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# ComSpective

Enlightening perspectives on computing today and tomorrow

- *Technologies & Trends*
- *Research & Applications*
- *Professional & Personal Development*
- *Perspectives on Computing*
- *Software Development Projects*
- *Interdisciplinary Topics*
- *Industry Perspectives*
- *Alumni Views*
- *News & Achievements*

*"Success is rarely achieved in isolation. Encouraging collaboration and creating a culture where everyone feels valued leads to greater innovation and productivity."*

**- Mr. Nishan Mendis**
Chairman of SLASSCOM
Technology and Transformation Leader | CIO of Deloitte, Sri Lanka and Maldives

Faculty of Computing
Sabaragamuwa University of Sri Lanka

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Volume: 04 Issue: 02 December, 2024

With the aim of exploring today'sworld-changing sciences and technolgies in the domain of computing, the Faculty of Computing, Sabaragamuwa University of Sri Lanka takes a step forward to unite with industry professionals and researchers through ComSpective the ICT Technical Magazine.

The magazine provides a brilliant opportunity for individuals who wish to contribute to the knowedge-base through submittingarticles on technology insights,research investigations and experiences in the domain of computing.

# CALL FOR ARTICLES

## VOLUME 05 | ISSUE 01

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- *Software Engineering*
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- *Signal Processing*
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- *Affective Computing*
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- *Industrial Informatics*
- *Robotics and Automation*
- *Image processing and Computer Visios*
- *Services Computing*
- *Multimedia Technologies*
- *Cloud Computing*
- *Visualization and Computer Graphics*

*The magazine also welcomes articles and contributions on various emerging and interdisciplinary topics.*

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Enlightening perspectives on computing today and tomorrow

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**15TH MARCH 2025**

**PUBLICATION DATE**
**25TH MAY 2025**

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- **Columns**
- **Features**
  - *Profiles/Personalities*
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  - *News/Achievements*
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# EDITOR'S NOTE

Dear Reader,

Research and innovation are at the heart of modern progress, driving transformative changes across industries and improving lives worldwide. These advancements enable the development of solutions to complex global challenges and it is crucial for securing a prosperous and sustainable future for everyone.

It is with great pleasure and pride that we present Volume 04, Issue 02 of ComSpective, the bi-annual technical magazine of the Faculty of Computing, Sabaragamuwa University of Sri Lanka.

ComSpective plays a pivotal role in strengthening research and innovation by serving as a platform to showcase groundbreaking ideas, emerging technologies, and impactful discoveries. By connecting researchers, industry experts, and enthusiasts, the magazine fosters collaboration and the exchange of knowledge, inspiring new perspectives and creative solutions. Its focus on highlighting advancements in computing and related fields encourages a culture of innovation, empowering individuals and institutions to push boundaries and drive technological progress.

As we turn the pages of this issue, we hope that you find inspiration, gain fresh perspectives, and discover ideas that spark your curiosity. Let this be a reminder of the boundless possibilities within the field of computing and the role we each play in driving technological progress.

Thank you for being a part of this journey. Together, let us continue to push the boundaries of innovation and excellence.

Thank you.

**Subodhi Wasalathilaka**
*Editor-in-Chief*

# FEATURES

# CONTENT

# HIGHLIGHTS OF EXCELLENCE - FACULTY OF COMPUTING

## EXCELLENCE IN EDUCATION AND INNOVATION: HIGHLIGHTS OF FACULTY OF COMPUTING, SUSL

*Composed by Composed by Dr. Sugeeswari Lekamge and Ms. Ashansa Wijeratne,*
*Faculty of Computing, Sabaragamuwa University of Sri Lanka*

*The Faculty of Computing (FoC) at Sabaragamuwa University of Sri Lanka (SUSL) has established itself as a hub of academic excellence, innovation, and research in the field of computing. Officially inaugurated as the ninth faculty of SUSL through an Order under Section 27(1) in Gazette Extraordinary 2312/14 dated 27th December 2022, the Faculty is committed to producing technologically proficient, ethically grounded, and socially responsible graduates.*

*With an annual intake of nearly 350 students, the Faculty comprises three dynamic academic departments:*

- ***Department of Computing and Information Systems***
- ***Department of Software Engineering***
- ***Department of Data Science***

*The three departments are supported by key committees and cells that uphold quality, innovation, and professional growth. The Faculty Quality Assurance Cell ensures teaching and administrative excellence, while the Curriculum Development Committee aligns curricula with national and global standards. The Research and Ethics Committee fosters interdisciplinary and innovative research, and the Professional Development Committee strengthens industry ties and student skills. The Public Relations Committee enhances visibility through digital platforms and publications. Together, these units drive the Faculty's mission of excellence in computing education and research.*

*The 25th General Convocation of Sabaragamuwa University of Sri Lanka, held on 13th September 2024, marked a significant milestone for the Faculty of Computing. This event celebrated the achievements of students who successfully completed their Bachelor of Science (BSc) Honours Degree in Computing and Information Systems.* **Ms. Hiruni Senevirathna** *was awarded the* **Thambipillai Thambiratnam (J.P.U.M.) Attorney-at-Law Memorial Gold Medal** *for her outstanding performance in Computing and Information Systems. The award, presented by Professor S. Vasanthapriyan, underscores the Faculty's commitment to recognizing and rewarding academic brilliance. Additionally, two exceptional researchers,* **Mr. Abisheth Varman** *and* **Mr. Ashen Iranga Hewarathna***, received the prestigious* **Best Undergraduate Researcher of Computing Gold Medal** *from the Department of Computing and Information Systems. Their innovative research and academic excellence set a benchmark for their peers.*

*On 6th November 2024, the Faculty of Computing unveiled a state-of-the-art Computer Laboratory in a modest yet meaningful ceremony held at the Faculty premises. This new facility is a crucial addition to the Faculty's infrastructure, offering students cutting-edge resources to enhance their academic and research endeavors. The laboratory's inauguration was graced by* **Professor M. Sunil Shantha***, the Vice Chancellor of SUSL,* **Professor S. Vasanthapriyan***, the Dean of the Faculty of Computing, and a group of distinguished guests.*

*As one of SUSL's newest faculties, the Faculty of Computing aspires to become a national leader in computing education and research. By delivering a robust curriculum, fostering a culture of innovation, and gradually upgrading its infrastructure, the Faculty aims to produce graduates capable of making meaningful contributions to the global technology landscape. The Faculty of Computing at SUSL is more than an academic institution; it is a vibrant community committed to shaping the future of technology and empowering students to excel in their chosen fields.*

## *Celebrating Academic Excellence: Professor S. Vasanthapriyan Honored as "ICT Leader of the Year 2023"*

*The Faculty of Computing is proud to announce that Professor S. Vasanthapriyan, Dean of the Faculty of Computing, has been named "ICT Leader of the Year 2023" by the Computer Society of Sri Lanka (CSSL). This prestigious award, presented on November 24, 2024, by the Deputy Minister of Digital Economy, recognizes Professor Vasanthapriyan's remarkable contributions to the ICT field and his visionary leadership in advancing Sri Lanka's digital transformation.*


*This recognition underscores Professor S. Vasanthapriyan's unwavering commitment to excellence, innovation, and leadership in the ICT sector. His accomplishments not only highlight his pivotal role in shaping the nation's digital landscape but also serve as a source of inspiration for aspiring leaders, innovators, and ICT professionals.*

# Sparse Neural Networks: Redefining Efficiency in Deep Learning

***Dr. T. Kokul****(kokul@univ.jfn.ac.lk) Department of Computer Science, University of Jaffna.*

*Dr. T. Kokul attached to the Department of Computer Science, University of Jaffna. His research interest includes Deep Learning, Computer Vision, and Human Computer Interaction.*

Over the past decade, deep neural networks have achieved impressive results in many applications. However, this progress has come with costs: as models grow larger and more complex to improve accuracy, the demand for vast amounts of training data and computational power increases dramatically. The latest deep learning models often face inefficiencies, requiring significant memory, processing power, and time to function effectively. These challenges make it difficult to deploy such models, particularly on devices with limited resources. To address these limitations, incorporating sparsity into neural network designs has emerged as a promising approach. This article explores what sparsity means in neural networks and highlights recent breakthroughs aimed at balancing accuracy and efficiency, leading to a sustainable path for the future of deep learning.

**Sparsity in Neural Networks:**

Sparsity in neural networks refers to a subset of connections between nurons having a value of exactly zero [1]. Unlike traditional dense networks, where every neuron is connected to the next layer, sparse neural networks reduce the number of active connections, making them more efficient without sacrificing performance. The sparsity concept is motivated by findings in neuroscience, where biological brains exhibit sparse activity, with neurons activating selectively rather than simultaneously. In deep learning, researchers found that many weights in dense networks contribute minimally to the final prediction, and neural networks can achieve similar or even superior performance when trained with sparse connections[2].

**Techniques for Sparsity in Neural Networks:**

In the last few years, several techniques have been introduced in sparse neural networks. One well-known approach is pruning, where unimportant elements of a deep neural network are removed to enhance computational efficiency [3].

