven** and **adaptable**. Action tokens like grasping, rotating, pushing, and other robot actions enable robots to learn from demonstrations and reinforcement learning by integrating vision, language, and action spaces together. Recent hierarchical models like **Puppeteer (A hierarchical world model for whole-body humanoid control)** inspired by JEPA, and discussed **OpenVLA** action tokenization push AI closer to **Artificial general intelligence (AGI)**, which is a theoretical AI system that can learn and perform any intellectual task a human can, enabling robots to learn from text, images, and audio inputs where they can see, understand, move and interact with real-world environments. While the timeline for achieving AGI remains uncertain, AI will continue to enhance human capabilities, making significant contributions to science, technology, and everyday life.

References

[1] S. Yin et al., "A survey on multimodal large language models," arXiv preprint arXiv:2306.13549, 2023. [Online]. Available: https://arxiv.org/abs/2306.13549.
[2] K. Simonyan and A. Zisserman, "Very deep convolutional networks for large-scale image recognition," arXiv preprint arXiv:1409.1556, 2014. [Online]. Available: https://arxiv.org/abs/1409.1556.
[3] A. Dosovitskiy et al., "An image is worth 16×16 words: Transformers for image recognition at scale," arXiv preprint arXiv:2010.11929, 2020. [Online]. Available: https://arxiv.org/abs/2010.11929.
[4] M. Assran et al., "Self-supervised learning from images with a joint-embedding predictive architecture," arXiv preprint arXiv:2301.08243, 2023. [Online]. Available: https://arxiv.org/abs/2301.08243.
[5] Y. LeCun, "A Path Towards Autonomous Machine Intelligence," OpenReview, [Online]. Available: https://openreview.net/pdf?id=BZ5a1r-kVsf.
[6] Airbyte, "OpenAI Embeddings 101: A Perfect Guide for Data Engineers," Airbyte, [Online]. Available: https://airbyte.com/data-engineering-resources/openai-embeddings.
[7] Y. LeCun and D.-Shum, "Objective-Driven AI," NYU, Harvard University Lecture Slides, [Online]. Available: https://cmsa.fas.harvard.edu/news/2024dingshum/.
[8] Airbyte, "Tokenization vs Embedding - How Are They Different?" Airbyte, [Online]. Available: https://airbyte.com/data-engineering-resources/tokenization-vs-embeddings.
[9] Y. LeCun et al., "Hierarchical World Models as Visual Whole-Body Humanoid Controllers," arXiv preprint arXiv:2405.18418, 2024. [Online]. Available: https://arxiv.org/abs/2405.18418.
[10] H. Liu et al., "Visual Instruction Tuning," arXiv preprint arXiv:2304.08485, 2023. [Online]. Available: https://arxiv.org/abs/2304.08485.
[11] Y. Tang et al., "SALMONN: Towards Generic Hearing Abilities for Large Language Models," arXiv preprint arXiv:2310.13289v2, 2023. [Online]. Available: https://arxiv.org/abs/2310.13289.
[12] Y. Kim et al., "OpenVLA: An Open-Source Vision-Language-Action Model," arXiv preprint arXiv:2406.09246, 2024. [Online]. Available: https://arxiv.org/abs/2406.09246.
[13] S. Han et al., "OneLLM: One Framework to Align All Modalities with Language," arXiv preprint arXiv:2312.03700, 2023. [Online]. Available: https://arxiv.org/abs/2312.03700.

From Circuit Design to Silicon: Exploring the OSIC Design Toolchain and Affordable Chip Tapeouts using Open-source PDKs

by Lohan Atapattu, Sajitha Madugalle

The field of electronics has been revolutionized by integrated circuits (ICs), enabling smaller yet more efficient, and powerful systems. Gaining experience in this field takes years of training in a chip design lab or industry setting, which also requires access to expensive resources and access to chip design tools and fabrication services. Today, open-source IC (OSIC) design toolchains have emerged as cost-effective platforms, simplifying the design process fostering a new era in chip design education and innovation.. This article focuses on the **Analog IC design flow** using OSIC toolchains and resources. Key stages include schematic and test bench design, top-level simulation, layout planning and creation, layout vs. schematic (LVS) checks,post-layout simulations, and tapeout pre-checks, all supported by open-source tools that enhance efficiency and creativity in IC design.

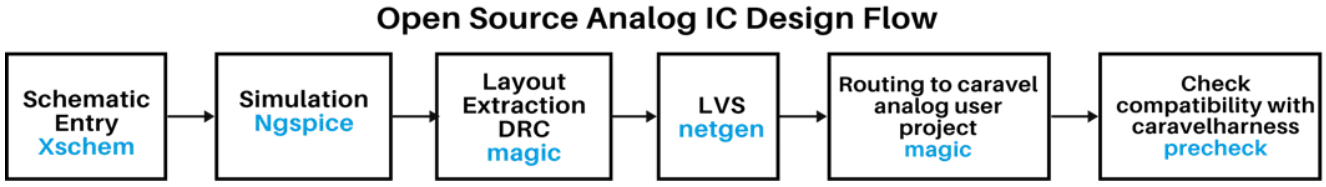


Figure 1

The first step in analog IC design is to create a schematic representation of the circuit, offering a clear and standardized visualization. This can be achieved using ***"Xschem"***, a free and flexible tool that allows parameter adjustments and supports simulations. Circuit behaviour is typically analyzed using SPICE (Simulation Program with Integrated Circuit Emphasis), a mathematical modelling method developed in 1973 by Laurence Nagel, which remains foundational in circuit design. ***"Ngspice"***, an open-source SPICE variant, works seamlessly with Xschem, enabling interactive and accurate circuit simulations. Various simulations, such as AC/DC simulation, transient analysis, and Monte Carlo simulations, can be performed using Ngspice.

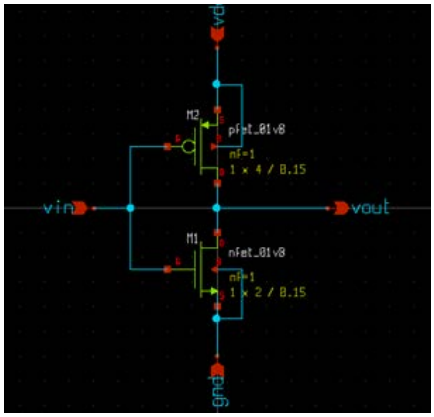


Figure 2 - Simple schematic level of a CMOS inverter design in Xschem

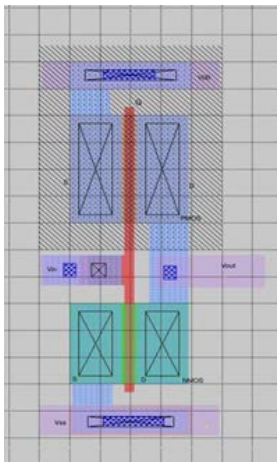


Figure 3 - Layout design of a CMOS inverter in Magic VLSI

After that, the physical Layout design should be done. ***"Magic VLSI"*** is a versatile tool for fully custom layout, allowing manual placement and routing of transistors with built-in Design Rule Checking (DRC). It supports hierarchical design, enabling modular layouts by integrating pre-designed transistors and subcircuits while also facilitating the use of standard cells from ***"Process Design Kit (PDK)"*** for digital and analog blocks. ***"KLayout"*** has good visualization and scripting capabilities, which makes it ideal for editing, verifying, and automating layout tasks. The layout process starts with the transistor-level design based on specifications from schematic simulations, progressing to a hierarchical assembly of circuits to reduce complexity. Designers can use Magic or Klayout separately or together to achieve design goals.

The final step in analog IC design is the Layout vs Schematic (LVS) check, which ensures the physical layout matches the original schematic design. This can be performed using the open-source tool ***"Netgen"***, which compares the netlist extracted from the physical layout (generated using tools like Magic VLSI or KLayout) with the netlist from the schematic design created in Xschem. Differences will be flagged for correction. To perform LVS checks and other design processes, a PDK is required. PDKs include essential data like design rules, layer definitions, and standard cells specific to a manufacturing process. The open-source "Sky130 PDK," developed by Google and SkyWater Technology, is widely used in the open-source domain for designing and fabricating ICs.