Pruning can be performed in different ways, such as weight pruning, neuron pruning, and structured pruning. In weight pruning, individual weights in the neural network that contribute the least to the final output are removed, whereas in neuron pruning, entire neurons are removed from a layer. Structured pruning is similar to neuron pruning, but it removes entire groups of weights, such as filters in convolutional layers, or complete channels, or layers of the network. In pruning, unimportant elements of the network can be identified in various ways, such as by the smallest magnitude of the weights, the sensitivity of the loss to changes in the weights, the magnitude of their activations, or the impact of removing each parameter on the network's loss. Although pruning is an effective way to introduce sparsity in neural networks, it has several limitations. It requires significant retraining to recover accuracy after pruning [3]. Additionally, pruning may result in a model that performs well on the training data but struggles to generalize to unseen data.

**Techniques for Sparsity in Neural Networks:**

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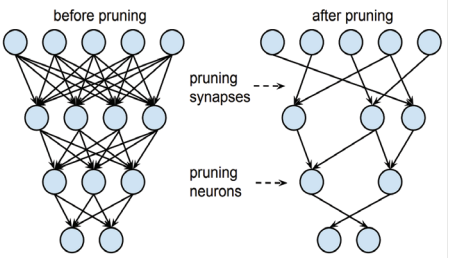



The Lottery Ticket Hypothesis[2] is a recently proposed concept in sparse neural networks. It suggests that within large, over-parameterized networks, there exist smaller sub-networks that can achieve performance similar to the full model [4]. These smaller sub-networks are referred to as "winning tickets". To identify a winning ticket, the full network is first trained to converge, and then a percentage of the network's weights with the smallest magnitudes is pruned. Then, the remaining weights of the pruned network are reset to their original initialization values. Finally, this smaller sub-network is retrained from scratch using the same initialization. If it performs as well as the original full network, it is considered as a "winning ticket". Experiments show that the Lottery Ticket Hypothesis mechanism is far better than traditional pruning techniques, as it achieves better performance with more optimal sub-networks.

**Dynamic Sparsity:**

Dynamic sparsity is another recent concept that differs from the previously discussed static sparsity techniques. Instead of certain neurons remaining inactive once they are pruned for the rest of the training process, dynamic sparsity allows the sparsity pattern to evolve during training. Weights that are pruned at one point may be reactivated in later training steps, while others may be pruned, allowing for a more flexible and adaptive model structure. Dynamic sparsity has several benefits, such as improved adaptability, better model accuracy, and is especially useful when the data distribution changes during training.

**Sparse Transformers: Efficiency in Generative AI:**

Transformers are the driving force behind advancements in Generative AI and language tasks. However, they are not very computationally efficient, primarily due to the quadratic complexity of the attention mechanism. In recent years, several sparse Transformer models [5] have been proposed with linear complexity. Instead of computing attention for all token pairs, sparse -

Transformer models selectively compute attention with nearby tokens or employ a sliding window attention mechanism to reduce computation. By incorporating sparsity into Transformers, it is possible to significantly reduce computational costs, and making it feasible to deploy advanced generative AI solutions at scale.

**Hardware Support and Applications**

To fully benefit from sparse models, specialized hardware support is necessary. Recently, advances in hardware, such as NVIDIA's Ampere and Hopper architectures, have introduced built-in support for sparse computations. These architectures optimize sparse neural network computations, making them faster and more energy-efficient.

Sparse neural networks can be deployed on resource-constrained devices like smartphones and IoT devices, making them suitable for tasks such as image recognition on smartphones, real-time video analytics on drones, and speech recognition in smart home devices. Additionally, they can be used to power AI applications in satellites, medical implants, and green computing.

**The Future of Sparse Neural Networks:**

The future of sparse neural networks involves a blend of advances in hardware, more sophisticated sparsity techniques, and a focus on energy efficiency and scalability. With ongoing research and development, sparsity will play a crucial role in making AI more sustainable, accessible, and capable of handling increasingly complex tasks across diverse platforms, from powerful data centers to tiny edge devices.

***References***

*[1]. T. Gale at al., "The state of sparsity in deep neural networks," arXiv preprint arXiv:.09574, 2019.*

*[2]. J. Frankle and M. Carbin, "The Lottery Ticket Hypothesis: Finding Sparse, Trainable Neural Networks," in International Conference on Learning Representations (ICLR), 2018.*

*[3]. E. Diao at al., "Pruning Deep Neural Networks from a Sparsity Perspective," in ICLR, 2023.*

*[4]. U. Evci at al., "Gradient flow in sparse neural networks and how lottery tickets win," in the AAAI conference on artificial intelligence, 2022.*

*[5]. K. Pinasthika at al., "SparseSwin: Swin transformer with sparse transformer block," Neurocomputing, 2024.*

## Congratulations to Ms. Hiruni Senevirathna

**- Gold Medalist for Best Academic Performance -**

*Warmest congratulations to **Ms. Hiruni Senevirathna** for being awarded the **Thambipillai Thambiratnam (J.P.U.M.) Attorney-at-Law Memorial Gold Medal**, awarded by **Professor S. Vasanthapriyan** at the 25th General Convocation of Sabaragamuwa University of Sri Lanka, held on 13th September 2024.*

*She received this esteemed accolade as the top-performing student in Computing and Information Systems and this achievement includes earning a First Class Degree with the highest Final Grade Point Average (FGPA) in the Degree Examinations.*

# Why You Should Choose Cross-Platform Frameworks Like Flutter Over Native Development for Revolutionizing Mobile Applications.

***R.M.I.M Bandara*** *(isurumbandara@gmail.com), Department of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka*

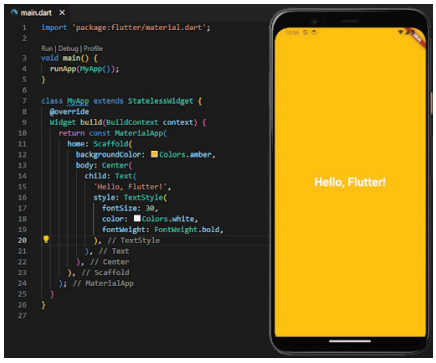
*R.M.I.M Bandara is an undergraduate at the Department of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka. He is passionate in developing mobile applications.*

In the mobile application development environment, it is really important to choose the right approach to get the final result for the product. Traditionally, Significant number of developers have preferred using native development where apps are created for one platform like as Kotlin and Java for Android, Swift and Objective-C for iOS. This approach gives the obvious benefits of being able to harness all the capabilities of the targeted platforms and also provide the most optimized code. But this results in a need to develop different code bases each for a single platform, which in turn affects the development time, effort and costs. Such an approach can pose quite a challenge particularly for organizations interested in targeting both Android and iOS users in the shortest time possible.

When we consider about ***Cross-platform frameworks*** such as ***Flutter*** are transforming the landscape of mobile development to create applications using a single codebase. So that it runs seamlessly on several platforms. Flutter was designed by Google to allow engineering of apps that offered near-native usability and visual quality with considerably less overhead of having to manage two different applications. It provides benefits such as longer time to market, lower maintenance costs as well as the possibility to reach larger numbers of clients without compromising on quality. Separately, Flutter and similar frameworks are the cost-effective and powerful work of native development for startup teams intending to launch a product as soon as possible and for successful business teams intending to build a similar interface for applications on different operating systems. Here's why you should consider using cross-platform frameworks like Flutter to revolutionize your mobile applications.

***The Rise of Cross-Platform Frameworks:*** A look at cross platform frameworks shows that there has been an interest in the method used to develop mobile apps. Originally, native development involved writing applications for the two platforms under different store environments leading to more time, effort, and cost. This was because they had to write two different versions of the same app, although with different languages – Swift and Objective C for iOS, and Kotlin and Java for Android. This often made native development a very costly development methodology particularly to startup firms and small enterprises. Traditional Mobile application development has been altered by framework such as Flutter, which empowers developers to write a ***single set of code for a project that can be run on different platform.*** This approach greatly decreases the time spent in development testing and maintaining the application to the point that businesses are many a time able to launch their products faster and less expensively.

Out of those cross-platform frameworks, Flutter crafted by Google has emerged as rather unique and advantageous in its use due to the backing of the active and large community. Flutter compiles to native ARM code, which can enhance performance by avoiding the need for a JavaScript bridge commonly used in some other frameworks, such as React Native. It works on Dart programming language that is designed for the development of interactive user interface and is furnished with a large set of pre-configurable widgets. These make it easy to create visually good and aligned applications with responsive flows on both IOS and Android. Moreover, Flutter provides developers with numerous plugins and third-party libraries that include a multitude of features that can be easily implemented into the app, which makes Flutter a future-proof to modern app development. Due to these factors, speed, low cost and strong community support make Flutter the best option for any business that would wish to offer quality mobile experience.




***Development Speed and Cost Efficiency:*** Cross-platform frameworks like Flutter offer one of the largest benefits of helping to reduce the development time and cost much. Originally, the native app construction involves writing the code in two distinct environments for Ios using Swift or Objective-C and the other for Android with Kotlin or Java. This does mean that each must be designed, built and rolled out separately which also means that each must be update, debugged and new features added are also added twice. This point doubles the amount of time/effort and financial resources you need and makes native development. That is when, it is unbeneficial for most businesses that strive to maintain the development development costs low.

Whereas when developers are using Flutter framework, App developers code the primary functionalities and layout of an app only once and the benefits include among others, the repetitiveness of coding is eliminated and the chances of having two different looking iOS and Android app are highly minimized. It enables the firms to launch their products much more quickly into the market place – this attribute gives them a competitive advantage especially within the ever dynamic applications market. Reduced time span also enable organizations to quickly and efficiently receive feedback from consumers, contain structural improvements and quickly adapt and launch new product innovations that would meet the needs of consumers. This is especially helpful to the startups and other small firms since they have to be careful when using their resources. To them the possibilities of attaining the quality product without grossing up the development costs by the double can make the difference between success and failure. Being cost efficient, the utilization of Flutter makes it all the more appealing to implement, as it allows companies to concentrate on enhancing the experience of their app, instead of having to allocate time to managing two distinctive codes.

***Consistent UI Across Platforms:*** The biggest issue with native development is a uniform and attractive look and feel across multiple platforms and devices. Every platform of which iOS and Android are part and parcel of has its own specifications when it comes to design standards as well as user interface. For exam

ple, Apple loves the Human Interface Guidelines (HIG), in total flat design and smooth animations, whereas Android uses Material Design. In order to adhere to these guidelines, most native application developers have to make conformities and make special alterations so that the UI corresponds to the norms of each platform. This leads to more time spent, and increased complexity since developers have to ensure that the designs are visually cohesive while considering that different users' experiences will be different. These challenges are solved by flutter which adopts ***"write once, run anywhere"*** strategy: developers can provide similar experience on iOS as well as on Android, while keeping an excellent quality.

Flutter has a rather extensive array of material design and highly configurable widgets and it allows developers to build an identical, platform-specific UI from the same code. This means that users of every platform receive an environment that works naturally even if the pattern of underlying code is indeed the same. Flutter has the so-called widget tree that helps developers compose a complex interface from the ready and own widgets. This approach also offers an apparent advantage of being able to develop app designs that appear refined and possess a standard interface across all the gadgets on which they operate. Moreover, Flutter's Hot Reload feature enables developers to instantly see changes made in the code, without restarting the application. This speeds up the development process and allows for rapid experimentation with design elements, making UI design much more dynamic and flexible.

***Performance on Par with Native:*** Another problem relating to cross-platform frameworks is that of performance where many developers get worried that their app developed on the platforms of such frameworks will not have the same performance as an app that is developed natively. Previously this was an issue since cross-platform solutions frequently relied on additional layers of translation which incurred performance penalties. Nevertheless, Flutter has managed to solve this problem, and today it is unparalleled in terms of speed among cross-platform platforms. Flutter is based on Dart, the language intended for high-speed development of the client part. Dart is compiled directly to native ARM code thus making the Flutter apps native for both iOS and Android platforms.

This leads to quicker run time and efficiency which is at par with the new generation applications developed using platform based languages such as Swift or Kotlin. While there are other cross-platform development frameworks that rely on a JavaScript-based intermediary to transmit information between the application's functional core and native elements of the device, Flutter does this directly. With the removal of the JavaScript bridge, Flutter reduces the amount of time taken to communicate between the app and main program which are major set- backs for most frameworks. This direct compilation process helps Flutter apps stay fluid and do not compromise on the level of native they could provide.

Additionally, the Flutter framework uses its own rendering engine called Skia that has a central position in the successful fulfillment of user experience. Skia helps Flutter render its widgets instead of native widgets, this means that the developer gets pixel-perfect control of the interface. This allows for smooth motion and efficacious transitions with high frame rates which in turn results to interaction elegance and good graphical user interfaces comparable to that of the native apps. The fact that you can do all of your graphic and animation work right at the native level makes Flutter ideal for creating highly graphical and animated applications such as games, multimedia applications, or any application that you may want to be smooth-shining with high quality graphic animations. Therefore, the users feel more or less the same feeling as that of using apps developed natively and thus makes Flutter an effective tool to promote quality mobile applications.

***Access to Native Features:*** Another important factor consistent with why developers have always preferred to use native development is the ability to have direct access to device functionality including ***the camera, GPS, accelerometer, sensors and the other hardware components.*** It is possible to deliver these features natively and as a result have tight control over them and guarantee t-

at the applications delivered will be able to work on within all the possibilities offered by the devices. This direct access is especially important for those apps that may need advanced functions such as augmented reality, virtual reality, or the application in which real-time geographic coordinates shall be widely employed. But frameworks that support cross-platform like Flutter have reduced this dichotomy to a very small extent, as these native features can now be used while having most benefits of using a single codebase. Regarding mixing functionalities, thanks to Flutter, developers have the opportunity to work on native platform channels.

These channels allow communication between the Flutter code to the native code, which would be Kotlin/Java for Android and Swift/Objective C for iOS. This means that if any functionality is not available in Flutter's widget and package, developers can reuse native code for each platform and use the platform channels to communicate with Flutter applications. This approach helps developers to use system level features or any API connected with the platform where Flutter cannot directly provide support or want to implement more control to interact with the device like a camera or Bluetooth controls. This flexibility is the key driving factor for projects which need to have native level performance and direct access to certain specific features of device and at the same time using only one code base.

Also, the active Flutter community continuously contributes to a growing ecosystem of plugins and packages which makes development a much simpler affair. Moreover, the majority of often-used capabilities, such as scanning the camera or working with the push notifications or with other services, are immediately available as plugins. This minimizes the use of developing custom native codes, which makes developers to spend much time and energy. For example, geolocator that helps to use GPS functions or camera that allows using camera in the application, are comparable in stability and easy to install in a Flutter application without many configurations. Therefore, developers can retrospectively enrich the application's functionality with features implemented with both cross-platform and native development. It results in Flutter continuing to be a viable option for making intricate applications whilst giving direct access to native API's without forcing one to juggle over different codes.

***Strong Community and Ecosystem:*** Selection of the framework is not only governed by technological considerations but also aspects of the community and ecosystem surrounding it. Flutter has quickly built a strong and active developers' community, contributors, and growing companies. Google continues to invest enhance and tangible money in improving Flutter and adding new features, the technology is guaranteed to be resilient for the long-term. Starting from detailed documentation to social media groups, one can get a lot of information on how to solve problems, how and when to do something, and what the latest innovations are.

This Ecosystem tells that to invest in long-term applications, they will use Flutter confidently because in the future, Flutter will be there to support and upgrade their apps.

***Future-Proofing with Cross-Platform Development:*** It will become inevitable to future proof our mobile applications as the future of the technology is very unpredictable. Frameworks that support more than single platform such as Flutter help the businesses very much when new devices and platforms appear. With platforms like Fuchsia, an experimental Operating System by Google, in the market, popular for creating fast applications, the cross-platform compilation becomes the biggest advantage to choose flutter for businesses. Selecting Flutter may leave your business well equipped to adapt to embracing the next novel technology or a new trend. As more people request a program that is compatible with multiple platforms it can be an advantage to have your app created with such a format.

***Conclusion:*** In conclusion, cross-platform frameworks like Flutter present a compelling alternative to native development and redefining how mobile applications are built. Flutter stands out as a powerful solution for creating modern mobile applications because of ability to combine faster development cycles, cost savings, consistent user interfaces, and high performance. The framework's powerful ecosystem that has a wide range of libraries and plugins. It enhances and enable developers to create apps that meet user expectations while maintaining a high quality. This unique combin-

combination makes Flutter an excellent selection for businesses looking to innovate and transform mobile app strategies in a rapid competitive landscape.

While native development still has its place for certain high-performance, platform-specific needs such as games requiring advanced graphics or applications. It demands deep integration with the operating system cross-platform frameworks like Flutter are increasingly becoming the preferred choice for mobile applications. Whether you're a startup aiming to rapidly launch a minimum viable product (MVP) or an established enterprise seeking to expand your reach into new markets. Flutter is able to facilitate the development of beautiful UI, performant, and cross-platform applications. Thus, using the possibilities of Flutter, organizations can bring their mobile application development process to the next level allowing them to meet the users' needs and new technologies much faster while giving users a similar experience across different devices. Apart from this, this new approach facilitates the app development process while providing value add businesses in the context of the digital mobile app business environment. When you consider the above factors, you can better understand why we should choose Flutter for mobile application development.