"OpenLane" can be used to layout the digital part of analog mixed signal IC designs. OpenLane is a prominent open-source tool that offers a fully automated pipeline for designing digital circuits [4]. It integrates several tools into a cohesive flow, from synthesis to layout. The design process begins with a ***"Register Transfer Level (RTL)"*** file, typically written in Verilog, which describes the circuit's functionality. Designers can modify various configurations to optimize floorplanning, chip area and adjust design parameters to meet specific requirements. OpenLane automates tasks such as synthesis, placement, routing, and Design Rule Checking (DRC), ensuring adherence to the target manufacturing process. The final output is a "GDSII" file, the standard format for fabrication.

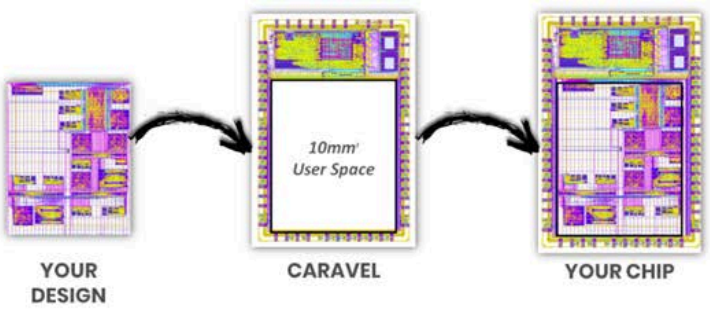


Figure 4 - Caraval User Project

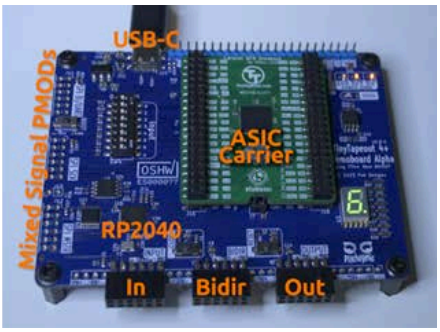


Figure 4 - Tiny tapeout development board.

After completing the design and verification steps, IC fabrication can be achieved cost-effectively through ***"Tiny Tapeout"*** [3]. While traditional fabrication processes cost around $20,000, the tiny tapeout provides a shared silicon space, significantly reducing expenses. Designers can secure a unique ***"tile"*** within this shared space, which accommodates approximately 10,000 logic gates, for just $300. Additional tiles can be purchased for $50 each, depending on the design requirements. The platform provides a development board for post-fabrication testing, allowing designers to evaluate and refine their ICs.

These tools are freely available for anyone to download and use. A group of postgraduate and undergraduate students from ENTC successfully used the OSIC design toolchain to submit a mixed-signal IC design and a digital IC for fabrication through Tiny Tapeout. This program was guided by the IEEE Circuits and Signals Society under the initiative "Universalization of IC Design." According to their feedback, even though OSIC tools are instrumental, the workflow is flexible, easy to understand, and even similar to some advanced options in EDA tools. While the industry relies on more advanced EDA tools, these toolchains offer an accessible yet powerful platform for prototyping and experimentation.

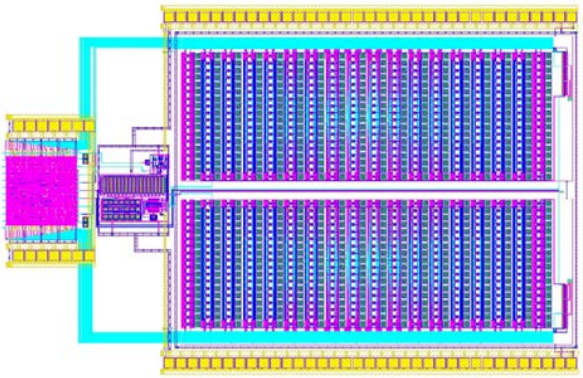


Figure 6 - 100KSPS 8-bit Fully-differential Successive Approximation

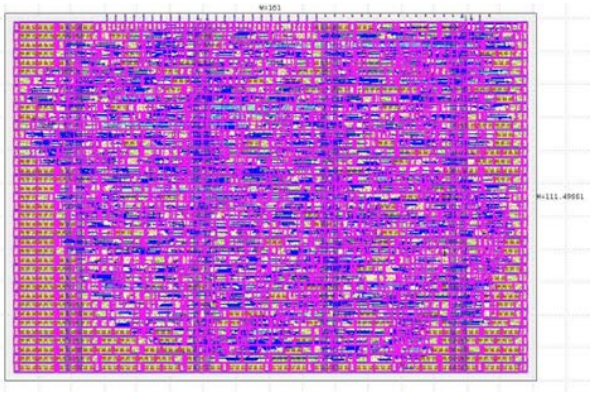


Figure 7 - Educational RISC V SBC using 100-lines of verilog code

Submitted layout designs by a Group of postgraduates and undergraduates of ENTC

References

[1] G. E. Moore, "Cramming more components onto integrated circuits," Electronics, pp. 114–117, Apr. 19, 1965.
[2] T. Edwards, "Introduction to the SkyWater PDK," 2021. [Online]. Available: https://isn.ucsd.edu/courses/beng207/lectures/Tim_Edwards_2021_slides.pdf.
[3] M. Venn, "Tiny Tapeout: A shared silicon tape out platform accessible to everyone," IEEE Solid-State Circuits Magazine, vol. 16, no. 2, pp. 20–29, Jan. 2024, doi: 10.1109/mssc.2024.3381097.
[4] "OpenLane Documentation." [Online]. Available: https://openlane2.readthedocs.io/en/latest/.
[5] "Tiny Tapeout," Efabless chipIgnite Store. [Online]. Available: https://store.efabless.com/products/tiny-tapeout-project.
[6] "SkillSurf/cmos_inverter_sky130: CMOS Inverter Design, Analysis and Layout in SKY130." [Online]. Available: https://github.com/SkillSurf/cmos_inverter_sky130.

PS: As of March 14, 2025, Tinytapeout has temporarily paused its shuttles due to the shutdown of Efabless. They are currently exploring alternative platforms and expect to resume their tapeouts soon using a different platform.

Revolutionizing Sensing: The Role of mmWave Sensors in Next-Gen Applications

by Tharushi Karavita

Millimeter-wave (mmWave) Frequency-Modulated Continuous Wave (FMCW) radar sensors are transforming modern sensing applications by providing high-resolution, real-time detection of objects. Operating in the 30 GHz to 300 GHz frequency range, these sensors leverage short-wavelength electromagnetic waves to accurately measure range, velocity, and angle of objects, making them invaluable in automotive, industrial automation, and robotics applications.

Fundamentals of mmWave FMCW Radar

FMCW radars work by transmitting a signal called a chirp, which is a frequency-modulated waveform that increases linearly over time. When this chirp reflects off a target, the radar captures the reflected signal and determines the target's distance and velocity based on the frequency shift between the transmitted and received signals. The fundamental parameters that define a chirp include:

- **Start Frequency (fc):** The initial frequency of the chirp
- **Bandwidth (B)**: The range of frequencies swept during the chirp
- **Chirp Duration (Tc)**: The time taken to sweep the bandwidth
- **Slope (S)**: The rate of frequency change per unit time

The intermediate frequency (IF) signal is generated by mixing the received signal with the transmitted chirp. The frequency of this IF signal is directly proportional to the range of the detected object.

Range, Velocity, and Angle Estimation

Range Measurement
The distance dd to an object is determined using the time delay τ between the transmitted and received chirps:

$$\tau = \frac{2d}{c}$$

where cc is the speed of light. The IF frequency corresponding to this delay is given by:

$$f_{IF} = S_{\tau}$$

Thus, the range resolution of the radar is given by:

$$d_{Res} = \frac{c}{2B}$$

For a chirp bandwidth of 4 GHz, the range resolution is approximately 3.75 cm, allowing precise object detection.

Velocity Measurement
Velocity is derived from the phase difference between chirps in a chirp sequence. If the radar transmits NN chirps, velocity resolution improves with the frame duration Tf

$$v_{Res} = \frac{\lambda}{2T_f}$$

where λ is the wavelength of the radar signal. Doppler processing using a second Fast Fourier Transform (FFT) allows differentiation of multiple moving objects at the same range but with different velocities.