# ALUMNI VIEW

**Buddhika Priyabhashana**
*Senior Software Engineer - Sysco LABS*

*I'm Buddhika Priyabhashana, currently working as a Senior Software Engineer at Sysco LABS. With a strong background in Software Engineering and a passion for emerging technologies, I have accumulated over five years of industry experience. Prior to Sysco LABS, I had the privilege of working at WSO2, Arimac Lanka, and Omobio, which significantly contributed to my professional growth.*

*I completed my Bachelor's Degree in Computing and Information Systems from Sabaragamuwa University of Sri Lanka. My final year research project focused on "Implementing Fog Computing Architecture using Cloud Computing and Deep Neural Networks," culminating in five research publications. In addition to my technical expertise, I hold a Master of Business Administration (MBA) from the Postgraduate Institute of Management, University of Sri Jayewardenepura, Sri Lanka.*

*As an alumni member, I can proudly say that the foundation of my success was built in the Department of Computing and Information Systems, which has now evolved into the Faculty of Computing. During my time as an undergraduate, I had the opportunity to contribute to the community alongside academics in various areas. Organizing events, sharing knowledge and experience through tech talks and dedicated platforms, participating in tech events, and expanding my network all played a major role in preparing me for the IT industry.*

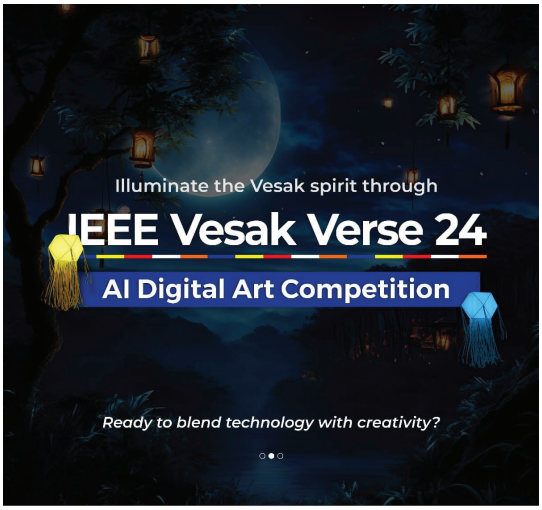
*Community engagement plays an essential role in the IT industry, opening numerous opportunities to expand knowledge and gain experience that can be applied in the field. Success in the IT sector is a journey of lifelong learning and continuous knowledge acquisition, which I consider vital for a successful career transition. To enter and thrive in the IT industry, one must be confident in their competencies, while also demonstrating passion and adaptability. I was able to acquire these skills during my time as an undergraduate with the Department of Computing and Information Systems, and I believe the Faculty of Computing continues to foster this transformational positive impact on the IT sector.*

# IEEE VESAK VERSE 24

## BRIDGING TRADITION AND TECHNOLOGY: IEEE STUDENT BRANCH OF SUSL PRESENTS IEEE VESAK VERSE

*Composed by Dushyantha Thilakarathne (dushyanthaat@gmail.com), Faculty of Computing, Sabaragamuwa University of Sri Lanka*

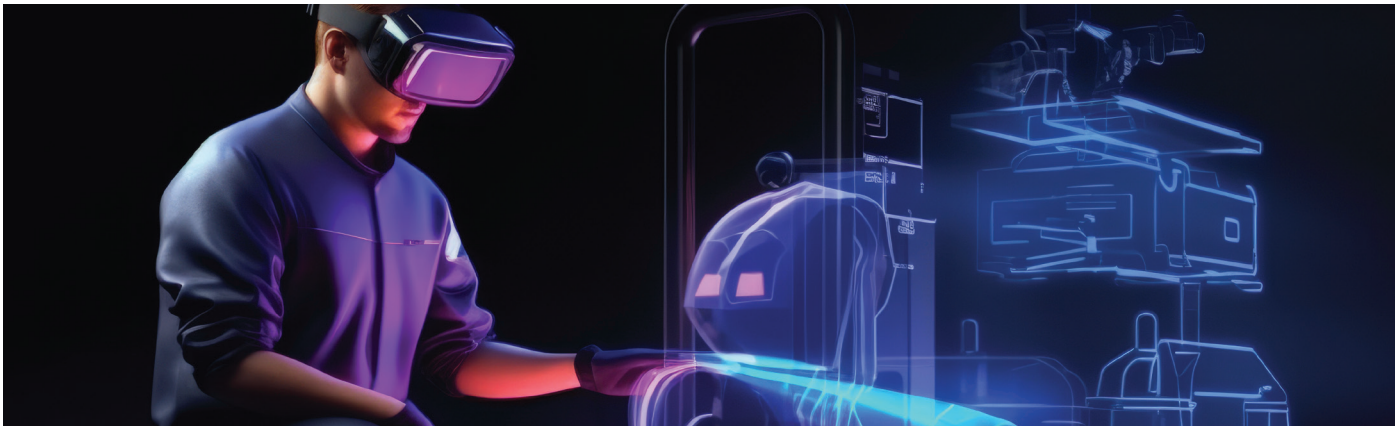
*The IEEE Student Branch at Sabaragamuwa University of Sri Lanka recently hosted the IEEE Vesak Verse 24 Inter-University AI Digital Post Competition, celebrating Vesak through AI-driven digital art. This unique event invited undergraduates from universities across Sri Lanka to create digital artworks inspired by Vesak, blending cultural tradition with modern technology.*




*The competition opened for submissions on May 15, 2024, receiving over 20 entries from talented students nationwide. A week-long voting phase followed on the IEEE SUSL branch's Facebook page, where the public liked and commented on their favorite pieces, fostering a sense of community around this digital Vesak celebration. Winners were selected based on reactions , making the process both transparent and community-driven.*

*TOn June 3, 2024, Mr. Kanchuka Chamod Amarasinghe from the Open University of Sri Lanka won first place for his captivating piece, while Ms. Yapagei Manodma Kavindi from SUSL took second place. Both winners received prizes in recognition of their talent.*

*With this year's success, the IEEE Student Branch of SUSL is excited to announce that Vesak Verse V2.0 will return next year, promising even more opportunities for students to creatively merge Sri Lankan heritage with digital innovation.*

# Balancing Privacy and Utility of ECG Data within Immersive Technologies

***Dr. R.T. Uthayasankar*** *(rtuthaya@cse.mrt.ac.lk), Department of Computer Science & Engineering, University of Moratuwa*

*Dr. R.T. Uthayasanker is a Senior Lecturer of the Department of Computer Science & Engineering at the University of Moratuwa in Sri Lanka. He oversees DATASEARCH, a multidisciplinary research center dedicated to conducting analytics, engineering, and data science research.*

The explosive adaptation towards immersive technologies such as augmented reality (AR), mixed reality (MR), and virtual reality (VR) is transforming our day-to-day activities. It is estimated that by 2027, both AR and VR are expected to have surpassed 100 million users worldwide [1]. The estimated growth is shown in Figure[1]. Meanwhile, it is rapidly transforming the healthcare industry, particularly the clinical setting in which biometric data are collected. In the past, the collection of Electrocardiograms (ECGs) was done in a clinical setting where the patients were strapped onto a machine. However, immersive technologies have transformed this traditional setting by providing an interactive and dynamic environment for the efficient collection of data.

AR can project real-time data onto the real environment, which enables individuals to view the behavior of their hearts while engaging in their daily activities, while VR generates virtual environments for training and simulation purposes. For example, VR can provide an immersive calming environment during the collection process to reduce anxiety which in turn results in a better accurate reading without many variations. In contrast, MR provides a blend of AR and VR technologies, enabling users to engage with virtual interfaces alongside the real surroundings.

### The Double-Edged Sword

Nevertheless, all the uniqueness and the advantages of immersive environments come with a huge privacy challenge, mainly due to data centralization and transmission. Although centralized storage makes it easy for healthcare providers to access and analyze data, it also provides a hotspot for adversaries to obtain the same data without authorization. Moreover, the transmission of data from the immersive headsets to a centralized server provides various pathways for adversaries to unauthorized access such as man-in-the-middle attacks. It is also

not eworthy to note that ECG data can also be used to identify an individual uniquely just like fingerprints and iris patterns. Since the ECG data contains unique biometric identifiers and other valuable information such as health data, gender data, and age data, [2] obtaining an ECG becomes much more valuable to an adversary. The exposed information could lead to identity theft and in worse case scenarios it could lead to singling out individuals for manipulation, extortion, or blackmail.

Many international bodies and governments are becoming increasingly vigilant about the potential impact of unauthorized access to personal information and actively developing precautionary measures to protect them. For example, the General Data Protection Regulation (GDPR) in Europe provides instructions on how to manage personal information, however, the adaptation of these rules to immersive technologies is minimal.

## The Urgent Need for Privacy-Preserving Techniques

There is an urgent need for privacy preservation techniques adapted to the immersive environment due to the inherent risk they pose. Various studies have been conducted on protecting biometric data, particularly focusing on ECG. Anonymization methods, differential privacy, encryption, and pseudonymization techniques have been studied extensively in the literature to increase the privacy of biometrics, while there is a growing trend in studies adapting them to immersive environments.

In addition to developing rules and improving technology to protect privacy, patients should be educated and made vigilant about the collection and utilization of these data in order to create awareness. Moreover, patients should be given the ability to consent to what data is shared and how much is shared. This ensures that individuals trust this emerging technology and feel comfortable using this technology.

The loss in utility when increasing privacy evident in numerous studies highlights that striking a balance between personal security and information remains a significant challenge. This tradeoff between privacy and utility is illustrated in Figure 1.

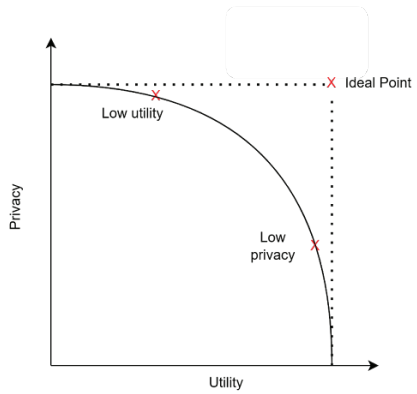



***Figure 1:*** *The Trade-off between Privacy and Utility for ECG signals*

With the increased regulations and to foster trust among the users, the organizations that manufacture the immersive headsets and those who intend to provide services through them might need to innovatively address this tradeoff. This complex interplay highlights the need for creative solutions that can simultaneously increase privacy while preserving the utility of data.

To effectively balance privacy and utility in immersive technologies, healthcare organizations and immersive technology manufacturers must adopt privacy-enhancing technologies (PETs) such as data anonymization and differential privacy to safeguard sensitive data during transmission and processing. Further implementing transparent consent mechanisms, ensures that users fully understand how their data will be used and granting them control over their privacy settings. Additionally, regular privacy audits and compliance assessments are necessary to stay aligned with evolving regulations and standards. Moreover, a user-centric approach should be adopted, enabling individuals to easily manage their data access and sharing preferences.

By effectively tackling privacy issues associated with immersive environments, the healthcare industry and users can harness the true capabilities of AR, MR, and VR while maintaining trust. The goal should be to establish a safer environment in which patients can enjoy real-time monitoring while trusting that their data is private and safeguarded.

### *References*

*[1]. F. Richter, "AR & VR Adoption Is Still in Its Infancy," Statista, 2024. [Online]. Available: https://www.statista.com/chart/28467/virtual-and-augmented-reality-adoption-forecast/. [Accessed: 21-Oct-2024].*

*[2].* S. Noh, J. Kim, S. Lee, Y. Kang, C. Park, and Y. Shin, "Broken Heart: Privacy Leakage Analysis on ECG-Based Authentication Schemes," Security and Communication Networks, vol. 2022, Article ID 7997509, 2022. doi: 10.1155/2022/7997509.

# SOCIETY OF COMPUTER SCIENCE - SUSL

## THE SOCIETY OF COMPUTER SCIENCE (SOCS), SABARAGAMUWA UNIVERSITY OF SRI LANKA

*Composed by Disara Mapalagama (ddmapalagama@std.appsc.sab.ac.lk), Sabaragamuwa University of Sri Lanka*

*Founded in 2012 by students from the Department of Computing and Information Systems (now the Faculty of Computing), the Society of Computer Sciences (SOCS) has become a cornerstone for fostering IT literacy and technological curiosity among undergraduates. Through various initiatives, SOCS has cultivated a vibrant community dedicated to advancing computer science knowledge and skills, both on campus and in the broader community.*

SOCS
Society Of Computer Sciences
Sabaragamuwa University of Sri Lanka

*A key annual event for SOCS is **LetMeHack**, an eco-friendly hackathon that emphasizes open-source solutions with social and environmental impact. This 24-hour overnight event invites university students from across Sri Lanka to develop solutions for pressing global challenges, showcasing their skills before a panel of tech experts. Participants engage with guest speakers, mentors, and sponsors from diverse fields. In line with its eco-friendly ethos, LetMeHack promotes initiatives such as tree planting and avoids single-use plastics, establishing itself as a premier platform for coding and collaboration. The latest edition, LetMeHack V3.0 is set to be held in December 2024 with grand celebrations.*


***Virtual Rival** is another hallmark event, transforming the university into an e-sports arena where students compete in popular and challenging games. This annual inter-faculty gaming competition promotes strategic thinking, teamwork, and a celebration of gaming culture while highlighting the growing field of e-sports.*


***Code Night*** *adds a competitive dimension tailored for 1st, 2nd, and 3rd-year undergraduates. Organized by final-year students, it introduces an idea hackathon for 3rd-year students, an algorithm hackathon for 2nd-year students, and, for the first time, participation from 1st-year students. Code Night fosters creativity, collaboration, and innovation among all academic years.*

***SOCS*** *also hosts Fortnight Meetup Sessions, a biweekly series that promotes technical and personal development through discussions led by experienced speakers. These sessions combine innovative ideas and activities, equipping students with essential skills and insights into the evolving tech landscape while promoting career opportunities in the IT sector. The latest Fortnight Meetup Sessions featured captivating talks on trending topics, including AI, Langchain, Project Management, and Real-Time Web Communication, delivered by undergraduates of the university.*


***The Tech Talk*** *Series enriches students' understanding of industry trends by inviting experts to share their experiences and insights, bridging the gap between academic learning and real-world applications. These engaging sessions provide practical advice and inspire students to align their skills with industry expectations. The next session of the Tech Talk Series is scheduled for December 2024, promising valuable insights.*

***The Vidunena*** *webinar series empowers advanced-level students preparing for the G.C.E. (A/L) Examination in ICT. This program focuses on key curriculum topics, helping students build essential knowledge and confidence while also raising awareness of career opportunities in IT. The latest version, Vidunena V4.0 is currently being conducted from November 8 to November 13, 2024.*

***The Exhibition of IT Innovations,*** *organized by SOCS, showcases student innovations that integrate IT with various fields. This exciting platform invites students to present unique IT-related projects, demonstrating technological advancements and promoting interdisciplinary collaboration. Through this exhibition, SOCS aims to inspire creativity and entrepreneurship while highlighting the practical applications of computer science in addressing real-world challenges.*

*Through these diverse initiatives and events, the Society of Computer Sciences at Sabaragamuwa University of Sri Lanka not only enhances the educational experience of its members but also cultivates a culture of innovation, collaboration, and leadership within the tech community. Committed to its mission, SOCS strives to make a positive impact on both its members and the wider community.*

# Securing the Future: Navigating the Complexities of Privacy in the Digital Age

***Ravindu Prabashwara Chandrarathna,*** *(tadrpchandrarathna@std.appsc.sab.ac.lk), Department of Software Engineering, Faculty Of Computing, Sabaragamuwa University of Sri Lanka.*

*Ravindu Chandrarathna is a third-year undergraduate of software engineering at Sabaragamuwa University of Sri Lanka. He successfully completed a diploma in cyber security and ethical hacking at SITC Campus with a commendable achievement. He is passionate about researching Cyber Security.*

In today's connected world, security and privacy have become critical concerns for individuals and organizations alike. With the rise in cybercrime, government surveillance, and data breaches, safeguarding our digital footprint is essential. This article explores the major challenges in data protection, emerging security technologies, and actionable strategies to navigate the complexities of privacy in the digital age.

## 1. Current Challenges in Security and Privacy

**1.1 Data Breaches and Cyberattacks:** *Cyberattacks, such as ransomware and phishing schemes, have become daily occurrences. High-profile incidents at multinational corporations and hospitals illustrate the vulnerabilities even in protected environments. Such breaches lead to financial losses and reputational harm.*

**1.2 Lack of User Awareness:** *Despite rapid technological advancements, many users remain unaware of how their personal data is collected, stored, and utilized. A study I conducted on Sri Lankan university students revealed that many lack basic knowledge about online security.*

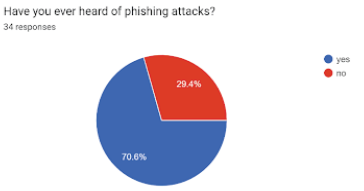



***Figure 1:*** *Knowledge about phishing attacks*

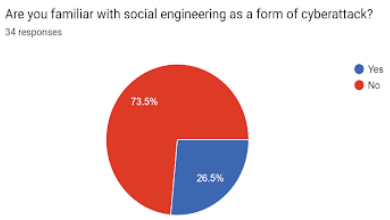



***Figure 2:*** *Knowledge about Social Engineering*

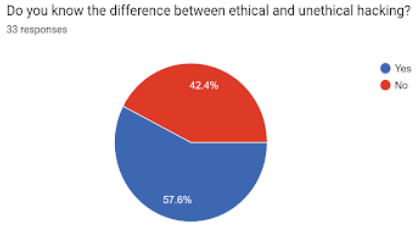



***Figure 3:*** *Knowledge about Ethical Hacking*

**1.3 Balancing Convenience with Security:** *Interconnected devices, such as smart homes and wearables, enhance convenience but increase vulnerability. The trade-off between convenience and security is a pressing challenge in today's IoT-driven world.*

**2. Emerging Trends and Technologies**

**2.1 Balancing Convenience with Security:** *Zero Trust Architecture operates on the principle of "never trust, always verify," ensuring higher security for every interaction.*