Angle Estimation
Angle of arrival (AoA) estimation uses multiple receive antennas to measure phase differences between signals arriving at different antennas. Given the spacing dd between antennas, the AoA is determined as:

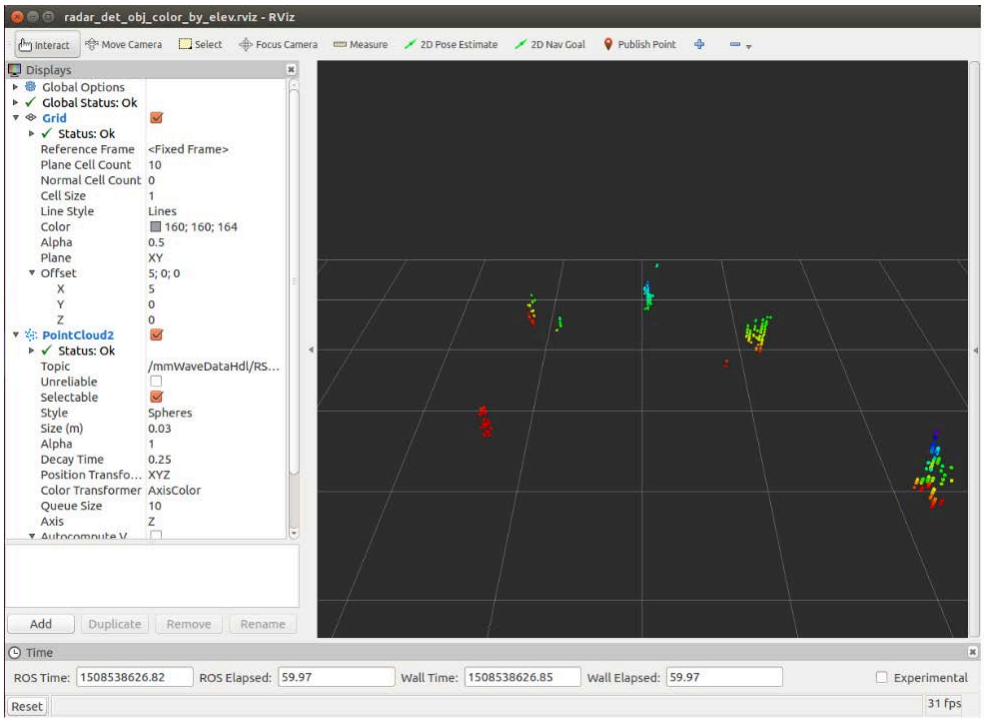
$$\theta = sin^{-1}(\frac{\lambda \Delta \phi}{2\Pi d})$$

where Δϕ is the phase difference. This enables precise angular tracking of objects.

Real-Time Processing and Visualization with ROS RViz

Raw data from the radar is processed on-device using an application binary, which converts IF signals into real-time position and velocity data. Advanced processing steps, such as object tracking and classification, can be integrated using a digital signal processor (DSP). The processed data is transmitted via UART in the TLV format for visualization.

For real-time evaluation, mmWave sensor output can be visualized using **ROS RViz**, which allows rendering of detected objects in a 3D space. By integrating the radar data into the **Robot Operating System (ROS2)**, developers can enhance robotic perception, obstacle avoidance, and motion planning in dynamic environments.
The following figure shows an example RViz window for the 6843 or 6843AOP sensor in a 3D configuration. The color of each point is based on its Z-axis elevation relative to the grid.



mmWave sensors, with their ability to dynamically adapt chirp configurations and real-time processing capabilities, are redefining the landscape of next-generation sensing technologies. Their integration with ROS and RViz provides an interactive and flexible platform for real-time visualization, enabling smarter and more autonomous systems across industries.

References

[1] A. Shafew, E.-J. Kim, and D. Kim, “A study on mm Wave sensor technology and its applications,” in Proc. 13th Int. Conf. Inf. Commun. Technol. Convergence (ICTC), Jeju Island, South Korea, 2022, pp. 1771–1776, doi: 10.1109/ICTC55196.2022.9952690.
[2] M. A. Ramírez-Moreno et al., “Sensors for sustainable smart cities: A review,” Appl. Sci., vol. 11, no. 17, p. 8198, 2021, doi: 10.3390/app11178198.
[3] Texas Instruments, “Radar toolbox,” [Online]. Available: https://dev.ti.com/tirex/explore/node?node=A__ANSECEN8pUpQyDw4PbR9XQ__radar_toolbox__1AslXXD__2.20.00.05.

Dr. Pranjeevan Kulasingham

by Pulasthi Udugamsooriya

The Department of Electronic and Telecommunication Engineering welcomed Dr. Pranjeevan Kulasingham as a new member of staff last year.

Dr. Kulasingham began his academic journey at S. Thomas' Preparatory School and later at S. Thomas' College, Mount Lavinia. He entered the University of Moratuwa as an undergraduate in 2011 and earned his Bachelor's Degree in Electronic and Telecommunications Engineering with First Class Honors in 2016, ranking first in his batch. He continued his education at the University of Maryland starting in 2017 and graduated with a Doctor of Philosophy in Electrical Engineering in 2021.

Dr. Kulasingham's research interests include neural signal processing (EEG, MEG), machine learning, auditory and speech neuroscience, and system identification. These interests are closely reflected in his numerous publications over the years, which have accumulated an impressive number of citations within the academic community. His doctoral thesis, titled Time-Locked Cortical Processing of Speech in Complex Environments, explores the use of magnetoencephalography (MEG) to estimate spatio-temporal models of cortical responses from the brain in order to better understand neural processing of sound and speech and address speech and hearing impairments. Notably, this work earned Dr. Kulasingham the Distinguished Dissertation Award awarded by the University of Maryland to outstanding students in recognition of research excellence.

After serving at the University of Maryland as a Graduate Teaching Assistant and Postdoctoral Associate, he became a Postdoctoral Researcher at Linköping University, Sweden, where he worked on modeling auditory brainstem responses to continuous speech stimuli using EEG signals. Auditory brainstem responses (ABRs) are electrical signals produced by the brain in response to sounds such as discrete clicks and can be used to assess how well sound is carried by the auditory nerve to the brain, and hence, a person's hearing ability. Dr. Kulasingham's research focused on studying the response of the brain (in terms of EEG signals) to continuous speech as opposed to discrete clicks and obtaining signals similar to ABRs to assess hearing, which helps overcome disadvantages of using discrete clicks.

Upon completing his research project in 2024, he rejoined the University of Moratuwa and has been serving as a Senior Lecturer at the Department of Electronics and Telecommunications Engineering since April 2024, focusing primarily on the Biomedical Engineering stream.

We wish him the very best of luck and continued success in this new journey.

Tronic Padura 2024: Symphony of melodies, graceful movements, and magic woven

by Manuri Boralugoda

The Department of Electronics and Telecommunication at the University of Moratuwa showcased its artistic side on the 15th of October with Tronic Padura, a celebration of music, talent, and creativity. Held at the Prof. Rupert Peiris Auditorium, the event embraced the theme 'Ganga Addara', meaning 'by the river', perfectly reflecting the serene beauty of the evening's music while honoring the picturesque location of the university beside Bolgoda Lake.

The evening featured mesmerizing performances by students from the 20, 21, and 22 batches, who took the audience on a nostalgic journey through timeless classics and contemporary hits. From heartfelt renditions of songs cherished across generations to tributes to legendary artists, the talented performers captivated the crowd, leaving a lasting impression.

Dance performances added to the vibrancy of the evening, with the ladies of the department enchanting the audience with their grace and charm, while the gents energized the crowd with their spirited moves and infectious humor. All music was performed live by the department's exceptionally talented students, whose skillful melodies resonated throughout the auditorium.

In a special moment, the 20th batch united for a heartfelt group performance to mark their final year at the university, earning sincere applause. Adding to the night's charm, the lecturers showcased their musical talents, proving that their expertise goes beyond academics.

The night concluded with a high-energy Baila session that got everyone on their feet, dancing with joy and enthusiasm. It was the perfect finale to an unforgettable evening, celebrating not just music but the unique spirit of the department. Tronic Padura proved that the Department of Electronics and Telecommunication is home to not only the brightest minds on the island but also to some of its most talented artists, where intellect and creativity come together seamlessly.

E-Care 2024: Making a Difference Through Education

by Thaveesha Wathudura

On May 1st, 2024, the E-Club hosted its annual charity event, E-Care 2024, at KG/DH/Yogama Tamil Vidyalaya in Avissawella. This rural Tamil-medium school became the focus of a heartfelt initiative aimed at empowering its students through education, infrastructure development, and cultural enrichment. The event showcased a deep commitment to social responsibility, reflecting the department's belief in giving back to society. Organized with enthusiasm and meticulous planning, E-Care 2024 left an indelible mark on the school and its community.

The day began with a donation drive that epitomized the true spirit of community and generosity. Thanks to the overwhelming support from students, staff, and well-wishers, a significant number of educational materials, such as textbooks, reference guides, and reading books in Tamil, Sinhala, and English, were collected and donated to the school. These materials will enrich the library at Yogama Tamil Vidyalaya, ensuring students have access to resources that enhance their learning experience.

The day began with a donation drive that epitomized the true spirit of community and generosity. Thanks to the overwhelming support from students, staff, and well-wishers, a significant number of educational materials, such as textbooks, reference guides , and reading books in Tamil, Sinhala, and English, were collected and donated to the school. These materials will enrich the library at Yogama Tamil Vidyalaya, ensuring students have access to resources that enhance their learning experience.

The event was designed not only to provide material support but also to inspire and uplift the students and the school community. A key highlight of the day was a seminar aimed at motivating students and broadening their horizons. It featured engaging talks on education, personal growth, and career opportunities, delivered by university faculty and students. Notably, the Head of the Department, Dr. Subramaniyam Thayaparan, and Senior Lecturer, Dr. Ranga Rodrigo, participated as the main invitees, further emphasizing the significance of the event. Additionally, volunteers worked tirelessly to repaint the school, transforming its premises into a vibrant and welcoming space for learning.

The event commenced early, with a bus departing from the ENTC department at 5:00 AM. The day-long program, running from 8:30 AM to 6:00 PM, was packed with meaningful activities that left everyone with a sense of fulfillment. By the end of the day, participants departed not only with memories of a well-spent day but also with the satisfaction of having made a tangible impact.

E-Care 2024 was more than just an event; it was a celebration of community, compassion, and the power of education to transform lives. Through the enrichment of the library and the renovation of school facilities, the initiative has paved the way for long-lasting improvements in the quality of education at Yogama Tamil Vidyalaya.

As the concluding event for the E-Club term, E-Care 2024 highlighted the unity and dedication of the ENTC family. It stands as a shining example of how collective efforts can bring about positive change, inspiring others to contribute to similar causes. With this successful event, the Electronic Club has once again demonstrated its unwavering commitment to societal progress, proving that small acts of kindness can create a ripple effect of hope and empowerment.

Tronic Avurudu '24: A fusion of tradition & Celebration

by Pasindu Darshana

Sinhala and Tamil New Year is a vibrant cultural festival that marks the traditional solar new year, bringing an atmosphere of harmony, unity, and prosperity. Our ENTC family warmly embraced the spirit of 'Avurudu' and its cherished traditions through joyous celebrations. Lecturers and students from the 19th, 21st, and 22nd batches gathered at the ENTC premises, ready to create lifelong memories.

Upon entering the premises, we were welcomed by a stunning Kolam design, intricately crafted by our Tamil brothers and sisters, beautifully symbolizing the true essence of Avurudu. Next, we arrived at the 'Avurudu Kema Mesaya,' a table filled with an array of traditional delicacies such as kevum, kokis, and many more festive treats. Staying true to tradition, we began the festivities by boiling a pot of milk, a ritual signifying prosperity, followed by a mesmerizing dance performance from our talented brothers and sisters.

Our New Year Festival was packed with a lineup of classic Avurudu games that we all know and love. ENTC undergraduates came together to compete, showcasing their talents and enjoying the festive spirit. Some tested their luck blindfolded, trying to strike the correct pot, while others took on our unique twist of 'Aliyata Asa Thabeema,' attempting to pinpoint the shark's eye while blindfolded. After a fiercely competitive 'Banis Kema' contest, a long-drawn battle of water balloon passing ensued, lasting for quite some time. Then, we watched as fellow batchmates frantically fed their blindfolded friends yogurt as fast as possible. Before we knew it, the game was over in the blink of an eye.Next came an exciting rhythm-based challenge, where pairs had to dance while balancing a balloon without letting it fall. This was followed by an intense test of both strength and balance in the 'Kotta Pora' tournament, where participants had to compete while standing on one foot. The energy remained high as we engaged in a spirited game of tug-of-war, leading up to the final test of speed and endurance in 'Gama Haraha Divima.'

The New Year Festival was filled with excitement and joy, bringing our ENTC family together and leaving us with unforgettable memories of laughter, camaraderie, and celebration. Every event was well-organized and flawlessly executed by ENTC students, and we have them to thank for a festival that truly embodied the passion, unity, and festive spirit of the Sinhala and Tamil New Year.

Electronic Club AGM 2024/25: A New Chapter Begins

by Samudra Uduwaka

The Annual General Meeting (AGM) of the Electronic Club, University of Moratuwa, was successfully held on the 7th of September 2024 at the ENTC 1 Hall. The event commenced at 9:20 a.m. under the leadership of the outgoing President, Mr. Lathika Wathsara, and was graced by the presence of esteemed faculty members, including Dr. Ranga Rodrigo, Eng. Kithsiri Samarasinghe, and Dr. Peshala Jayasekara.

Following the ceremonial traditions of the National Anthem and the lighting of the oil lamp, the AGM proceeded with key discussions, including the approval of the previous year's minutes and the Treasurer's report. A noteworthy proposal to integrate online banking facilities for club transactions was also approved, marking a step towards modernization.

A significant highlight of the event was the election of the new office bearers for the upcoming term. Mr. Dilupa Vinod was appointed as the new President, Miss Sanjana Kapukotuwa as the Secretary, and Mr. Ruchith Sandeepa as the Treasurer, alongside a dedicated team of executives and committee members from the 20, 21, and 22 batches. Their collective vision and leadership are set to drive the club to new heights in innovation and collaboration.

The meeting also reflected on the club's achievements through a 'Down the Memory Lane' video and concluded with an inspiring address by the newly elected President, who outlined the roadmap for the upcoming year. The event ended on a high note with entertainment segments and the awarding of certificates to outgoing members in appreciation of their contributions.

With fresh leadership and ambitious goals, the Electronic Club is ready to embark on another year of excellence, innovation, and teamwork.

An Inside Look at SLRC with the Minds Behind the Magic

by Pasindu Nethmina

Robotics competitions are a fusion of innovation and technical prowess, offering a dynamic platform for engineering enthusiasts to showcase their skills. At the heart of these events are the brilliant minds who craft intricate challenges that redefine the possibilities of robotics. In this feature, we delve into the creative process of Odil and Kiran, the architects behind SLRC, as they share their insights, experiences, and invaluable tips for succeeding in the world of robotics competitions.

Can you share your insights on the different types of robotics competitions and what distinguishes them from each other?

There are numerous local and international robotics competitions where both university and school students can participate and enjoy building robots. Most robotics competitions are task-based, requiring participants to develop a robot that can complete a set of tasks accurately and as quickly as possible. These robots typically include sensors and actuators to follow lines, avoid obstacles, pick up boxes, solve mazes, and more. Since competition guidelines vary, it is rare to use the same robot in different competitions.

On the other hand, competitions such as Micromouse and high-speed line followers follow more standardized rules. In a Micromouse competition, participants develop a robot that must search for and navigate the fastest route to the center of a maze in the shortest possible time. In high-speed line-follower races, participants design a robot resembling a toy F1 car to follow a track with curves and bends at high speeds. Some competitions also focus on vision-based tasks, such as detecting and pushing colored balls into designated goalposts.

Could you explain what kind of competition SLRC is and share your thoughts on it?

The Sri Lanka Robotics Challenge (SLRC), organized by ENTC, brings together robotics enthusiasts from across the country to showcase their skills in various challenging events. By fostering creativity and problem-solving, the competition serves as a platform for school students and undergraduates to exchange ideas and push the boundaries of robotics technology.

In my opinion, SLRC is a breeding ground for future roboticists and embedded engineers. Many seniors I have met, who are now excelling in the robotics and embedded systems fields, have participated in and won SLRC at some point in their academic careers. SLRC offers students an opportunity to collaborate and tackle complex problems requiring diverse skills in programming, electronics, mechanical design, and computer vision.

For me, participating in SLRC is not just about winning, it's about learning from mistakes and being prepared to handle unforeseen challenges.

Who can participate in SLRC? What are the different categories?

SLRC is open to all students and undergraduates passionate about robotics, whether they are beginners eager to learn or experienced enthusiasts looking to showcase their skills. The competition is divided into two categories:

- School Category
- University Category

What are the main considerations and prerequisites when selecting a team?

Building a multidisciplinary team can be a significant advantage in robotics competitions like SLRC. A well-rounded team, composed of individuals with diverse skill sets, is better equipped to handle different challenges, especially in the university category.