**2.2 Advances in Encryption:** *Modern encryption techniques allow secure data processing without exposure, benefiting industries like healthcare and finance.*

**2.3 Artificial Intelligence in Security:** *AI-powered systems revolutionize security by detecting, predicting, and responding to threats in real time.*

**2.4 Blockchain for Data Integrity:** *Beyond cryptocurrency, blockchain ensures data integrity by decentralizing records, making tampering exceedingly difficult.*

**3. Privacy in the Age of Surveillance**

**3.1 Government Surveillance and Regulation:** *Global regulations, such as GDPR and CCPA, aim to give individuals more control over their data, emphasizing privacy rights.*

**3.2 Corporate Responsibility and Transparency:** *Companies must prioritize transparent data practices to build customer trust and comply with privacy laws.*

**4. The Role of Individuals in Protecting Privacy**

**4.1 Best Practices for Personal Security:** *Simple habits, such as using strong passwords and enabling two-factor authentication, significantly enhance security.*

**4.2 Avoiding Social Engineering Scams:** *Awareness of manipulation tactics, such as phishing, can mitigate risks associated with social engineering attacks.*

**4.3 Avoiding Social Engineering Scams:** *Awareness of manipulation tactics, such as phishing, can mitigate risks associated with social engineering attacks.*

**5. Conclusion and Suggestions**

Security and privacy extend beyond corporate domains to personal responsibilities. Advancements in AI encryption, and blockchain offer promising solutions, but the onus lies on individuals, organizations, and governments to ensure data protection. By adopting proactive strategies and staying informed, we can build a secure digital future.

***References***

*[1]. R. Anderson, Security Engineering: A Guide to Building Dependable Distributed Systems, 3rd ed. Indianapolis, IN: Wiley, 2020.*

*[2].* K. Zetter, Countdown to Zero Day: Stuxnet and the Launch of the World's First Digital Weapon. New York, NY: Crown, 2014.

*[3].* E. Casey, "The impact of digital forensics on privacy and security," Communications of the ACM, vol. 62, no. 4, pp. 58–65, Apr. 2019.

*[4].* A. Greenberg, Sandworm: A New Era of Cyberwar and the Hunt for the Kremlin's Most Dangerous Hackers. New York, NY: Doubleday, 2019.

*[5].* S. Sachdeva, A. Kumar, and R. Rajesh, "IoT security framework using Blockchain technology," in Proc. Int. Conf. Security and Privacy (SP), 2023, pp. 75–81.

## *Celebrating the Achievements of the Fresh Graduates of Faculty of Computing!*

*With profound delight, extending warmest congratulations to the students of the Faculty of Computing who have earned their BSc Honors Degree in Computing and Information Systems at the 25th General Convocation of Sabaragamuwa University of Sri Lanka, held on 13th September 2024.*

*Their hard work and determination have led to this remarkable milestone, and the Faculty of Computing of SUSL takes immense pride in their accomplishments.*

# WIE AFFINITY GROUP - SUSL

## ADVANCING WOMEN IN TECH: THE INSPIRING JOURNEY OF IEEE WIE AFFINITY GROUP AT SABARAGAMUWA UNIVERSITY

*Composed by Ms. Warushika Dahanayake (warushikarashmi@gmail.com), IEEE WIE Student Branch Affinity Group of Sabaragamuwa University of Sri Lanka*

*The IEEE Women in Engineering (WIE) Affinity Group at Sabaragamuwa University of Sri Lanka is a vibrant organization dedicated to advancing women's involvement in STEM (Science, Technology, Engineering, and Mathematics) fields. As part of the IEEE network, this affinity group strives to empower and inspire female undergraduates to excel in technology and engineering, fostering a supportive environment where they can build futures driven by knowledge, innovation, and leadership.*

*One of the most notable achievements of the IEEE WIE Affinity Group at Sabaragamuwa University is the highly anticipated annual event, PearlHack. As the flagship event, PearlHack brings together enthusiastic minds in technology and innovation, challenging participants to push the boundaries of their technical skills and creativity. The event has gained even more prestige due to its parallel alignment with ICARC, the International Conference on Advanced Research in Computing. In 2024, the collaboration between PearlHack and ICARC provided participants with an unmatched platform to showcase their ideas at a conference that celebrates cutting-edge advancements in computing. In 2025, PearlHack V3.0 will once again run in parallel with the prestigious ICARC 2025 conference, continuing to provide a high-impact platform where participants can showcase their innovations alongside global advancements in computing.*


*The initiatives of the IEEE WIE Affinnity Group extend beyond PearlHack, with an impressive lineup of events that significantly impact society and empower women to engage with technology. Among these are Pathforward, a series of knowledge-sharing sessions designed to bridge knowledge gaps and facilitate growth; Qwhiz, an online quiz competition that challenges participants' knowledge and problem-solving abilities; VisionX, an AI and IoT innovation challenge that encourages students to solve real-world issues with advanced technologies; Hope, a charity-focused initiative aimed at creating meaningful social impacts; and Aurelia, a special event celebrating IEEE WIE Day to raise awareness among young women about STEM opportunities and the potential to excel in technology-driven careers.*

*The dedication of the IEEE WIE Affinity Group of SUSL has brought about numerous positive changes, and its new executive committee for the 2024/25 term is poised to continue this momentum. This new board, officially appointed on September 10, 2024, consists of passionate and motivated leaders who will guide the affinity group in achieving its mission. Mrs. W.V. S.K. Wasalthilake, a probationary lecturer at Sabaragamuwa University, will serve as the Counselor, pro*

*viding valuable guidance and support. Leading the group as Chairperson is Ms. Warushika Dahanayake, supported by Ms. Tharani De Silva as Vice-Chairperson. Ms. Shanika Dilrukshi takes on the role of Secretary, with Ms. Imasha Kumarasinghe as Vice-Secretary. The Public Relations Manager, Ms. Mariyeta Rodrigo, will focus on enhancing the group's outreach, while Ms. Imasha Samarasinghe, as Event Coordinator, will bring innovation to every occasion. Overseeing the group's financial activities is Treasurer Ms. Nethmini Sandunika, while Ms. Anathil Jeyapathy serves as the Volunteer Coordinator, connecting passionate volunteers with impactful projects.*

*Together, this dedicated team is prepared to carry forward the legacy of the IEEE WIE Affinity Group, building on the transformative initiatives established by the previous executive committee. The hard work and vision of the past committee have paved the way for continued progress, empowering women in technology. The new team is committed to inspiring the next generation and advancing efforts to close the gender gap in STEM, demonstrating that with the right opportunities, women in Sri Lanka and beyond can lead and innovate across all fields.*

# ALUMNI VIEW


**Salinda Wijayabandara**
*XD Consultant - Virtusa (Pvt) Ltd.*

*Hello Readers,*

*I am Salinda Wijayabandara, currently serving as an Experience Design Consultant at Virtusa (Pvt) Ltd. With over seven years of exceptional experience in user experience design, I have had the privilege of contributing to some of the world's leading tech projects over the past few years.*

*I hold a Bachelor's Degree in Computing and Information Systems from the Sabaragamuwa University of Sri Lanka. As a proud alumnus, I can confidently say that the foundation of my success was built within the Department of Computing and Information Systems, which has now evolved into the esteemed Faculty of Computing.*

*During my undergraduate years, I honed my skills to align with industry standards, enabling me to seamlessly transition into the professional world. I owe immense gratitude to the leadership and academic staff of the department for their unwavering dedication and commitment to shaping students into industry-ready professionals. The department's comprehensive curriculum, combined with its well-structured academic activities, offered a range of technical sessions, workshops, and extracurricular events, all of which were instrumental in preparing students to meet the demands of the industry.*

*To everyone who has contributed to this remarkable journey, I extend my heartfelt congratulations and best wishes. I firmly believe that the skills and knowledge imparted through these programs will empower students to face the challenges and opportunities of tomorrow, make meaningful contributions to the global community, and further elevate the reputation of our esteemed faculty.*

# COVER STORY

## INSPIRING LEADERSHIP: A JOURNEY THROUGH THE CAREER OF MR. NISHAN MENDIS

*With over 26 years of professional excellence, Mr. Nishan Mendis, the Chairperson of SLASSCOM, epitomizes the perfect blend of leadership, vision, and unwavering commitment to Sri Lanka's growth. Born in Ratnapura, his remarkable journey, from a young boy studying at S. Thomas' College, Mount Lavinia, to leading the nation's premier IT and BPM industry association, is a testament to hard work, resilience, and a deep-seated desire to make a difference.*


### Early Education and Career Beginnings

*Mr. Mendis began his educational journey at the University of Peradeniya, where he pursued a Bachelor of Science degree. He complemented his academic achievements by earnearning his CIMA qualification, equipping himself with both theoretical and practical knowledge for the corporate world. His professional career began at KPMG, where he honed his financial and auditing skills. From there, he joined a fintech company, SasiaNet/RoomsNet, where he rose to the position of COO. However, his true calling emerged when he joined PwC to lead the World Bank-funded eSriLanka ICBP program, implemented by ICTA. This marked a turning point, as it allowed him to channel his passion for contributing to the development of Sri Lanka.*