For example, having team members with mechanical engineering expertise can be highly beneficial for designing custom components such as robotic arms, grippers, projectile launchers, or innovative locomotion mechanisms. Similarly, computer science knowledge is essential for writing efficient software and optimizing algorithms to improve robot performance and reduce time complexity.

While these skills are not mandatory, they significantly enhance a team's overall performance. If most team members are new to robotics, it is advisable to include at least one experienced member to help navigate challenges and avoid costly mistakes.

What are some common challenges when building a robot?

You can never fully predict a robot's performance. Robots are bound to fail, especially when the stakes are high. It can be frustrating and disheartening to see a robot struggle due to an unforeseen issue, despite sleepless nights spent perfecting it. However, this reality is what makes robotics competitions unique.

Teams must anticipate potential problems, such as:

- Power issues
- Sensor calibration errors
- Design flaws (e.g., a robot unable to climb a ramp)

Some issues can be resolved on the spot, while others serve as tough but valuable lessons. Additionally, teamwork and collaboration within a diverse team can be challenging. Robotics is also expensive, as high-quality hardware can be costly, often requiring creative and budget-friendly DIY solutions.

Ultimately, only a rough sea makes a skilled sailor.

What technical knowledge is required to build a robot for SLRC?

Building a robot for SLRC requires a combination of technical knowledge, hands-on skills, and, most importantly, a willingness to learn. Beginners should focus on basic electronics, microcontroller programming, and fundamental programming concepts. Over time, they will gain experience in controlling motors, integrating sensors, using communication protocols, managing power consumption, and troubleshooting hardware.

Understanding basic electronics is crucial, particularly when working with batteries and motors. Knowing how to use electrical tools such as multimeters and soldering irons ensures safety and prevents damage to circuits. Additionally, familiarity with mechanical design, CAD tools, and 3D printing can be advantageous when creating custom components.

Even without prior experience, online resources, tutorials, and forums provide ample guidance. The key is to just get started.

How long does it take to build a fully functional robot?

The time required to build a robot depends on several factors, including:

- Team experience
- Number of contributors
- Weekly time commitment
- Complexity of tasks
- Component availability

For a novice two-member team, it typically takes around two months to build a fully functional robot, assuming 30 hours of work per week. Effective planning and pre-sourcing components can help meet deadlines and handle unexpected challenges.

However, there's a difference between a "functional" robot and a "winning" robot. Fine-tuning software, optimizing algorithms, and extensive testing are necessary for competition success.

What are the best practices when building a robot?

- Research all components before assembly and review their datasheets.
- Use a PCB for the controller instead of loose jumper wires, which can cause connectivity issues.
- Design a robust power subsystem, as most failures stem from power-related issues.
- Use voltage regulators to meet different power requirements while accounting for current needs, especially for motors.

• Isolate the microcontroller's power line from the motor power supply to prevent shutdowns.
• Implement unit testing with an inbuilt display to quickly debug hardware issues.
• Use version control (GitHub) to facilitate collaborative coding and track changes efficiently.

Any final message to SLRC competitors?

Odil – The only way to start robotics is by building a robot. Waste no more time—form a team, start creating, and register for SLRC. Your first robot might not work perfectly, but that's just the beginning. Robotics competitions teach invaluable technical and soft skills that will be useful in your career. See you at SLRC 2025!

Kiran – If you have even a spark of interest in robotics, gather your friends and build a robot for SLRC. Don't focus solely on winning—treat it as an opportunity to learn and explore. Watching your robot come to life is an incredible feeling. You'll face challenges, but by the end, you'll be amazed at how much you've learned. Take the leap, have fun, and embrace the journey!

Shaping Young Minds Through Robotics: SLRC Workshops

by Nethmi Amasha

The Sri Lanka Robotics Challenge (SLRC) 2025 took a significant step toward nurturing young minds by organizing two impactful workshops designed to foster creativity, knowledge, and excitement for robotics. These workshops stood as a testament to SLRC's dedication to inspiring the next generation of innovators through hands-on learning and engaging experiences.

The first workshop, held on October 3rd at St. Bridget's Convent Montessori, brought together over 300 young participants eager to witness the magic of robotics. Tailored for Montessori children, the session focused on demonstrating how robots work through interactive and captivating displays. The children's faces lit up with joy and curiosity as they watched robots in action, sparking a sense of wonder and excitement. This workshop provided a unique opportunity for young learners to engage with technology, laying a strong foundation for future interest in robotics
.
The second workshop, conducted on October 16th at Rahula College, Matara, welcomed more than 150 enthusiastic participants. This session delved deeper into the fundamentals of robotics, offering students a combination of theoretical knowledge and hands-on experience. Working in teams, participants tackled practical challenges, allowing them to apply what they had learned. By engaging in various tasks, the workshop not only strengthened their understanding of robotics concepts but also fostered teamwork, problem-solving, and critical thinking. The experience left a lasting impact, inspiring students to pursue robotics further and contribute to Sri Lanka's growing robotics community.

Both workshops exemplified SLRC's commitment to bridging the gap between imagination and creation. Through these initiatives, participants - from young Montessori learners to eager school students were empowered to dream, innovate, and explore. As SLRC 2025 continues to unfold, the seeds sown in these workshops will undoubtedly nurture a brighter, technology-driven future for Sri Lanka.

SPARK Challenge 23/24: Inspiring Innovative Solutions for a Sustainable Future

by Nilupulee Amarathunga

The SPARK Challenge, an annual competition for undergraduates at ENTC, concluded its 2023/24 edition on September 28, 2024, showcasing innovative solutions that prioritized sustainability and real-world impact. This initiative fosters creativity and teamwork while promoting sustainable development through the integration of Raspberry Pi technology.

This year, 21 proposals were submitted, with five teams advancing to the final round, where they presented their ideas to a panel of industry experts. Among them, three teams stood out for their exceptional creativity and impactful solutions.

The championship title was claimed by Team Eco Nova for their Smart Agri-Voltaic System, which integrates solar energy with sustainable agriculture to optimize land use. Their solution utilizes IoT-based monitoring and a GIS-powered Agro-Plan Model to enhance solar panel efficiency and crop health, addressing Sri Lanka's agricultural and energy challenges while contributing to global sustainability goals.

The first runners-up, Team Drarosg, introduced Farm Knight, an innovative solution designed to improve poultry farming efficiency. Leveraging machine learning and thermal imaging, it enables real-time health monitoring and early disease detection, optimizing resources and minimizing losses.

Securing the second runner-up position, Team Sustainix developed Hedwig, an IoT-based energy monitoring solution for industrial applications. Featuring real-time data analytics, wireless connectivity, and advanced monitoring capabilities, it empowers businesses to reduce energy costs, lower carbon footprints, and advance clean energy initiatives.

The SPARK Challenge continues to inspire students to develop transformative solutions that tackle critical global challenges while driving sustainability and innovation.

Sparking Innovation: Raspberry Pi Gift Distribution and SPARK Challenge 24/25 Launch

The SPARK Branch of the Electronics Club came alive with excitement on December 6th as the much-anticipated Raspberry Pi Gift Distribution and Introductory Session for SPARK Challenge 24/25 unfolded. Organized by SPARK in collaboration with SquareHub, the event brought together innovation enthusiasts and aspiring engineers, marking the beginning of a transformative journey for the 22nd Batch students.

The event aimed to empower students by providing hands-on learning opportunities and preparing them for the exciting challenges of the upcoming SPARK Challenge. The distributed Raspberry Pi devices will serve as powerful tools to fuel their creativity and equip them for the thrilling journey ahead.

During the session, SquareHub introduced the SPARK Challenge 24/25, emphasizing its mission to inspire groundbreaking ideas driven by innovation, sustainability, and teamwork. Students were encouraged to embrace the spirit of creativity and collaboration as they embark on their Raspberry Pi-powered projects.

With the momentum set by this event, SPARK Challenge 24/25 is poised to push the boundaries of creativity and problem-solving. Here's to sparking innovation and shaping a brighter future at ENTC!

Future-Ready with Industry Leaders

by Sivamynthan Nadesamoorthy

Understanding the gap between academia and real-world industry demands, the department has fostered strong collaborations with industry partners to actively engage undergraduates in practical industrial activities. Notable initiatives include insightful field visits to leading companies and specialized industrial courses designed to bridge theory and practice, offering students a firsthand experience of cutting-edge technologies and professional challenges.

Field Visits to Variosystems and GPV Lanka by the 22nd Batch

In order to gain ideas and motivation for their semester projects, first-year students were taken on a field visit. This offered them a firsthand experience of operations at two leading Electronics Manufacturing Services (EMS) providers: Variosystems and GPV Lanka.

At Variosystems, students observed modern electronic manufacturing processes, including surface mount and through-hole assemblies, press-fit backplanes, turn-key box builds, and cable assemblies. Meanwhile, GPV Lanka provided a comprehensive view of its facilities, focusing on innovative practices in circuit design, testing, and assembly. GPV also offered insights into its in-house mechanics, cable harness, and box-build facilities.

For the students, these visits were transformative. Observing real-world applications of classroom theories helped them mold their projects to meet high standards while shaping a clearer vision for their future careers.

Beyond reinforcing their role in promoting industry-academia collaboration, the visits also enhanced the host companies' brand image as community-engaged organizations, while offering opportunities to network with the future workforce and gather fresh perspectives.

LSEG C++ Course for ENTC Students

In order to enhance industry preparedness, ENTC and LSEG joined hands to conduct a C++ course for third-year ENTC students. Following its success last year, this year's course was held from July 18th to November 25th.

For ENTC students, the program offered hands-on experience with C++ programming, covering foundational concepts as well as advanced topics like high-performance computing and object-oriented programming. The course included lectures by industry professionals and concluded with a final project evaluated at LSEG's Malabe office. Beyond technical skill development, students were exposed to the work environment of global tech industries, helping them better plan their careers.

From LSEG's perspective, this course is a strategic investment, providing access to a pool of potential interns and employees already trained in industry-relevant programming techniques.

Additionally, this collaboration enhances LSEG's presence within Sri Lanka's engineering community.

The outcome of these collaborations underscores the importance of academia-industry relationships in developing Sri Lanka's electronics sector and fostering a mutually beneficial partnership.

ENTC students leaving a legacy of triumphs

by Sasindi Pieris

The Department of Electronic and Telecommunication Engineering has long been recognized for fostering excellence and producing individuals who consistently excel in academics and extracurricular activities. This article showcases the outstanding achievements of a few exceptional students from our department. Join us as we honor their success and delve into the profound impact their accomplishments have had on their personal journeys and the department's ongoing legacy.

The first of these remarkable achievements comes from Supun Dasantha Kuruppu and Biyon Fernando, talented students from the 19 batch, who achieved a significant milestone under the guidance of Dr. Anusha Withana, Prof. Sriram Subramanian, and Dr. Yutu Sugiura. Their groundbreaking work was presented at the prestigious UbiComp/ISWC 2024 conference held from October 7th to 9th at Sofitel Melbourne on Collins. This significant achievement included the publication of their research in the Proceedings of the ACM on Interactive, Mobile, Wearable, and Ubiquitous Technologies (IMWUT), a highly respected journal by the Association of Computing Machinery. Their contribution not only underscores their dedication and expertise but also highlights the department's commitment to fostering innovation and excellence in cutting-edge technological research.

Continuing the streak of exceptional achievements, Chamith Dilshan Ranatunga, Lahiru Shyamal, Lakshan Rathnayake, and Yohan Abeysinghe from the 19 batch secured first place in the 2024 Undergraduate Thesis Project Competition organized by the IEEE Signal Processing Society Sri Lanka Chapter. The competition, held on November 30th at SLTC Research University, evaluated final-year projects completed during 2024, with a focus on signal processing techniques. Guided by Dr. Chamira Edussooriya and Dr. Anjula de Silva, the team excelled through a rigorous two-round process, submitting an initial report and delivering an outstanding presentation during the finals.Their project, titled Ear EEG Hardware and Interpretable Deep Learning in P300-Based Event Classification, showcased a cutting-edge ear-piece device capable of acquiring ear EEG signals. The team demonstrated its statistical validity using advanced signal processing and mathematical methods and developed a brain-computer interface to highlight its effectiveness in EEG signal acquisition. Their success underscores the innovative spirit and technical excellence cultivated within the department.

Adding to the department's list of notable accomplishments, Team Codeblast, comprising Himanshi De Silva, Pabadhi Liyanage, Thulani Amanda, and Kasuni Wijeratne from the 20 batch, secured second place in "Innovate with Ballerina", an inter-university competition designed to showcase programming skills through innovative solutions using the Ballerina language. The event, powered by WSO2 and organized by the IEEE Computer Society Student Branch of the University of Moratuwa, drew participation from over 500 teams representing 24 universities across Sri Lanka. Team Codeblast's project stood out for its creativity and technical expertise, earning them a spot among the top 10 most innovative projects and ultimately securing second place during the final pitching session. Their achievement underscores their exceptional programming abilities and reinforces the department's reputation for fostering creativity and innovation.

These remarkable achievements by our students highlight the dedication, innovation, and technical excellence nurtured within the Department of Electronic and Telecommunication Engineering. Their success not only brings pride to the department but also inspires future generations to push boundaries and strive for excellence. As we celebrate their accomplishments, we remain committed to fostering an environment that empowers our students to achieve greatness and make a lasting impact on the world.

Creating, innovating, solving & winning

by Sanugi Wickramasinghe

In 2024, ENTC students achieved remarkable success in competitions, bringing pride to the department. They have done exceptional things, going far beyond the knowledge and skills taught at the university. Let's delve into some of these achievements.

Team FlashGuard, consisting of Anuki Paqual, Supun Kuruppu, and two other members, was selected as a finalist (top 10 out of more than 1,000 teams) and won the Most Innovative Product Award at the Dialog Innovation Challenge. It is a national competition organized by Dialog Axiata PLC and TV Derana, where participants propose and implement innovative technical products. The grand finale took place on August 13, 2024, at the TV Derana Reality Studio and was broadcast on TV Derana. Their product, FlashGuard, is a pair of smart glasses designed to provide real-time protection against photosensitive epileptic triggers.

Our students were recognized both nationally and globally. Team BitWeavers, consisting of Anuki Pasqual, Supun Kuruppu, and Dakshina Tharindu, secured 1st place at the DVCon India Design Contest 2024, which took place alongside the DVCon India 2024 Design and Verification Conference. The contest was held virtually from April to September 2024.

This global design contest aimed to encourage innovation in digital system design and verification among university students. Over five months, teams were tasked with designing, verifying, and implementing a custom AI accelerator to enhance a vision transformer model for a malware detection application. The accelerator was interfaced with the VEGA AS1061 CPU, developed indigenously by the Center for Development of Advanced Computing (C-DAC) in India, and implemented on a Genesys 2 FPGA board. The contest happened in three stages, with 20 out of 120 teams advancing to Stage 2A, and 9 moving on to Stage 2B. BitWeavers team emerged as champions by designing and implementing their custom AI accelerator, achieving an impressive 3x reduction in inference latency compared to pure CPU execution. This performance surpassed that of all other teams in the competition. Notably, they were the only team from Sri Lanka to finish in the top three. They were invited to present their accelerator at the DVCon India 2024 conference, which was held on September 18th and 19th, 2024, in Bangalore.

Last but not least, Anuki Pasqual from the 20th batch had a paper accepted and awarded the Best Presentation in a technical session at the 50th Annual Conference of the IEEE Industrial Electronics Society (IECON 2024), which took place from November 3 to 6, 2024, in Chicago, Illinois, USA. IECON is the flagship conference of the IEEE Industrial Electronics Society covering a wide range of research topics related to industrial technology, including power systems, industrial automation, and factory communication. Anuki was the first author of the paper "Optimized Base Station Deployment and Assignment for Smart Factory Millimeter Wave Networks," based on research conducted in the Department of Electrical and Electronic Engineering at the University of Melbourne. When she attended the conference to present the paper, she received recognition for Best Presentation in the technical session TS53: Communication for Industrial and Factory Automation, showcasing the brilliance of our department to the world.

ENTC minds, unstoppable victories

by Rusiru Fernando

SocketBurners Shine at IESL Techno 2024

The SocketBurners team, consisting of Muftee Mysan, Nadha Irshad, Ahmed Munavvar, and Mohammed Aashir from the 22nd Batch of the University of Moratuwa, secured the 1st Runner-Up position at the prestigious IESL Techno 2024 - StartUp Spark competition.

Held at the BMICH, the competition ran through September and October, culminating in the grand finale on October 13, 2024. Competing against nearly 100 teams, SocketBurners stood out with their innovative EDP project: an advanced A/C controller designed to remotely manage air-conditioning systems in luxury hotels. The project was presented alongside a comprehensive business model, aimed at bringing the product to market.