### A Legacy of Leadership and Transformation at Deloitte

*Mr. Mendis's career reflects a remarkable blend of technical expertise and strategic vision. Following a successful tenure at PwC, where he held various leadership roles, including Partner and Technology Consulting Leader, his journey took a significant step forward in 2023 when the firm transitioned to the Deloitte network. At Deloitte, he serves as a Partner, Technology & Transformation Leader, and a member of the Leadership Team and Executive Committee, driving innovation and impactful transformation across multiple industries.*

### A Lifelong Association with SLASSCOM

*Mr. Mendis' association with SLASSCOM dates back to its inception. During his time with the ICBP program, he collaborated closely with industry leaders, building strong relationships with veterans who later united to establish SLASSCOM. Over the years, he has played pivotal roles within the organization, serving as part of the General Council and later on as Director of Finance, Vice Chair, and now Chairperson. His leadership has been instrumental in shaping the IT-BPM industry's growth trajectory. Reflecting on his journey, Mr. Mendis humbly acknowledges the contributions of others:* ***"At SLASSCOM, I stand on the shoulders of many visionary leaders and dedicated boards who have guided us with wisdom and foresight. Their legacy is the foundation upon which I now have the privilege to build."***

### An Evolved Leadership Style

*As a leader, Mr. Mendis has evolved from focusing solely on goals to valuing empathy, appreciation, and teamwork. He believes in recognizing the efforts of every team member, fostering collaboration, and building motivated teams. "****Success is rarely achieved in isolation. Encouraging collaboration and creating a culture where everyone feels valued leads to greater innovation and productivity,"*** *he explains.*

### A Vision for Sri Lanka as a Global Tech Hub

*At the helm of SLASSCOM, Mr. Mendis' vision is clear: to position Sri Lanka as a global hub for technological innovation. Recognizing the critical role of exports in the country's economic recovery, he envisions to spearhead initiatives such as the 'Industry Ambassador Program,' leveraging the goodwill of Sri Lankans abroad to amplify the country's global presence. Additionally, programs like 'Empowering Global Growth' aim to provide companies with resources, market access guidance, and support to thrive in export markets. Partnerships with global ecosystems, such as the recent MoU with IIT Madras, further underscore his commitment to fostering innovation and growth.At the helm of SLASSCOM, Mr. Mendis' vision is clear: to posi*

## A Vision for Sri Lanka as a Global Tech Hub

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## The Current State of Sri Lanka's IT Industry

*Under Mr. Mendis' leadership, SLASSCOM has navigated significant challenges, including talent shortages due to brain drain and increased business costs. Yet, he remains optimistic about the industry's potential.* ***"We have extraordinary talent, second to none, capable of turning opportunities into reality. This industry has the potential to be a game-changer for Sri Lanka's economic development,"*** *he asserts.*

## Preparing for the Future

*Recognizing the importance of staying ahead in emerging technologies, SLASSCOM, under Mr. Mendis' guidance, focuses on areas like AI, cloud computing, data analytics, and cybersecurity. Initiatives like the SLASSCOM Academy and the AI Asia Summit aim to equip professionals with the skills needed for the future. "****While technical skills are essential, professional and life skills are equally important. SLASSCOM's Professional Skills Framework offers free access to soft skills training, helping individuals enhance their capabilities,"*** *he adds.*

## Strengthening Industry-Academia Collaboration

*Mr. Mendis emphasizes the evolving relationship between academia and industry. Through partnerships, MoUs, and initiatives like the Industry Placement Program for academic staff, SLASSCOM ensures that curricula align with industry needs, preparing a future-ready workforce.*

## Advice to Aspiring Professionals

*To students and young professionals, Mr. Mendis offers words of wisdom: "Embrace continuous learning and develop qualities that embody our brand, 'Island of Ingenuity.' Foster collaboration, creativity, and problem-solving capabilities. He further states, "Don't just focus on climbing the corporate ladder—focus on building ladders for others. Your legacy won't be measured only by your achievements but by the lives you touch along the way. Success is not a destination, but a journey, and the most fulfilling part of that journey is knowing you made a difference."*

*Throughout his life, Mr. Mendis has been dedicated to inspiring young professionals to stay grounded and remember their roots. As he passionately puts it, "Sri Lanka is an island of ingenuity, and you are blessed to be born into this country and carry forward that proud legacy. This nation has given you so much." Whether at home or abroad, Mr. Mendis encourages young minds to give back to their homeland, carrying the spirit of resilience, creativity, and community.*

## In Overall

*Mr. Nishan Mendis' journey is one of inspiration and aspiration. As the Chairperson of SLASSCOM, he continues to pave the way for Sri Lanka's IT-BPM industry to shine on the global stage. His story is a powerful reminder that with dedication, collaboration, and a vision for the greater good, the possibilities are truly limitless.*

***Author:*** *Ms. W.A.Tharushi Gavesha Rusirini Wijethunga, 3rd Year Undergraduate, Faculty of Computing, SUSL*
***Editor:*** *Mrs. P.K.D.K. Kaushalya, Lecturer(Temp.), Faculty of Computing, SUSL*

# Optimizing Flow Table Efficiency and Security with Dynamic Timeout Policies in Software-Defined Networks

***Mr. K. Saanusan,*** *(saanusansaanu@gmail.com), Department of Computer Science, University of Jaffna.*

*Mr. Karuppaiyah Saanusan is a final-year undergraduate student in the Department of Computer Science at the University of Jaffna, Sri Lanka. His research interests include Software-Defined Networking, Network Security, and Machine Learning.*

In the digital age, the rapid growth of connected devices and data traffic has pushed the limits of traditional networking models. Internet-dependent activities are essential for personal and organizational tasks, requiring high-speed, reliable, and scalable communication. Network infrastructure ensures smooth data exchange between devices, supporting uninterrupted workflows across domains like Finance, Healthcare, and Education.

Traditional networks combine decision-making and packet forwarding into the same physical devices, known as the control plane and data plane [1]. While this design was effective for simpler infrastructures, it creates challenges in modern networks, including limited flexibility and complex management. As networks grow, these limitations cause performance buffers. Figure 1 shows that Software-defined networks (SDNs) offer a solution by separating the control plane from the data plane, improving scalability, and management.

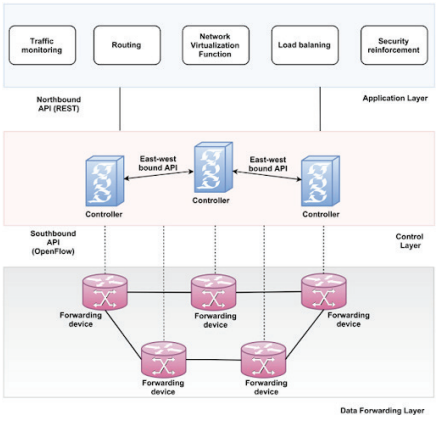



***Figure 1:*** *SDN Architecture. (Image source: [2])*

However, SDNs also introduce vulnerabilities [1], Malicious actors can exploit control messages between the planes to fill SDN flow tables, blocking legitimate users. This ***flow table overflow attack*** exhausts the table's capacity with malicious entries, disrupting network operations. Preventing such attacks requires efficient flow management that balances performance and security [3].

A common method for managing

flow entries in SDNs relies on static timeout values, but these often perform poorly in dynamic environments [4]. Short timeouts disrupt traffic by prematurely removing flows, while long ones waste space and expose the network to overflow attacks. To address these limitations, ***dynamic timeout mechanisms*** have been introduced, adjusting timeouts in real time based on flow table occupancy. These mechanisms aim to optimize resource use by retaining flows only for as long as necessary [5].

**Experiment on Dynamic Timeout Value Allocation**

My experiment focuses on allocating dynamic timeout values using a ***lightweight linear regression*** and ***second standard deviation*** (2nd SD) approach. The linear regression model predicts future occupancy based on recent data trends, allowing proactive flow management. Unlike machine learning-based flow management, this statistical approach has minimal computational overhead, and low latency, and offers transparency and predictability; ideal for critical networking infrastructure. As shown in Figure 2, if predicted occupancy exceeds the 2nd SD of historical data, it flags an anomaly and releases flows to prevent overflow. Additionally, the 2nd

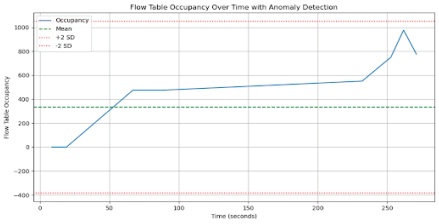



***Figure 2:*** *Anomaly Detection.*

SD model detects unexpected spikes, enabling real-time anomaly detection. Together, these models provide predictive and real-time flow management..