The finals featured 12 top teams pitching their solutions and business strategies to an expert panel of judges. SocketBurners' outstanding performance and practical approach earned them the 2nd place title, showcasing the team's technical brilliance and entrepreneurial spirit.

Organized by the IESL Student Chapter - University of Moratuwa, Techno Spark is a platform that fosters innovation and entrepreneurship among university students. This remarkable achievement highlights the creativity and problem-solving capabilities of the team and adds another accolade to the University of Moratuwa's legacy.

Rajinthan Wins First Place at Dextron 2024

R. Rajinthan from the Department of Electronic and Telecommunication Engineering, University of Moratuwa, secured 1st place in the Fast Line Following Competition at Dextron 2024, held on December 7, 2024, in Moratuwa.

Competing solo under the name "Raspi Cap," Rajinthan designed a high-performance robot capable of navigating complex maze paths with speed and precision. His innovative approach outshone all competitors, showcasing his exceptional technical expertise and problem-solving skills.

This victory brings pride to the ENTC department and the University of Moratuwa, highlighting its commitment to fostering talent and innovation in robotics and engineering.

ENTC Triumphs at Varsity Battles 2024

Manimohan Thiriloganathan from the 20th Batch delivered an outstanding performance by winning Cluster 3 of the prestigious Varsity Battles 2024. The event was held on October 29, 2024, at the Sri Lanka Foundation Institute.

Representing "Team 01," Manimohan competed against participants from top universities, including the University of Colombo, University of Kelaniya, University of Sri Jayewardenepura, University of Sabaragamuwa, and University of Ruhuna. The competition tested knowledge in capital markets, business, and financial securities within both local and global contexts.

Varsity Battles, organized by the Securities and Exchange Commission of Sri Lanka (SEC) and the Colombo Stock Exchange (CSE), is a premier inter-university quiz aimed at promoting financial literacy and capital market awareness among students.

Manimohan's victory reflects the academic excellence and highlights the exceptional talent and determination of ENTC students.

Shining in academics, extra-curricular activities, sports and beyond!

by Muftee Mysan

Academic Excellence: Pushing Boundaries of Knowledge

Sri Lanka's First-Ever CMOS Tapeout by Undergraduates

In a groundbreaking achievement, a team of ENTC undergraduates successfully submitted Sri Lanka's first-ever CMOS tapeout to the chipIgnite shuttle service from Efabless. The project, titled "100KSPS 8-bit Fully-differential Successive Approximation Register (SAR) ADC for Low-power Applications," was led by Lohan Atapattu, Sajitha Madugalle, Hirusha Maduwantha, Imasha Nethmal, and Erandee Jayathilaka, mentored by Udara Mendis, Kithmin R. and Dr. Nilan Udayanga.

This remarkable feat was accomplished in just 10 weeks using open-source IC design tools like xschem, ngspice, netgen, openLane, Magic, KLayout, and the SKY130A PDK. Starting from fundamental MOSFET theory, the team built everything from scratch, overcoming the challenge of not having formal education in Analog IC Design at the undergraduate level.
This milestone was made possible by the UNIC program of the IEEE Circuits and Systems Society (CASS) in collaboration with the IEEE Solid-State Circuits Society, along with immense support from Efabless. The submission represents a historic step forward for Sri Lankan students in ASIC design, paving the way for more opportunities in the future.

Additionally, Abarajithan G. and Jazoolee Ahamed led another UNIC-CASS project, "Educational RISC V SBC using 100-lines of Verilog code," further highlighting ENTC's growing expertise in chip design. The success of these projects signals an exciting future for Sri Lankan students in semiconductor innovation.

IEEE Challenge Sphere Champions: Team PulseX

Team PulseX, comprising Sajitha Madugalle, Lasith Haputhanthri, Prabath Wijethilake, Anushka Samaranayake, and Savinu Attanayake, demonstrated their ingenuity and technical prowess by emerging as champions of the IEEE Challenge Sphere - Circuit Challenge. Their winning innovation was a wearable biomedical device leveraging Electrooculography (EOG) signals to detect driver drowsiness, addressing a critical issue in road safety. This winning solution showcased the team's ability to integrate cutting-edge technology with practical applications, reinforcing the department's focus on solving real-world challenges through academic rigor and creative problem-solving.

Sports: Champions on the Field

Sri Lanka University Sports Association (SLUSA) Colors Awards

Gavin Botheju, a third-year colorsman, and Muftee Mysan, a second-year colorsman, made waves in university cricket by earning the prestigious Sri Lanka University Sports Association (SLUSA) Colors Awards for their outstanding performances. Gavin, who served as the vice-captain of the university cricket team in the 2024 season, is set to take on the mantle of captaincy for the 2025 season, exemplifying leadership and sporting excellence. Their achievements reflect the department's commitment to fostering talent both on and off the field.

Looking Ahead

The success of ENTC students in academics, extra-curricular activities, and beyond is a testament to the department's commitment to nurturing well-rounded engineers. Their achievements inspire future generations to dream bigger, work harder, and continue the tradition of excellence that defines ENTC.

As they step into the world as innovators, leaders, and changemakers, they carry the spirit of ENTC with them, shining brightly in every endeavor. Let us celebrate the remarkable achievements of our students and continue to support their journey toward excellence. Together, we build a legacy of success and innovation that will inspire generations to come.

Dr. Samiru Gayan

by Warren Jayakumar

Dr. Samiru Gayan is a Senior Lecturer at the Department of Electronic and Telecommunication Engineering at the University of Moratuwa. He is a committed educator who plays a crucial role in shaping the next generation of engineers and researchers in the department. With a deep understanding of communication systems, he teaches a range of core subjects related to telecommunications, that equip students with theoretical knowledge and hands-on experience.

Dr Samiru received his B.Sc. and M.Phil. degrees in Electronic and Telecommunication Engineering from the University of Moratuwa, Sri Lanka, in 2011 and 2015, respectively. He received his PhD degree in Electrical and Electronic Engineering from the University of Melbourne, Australia in 2021. His Ph.D. thesis, titled "Wireless Communications with Low-Resolution Quantization", presents a comprehensive study on the performance impact of using low-resolution quantization at the receiver of wireless communication systems compared to traditional high-resolution systems.

Beyond teaching, Dr. Samiru is deeply involved in cutting-edge research that advances the field of wireless communications. His research interests span multiple domains, including integrated sensing and communications, low-resolution quantization-based systems and signal processing for wireless communications. By using mathematical modeling, machine learning algorithms, and experimental testing, Dr. Samiru contributes to the development of energy efficient wireless networks.

Dr. Samiru, a Senior Member of IEEE, is highly dedicated to volunteering and professional service. He currently holds the position of Chair of the IEEE Signal Processing Society Sri Lanka Section Chapter and serves as the Vice Chair (Chair-Elect) of the IEEE Communications Society Sri Lanka Section Chapter. Additionally, he contributes as the Program Co-Chair of the Moratuwa Engineering Conference (MERCon) and serves as the Mentoring Program Coordinator for the department.

Dr. Samiru's dedication to education, research, and professional service has made a lasting impact on the field of electronic and telecommunication engineering. His passion for knowledge-sharing and innovation continues to inspire students and colleagues alike. We wish him the very best in all his future endeavors and look forward to more of his remarkable contributions to academia and industry.

Mr. Supun Dasantha Kuruppu

by Ransadi de Alwis

"GIVE YOUR BEST SHOT IN EVERYTHING YOU ATTEMPT, FOR ONLY THROUGH YOUR FULLEST EFFORT CAN YOU ACHIEVE YOUR GOALS. AND EVEN IF YOU FALL SHORT, YOU'LL EMERGE STRONGER, WISER, AND MORE SKILLED THAN WHEN YOU BEGAN."

Mr. Supun Dasantha Kuruppu is a distinguished graduate of the Department of Electronic and Telecommunication Engineering at the University of Moratuwa, recognized for his academic excellence, technical expertise, and research contributions. Throughout his undergraduate journey, he consistently demonstrated outstanding performance, earning a place on the Dean's List for all eight semesters and graduating with a CGPA of 4.07 out of 4.2. His achievements culminated in receiving the Vidya Jyothi Professor Dayantha S. Wijeyesekara Award for the Most Outstanding Graduand of 2024.

His academic foundation was established at Ananda College, Colombo, where he excelled in the G.C.E. Advanced Level Examination in 2018, securing 3As and ranking 38th island-wide. Beyond academics, he was actively involved in extracurricular activities, serving as the Captain of the Chess team and earning school colours and the Ananda Padma award. A highly accomplished chess player, he became the Junior National Chess Champion in 2018, received the FIDE Candidate Master title in 2014, and was the 2nd runner-up at the Asian Schools Chess Championships in 2012 and 2013. He also represented Sri Lanka at multiple international chess events, including the World Youth Chess Olympiad and World Schools Chess Championship.

At the university, Supun was an all-rounder who excelled in academics as well as sports and leadership roles. As the Vice Captain of the University of Moratuwa tennis team, he played a pivotal role in their championship victory at the Sri Lanka University Games. His sporting achievements earned him the University of Moratuwa Colours Insignia in both 2022 and 2023, and he was awarded the Daham Anuradha Award for being the Coloursman with the highest GPA in his second academic year. He also represented Sri Lanka at the FISU World University Chess Championship 2020.

Supun's technical achievements span multiple domains, with a particular focus on digital systems design and hardware acceleration. His recent work includes developing a hardware accelerator for a malware detection ViT model, where his team achieved a remarkable 3× improvement in inference latency over CPU execution. This project led his team to become champions at the DVCon India Design Contest 2024. Additionally, he contributed to the field of healthcare technology through his research on hemodynamic analysis of the blood circulatory system from wearable sensor data. This project resulted in the development of a wearable consumer device capable of capturing Photoplethysmography (PPG) signals from the radial artery, a deep learning model for blood pressure prediction, and a computational model simulating PPG signal generation.

Supun played a key role in developing FlashGuard, a pair of smart glasses designed to provide real-time seizure protection for photosensitive epileptic patients. This innovation earned multiple accolades, including championship titles at the Brainstorm Healthcare Innovation Challenge 2023 and the Medical Electronics and Coding Hackathon 2023, along with the Most Innovative Award at the Dialog Innovation Challenge 2024. Furthermore, he showcased his exceptional skills in competitive programming and engineering challenges. As part of a team, he secured 1st place in Sri Lanka and ranked 88th globally in IEEEXtreme 16.0, while in IEEEXtreme 15.0, his team placed 3rd in Sri Lanka and 99th globally. He was also part of the runner-up teams at Mora Xtreme 8.0 and 7.0 and contributed to securing third place at the IESL RoboGames 2020.

Professionally, he works as an Engineering Consultant at Sagence AI and an Electronics Engineer at Paraqum Technologies. In addition to his industry roles, he gained valuable research experience as a Research Affiliate at the University of Sydney, contributing to Human-Centered Computing research. His work led to the co-authorship of a paper titled "IrOnTex: Using Ironable 3D Printed Objects to Fabricate and Prototype Customizable Interactive Textiles" in the journal ACM Interactive, Mobile, Wearable, and Ubiquitous Technologies.

Beyond his technical and research contributions, Supun has been actively involved in academia as a Visiting Instructor at the University of Moratuwa. He has also shared his expertise as a resource person in various educational sessions and webinars.

Supun's journey highlights the importance of dedication, perseverance, and technical innovation. He encourages aspiring engineers to embrace challenges, engage in research, and actively contribute to their fields. One thing he strongly advocates for juniors is exploring different areas within their domain during the first two to three years of university to discover their true passion. He believes that choosing an area based on passion rather than current strengths makes it easier to dedicate time and effort, leading to exponential skill growth. He especially received guidance from Mr. Deepana Ishtaweera (17 Batch) and Mr.Ramith Hettiarachchi (17 Batch) from the very beginning and remains grateful for their mentorship. He is deeply grateful for the numerous opportunities that the Department of Electronic and Telecommunication Engineering has provided, which have significantly shaped his journey. He is appreciative of all those who supported him during his time as an undergraduate. The Department of Electronic and Telecommunication Engineering recognizes his contributions and wishes him continued success in his future endeavors.

Mrs. Chathuni Wijegunawardana

by Ransadi de Alwis

Mrs. Chathuni Wijegunawardana stands as a shining example of dedication, innovation and excellence. A proud graduate of the 19th batch of the Department of Electronic and Telecommunication Engineering at the University of Moratuwa, she consistently demonstrated academic brilliance, earning a place on the Dean's List every semester. Her journey reflects an unwavering commitment to both learning and leadership.

Her foundation of excellence was laid at Visakha Vidyalaya, Colombo, where she excelled in both academics and extracurricular activities. She achieved an extraordinary feat by securing 3As in the G.C.E. Advanced Level Examination in 2018, ranking 1st in the country in the Physical Science stream, becoming the first student from Visakha and only the second female in Sri Lankan history to achieve this milestone.

At university, Chathuni secured a place in the most sought-after department, emerging as the top of the batch in her first year. She immersed herself in various leadership roles, serving as Secretary of the Electronic Club, co-chairperson of the Sri Lankan Robotics Challenge (SLRC) 2022/23, and Media Committee Chair for the IEEE WIE International Leadership Summit 2023 in Auckland, New Zealand.

Her technical achievements are equally impressive. Competing in prestigious global competitions, her team won the Silver Award at the InnovateFPGA Design Contest Grand Finals, organized by Terasic Inc. and Intel Corporation, after securing Gold in the Asia Pacific and Japan Region for their mini-greenhouse management system using Intel FPGAs. She was also a finalist and Best Participant Award recipient at the IEEE International Future Energy Challenge 2022 for developing a smart microgrid inverter.

Competing in these challenges during the COVID-19 pandemic added another layer of difficulty, as limited resources and import restrictions made it extremely challenging to work on hardware projects. Despite these obstacles, Chathuni and her team remained determined, pushing through every challenge with unwavering focus and dedication. She strongly believes that challenges should not be excuses to hold back but rather opportunities to push one's limits and innovate. At a time when many students hesitate to take on hardware-oriented projects due to difficulties in sourcing components, she encourages aspiring engineers to remain committed and fully invest themselves in their work, no matter the challenges they face.

Her final year project focused on Doppler radar-based drone detection in dense urban environments, developing a SIMO radar system integrating advanced signal processing and machine learning. The system achieved 86.11% accuracy across five drone types within a ~10m range and 180° field of view, marking a breakthrough in non-line-of-sight detection.

Beyond academics, Chathuni has built a strong professional foundation. She currently works as a Design Verification Engineer at SiFive, specializing in UVM, cache coherency, hardware verification and RISC-V architecture. Additionally, she serves as an Electronic Engineer at Paraqum Technologies and has been a Visiting Instructor at the University of Moratuwa. Her internship at Electroteks NZ provided hands-on experience in power electronics, supercapacitors, energy storage and wireless power transfer.

Her interests span computer organization, electronics, digital signal processing, image processing, robot design and communication systems. She is an accomplished moderator and public speaker who actively engages in tech talks and leadership initiatives, inspiring young engineers to push their boundaries.

Chathuni's story is one of perseverance, passion and the courage to take on challenges head-on. She believes undergraduate years, while demanding, offer immense opportunities for growth. Encouraging students to explore their interests, engage with lecturers and seize every opportunity, she stands as a beacon of inspiration. The Department of Electronic and Telecommunication Engineering wishes her continued success in all future endeavors.


UNIVERSITY CATEGORY
CHAMPIONS
ENTC
Electronic and Telecommunication Engineering

Acknowledgement

“Do not go where the path may lead, go instead where there is no path and leave a trail.”

-RALPH WALDO EMERSON-

Dr. Thayaparan Subramaniam
Head of the Department

Dr. Subodha Charles
Staff Editor-in-Chief

Dr. Samiru Gayan
Coordinator - ENTC Alumni Connect

Thaveesha Wathudura
Student Editor-in-Chief

Dinujaya Wijewickrama
Student Editor-in-Chief

Ransadi de Alwis
Student Editor-in-Chief

Hansani Kaumadi
Student Editor-in-Chief

Subitson Croos
Head of Public Relations

Viyathma Vidumini
Design Coordinator

Warren Jayakumar
Graphic Coordinator

Praveen Samuditha
Designer

Tharusha Dilshan
Designer

Authors

Chathura Weerasinghe
Hasitha Gallella
Lohan Atapattu
Sajitha Madugalle
Tharushi Karavita
Pulasthi Udugamsooriya
Manuri Boralugoda
Thaveesha Wathudura
Samudra Uduwaka
Pasindu Darshana
Nethmi Amasha
Nilupulee Amarathunga
Sivamynthan Nadesamoorthy
Sasindi Pieris
Sanugi Wickramasinghe
Rusiru Fernando
Muftee Mysan
Warren Jayakumar
Ransadi de Alwis