The experiment lies in developing an ***adaptive timeout mechanism*** that dynamically allocates idle and hard timeouts based on the ***severity of flow table occupancy***, with real-time monitoring guiding the adjustments. This strategy ensures efficient flow table management and stable network performance, even under attack conditions.

The mechanism was validated through simulations in Mininet, where ***flooding attacks generated by Hping3*** stressed the SDN infrastructure. The results showed that larger packet sizes, such as 64 MB, experienced delays during attacks, highlighting the importance of effective flow management. By adopting dynamic timeouts, the system improved ***flow table utilization by 6.46%*** and reduced packet transfer times, demonstrating significant performance gains.

This lightweight, transparent, and CPU-efficient solution ensures better resource utilization compared to static methods, which often retain flows longer than necessary. The adaptive strategy enhances SDN environments by improving scalability, mitigating security risks, and maintaining high performance under varying conditions.

***References***

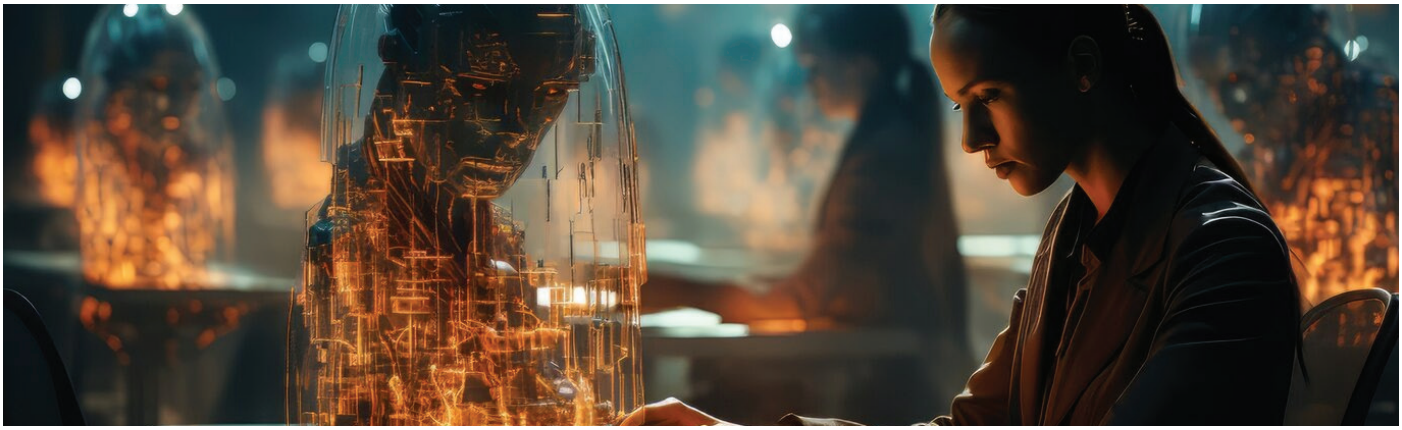
*[1].* D. Kreutz, F. M. Ramos and P. Verissimo, "Towards secure and dependable software-defined networks," in The second ACM SIGCOMM workshop on Hot topics in software defined networking, 2013.

*[2].* R. Swami, M. Dave and V. Ranga, "Software-defined networking-based DDoS defense mechanisms," ACM Computing Surveys (CSUR), vol. 52, no. 2, pp. 1-36, 2019.

*[3].* B. Isyaku, K. A. Bakar, M. S. M. Zahid and M. Nura Yusuf, "Adaptive and hybrid idle–hard timeout allocation and flow eviction mechanism considering traffic characteristics.," Electronics, vol. 9, no. 11, p. 1983, 2020.

*[4].* Z. Guo, Y. Xu, R. Liu, A. Gushchin, K. Y. Chen, A. Walid and H. J. Chao, "Balancing flow table occupancy and link utilization in software-defined networks.," Future Generation Computer Systems, vol. 89, pp. 213-223, 2018.

*[5].* A. Panda, S. S. Samal, A. K. Turuk, A. Panda and V. C. Venkatesh, "Dynamic hard timeout-based flow table management in OpenFlow enabled SDN," in International Conference on Vision Towards Emerging Trends in Communication and Networking, 2019



# Combined Semi-Supervised Learning and Active Learning (SSL&AL) Framework for the Limited Labeled Data

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*Ms. Thanushika Thedsanamoorthysarma is a final-year undergraduate student in the Department of Computer Science at the University of Jaffna, Sri Lanka. Her research interests include medical image analysis, deep learning, and machine learning.*

*Dr. Nirthika Rajendran is a Lecturer in the Department of Computer Science at the University of Jaffna, Sri Lanka. Her academic and research focus lies in the areas of medical image analysis, computer vision, deep learning, and machine learning.*

Machine learning models in areas like Medical Diagnostics, Autonomous Driving, and NLP typically rely on large labeled datasets for high accuracy. However, gathering extensive labeled data is often costly and time-consuming, especially in specialized fields requiring expert annotation. This challenge has prompted the exploration of methods like semi-supervised learning (SSL) and active learning (AL) to improve model performance with minimal labeled data.

SSL shows promise by leveraging unlabeled data to boost performance where labeled data is scarce [1]. AL complements SSL by selectively querying the most informative samples for labeling, thus enhancing learning efficiency [2]. Combining SSL and AL into an SSL&AL framework enables high accuracy with minimal labeling. This article explores SSL&AL's design and applicability in fields requiring efficient data use, showcasing its ability to maintain robust performance with reduced labeled data.

### Semi-Supervised Learning (SSL)

Semi-supervised learning (SSL) uses both labeled and unlabeled data to enhance model performance without extensive labeling. In medical imaging, pseudo-labeling is a common SSL technique, assigning labels to high-confidence unlabeled samples, thus reducing manual labeling demands [3].

In the SSL&AL framework, SSL applies pseudo-labeling after training a CNN on labeled data. As shown in Figure 1, data augmentation is used with both “weak” and “strong” transformations to increase model robu-

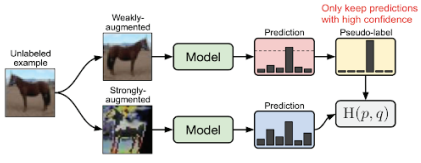



***Figure 1:*** *Illustration of the SSL framework. (Image source: [4])*

stness. Only high-confidence pseudo-labeled samples are added to the training set, effectively expanding the labeled dataset and boosting classification accuracy.

### Active Learning (AL)

Active learning (AL) enhances labeling efficiency by selecting the most informative samples for annotation, crucial in scenarios with limited labeled data [2]. Figure 2 demonstrates that AL prioritizes low-confidence samples, often near decision boundaries, to improve model accuracy.

In the SSL&AL framework, AL utilizes a cluster-based sampling approach. Using K-means++ clustering (Figure 2), samples are grouped, and low-confidence samples within each cluster are identified by probability scores. By prioritizing these boundary samples for labeling, the SSAL framework minimizes labeling needs while optimizing model performance.

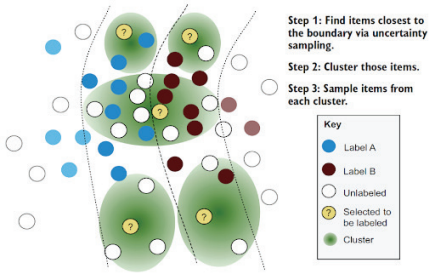



***Figure 2:*** *Illustration of the AL framework. (Image source: [5])*

### Semi-Supervised Learning and Active Learning (SSL&AL)

SSL and AL are combined in the SSL&AL framework to provide an effective, iterative categorization model. While AL chooses the most informative samples for labeling, maximizing resources, and increasing accuracy with little labeled data, SSL uses unlabelled data to improve learning [1].

The SSL&AL framework alternates between SSL and AL phases: starting with a CNN model trained on labeled data, the SSL phase adds high-confidence pseudo-labeled samples to the dataset, while the AL phase targets low-confidence samples for annotation via clustering and confidence sampling. This cycle incrementally improves classification accuracy by efficiently utilizing both labeled and unlabeled data.

### Experiment on the BCCD Dataset

The SSL&AL framework was tested on the BCCD dataset [3], a standard in blood cell classification, chosen for its diverse cell images that support model generalization. Starting with limited labeled data, the framework expanded the dataset iteratively using SSL and AL, resulting in significant improvements in classification accuracy, even with minimal labeled samples. Each iteration refined decision boundaries, enhancing the model's ability to classify new data and underscoring SSL&AL's efficiency in achieving high accuracy with limited labeling.

### Discussion and Conclusion

The SSL&AL framework's success on the BCCD dataset underscores its potential in medical diagnostics, where large labeled datasets are costly. Combining SSL and AL, the framework efficiently uses unlabeled data and selectively annotates informative samples, optimizing resources [1, 2]. Its iterative approach continuously improves model accuracy, making SSL&AL a scalable solution for complex classification tasks. Future enhancements to SSL and AL could extend SSL&AL's adaptability to diverse and complex medical imaging applications.

### *References*

*[1]. I. Nakamura, H. Ida, M. Yabuta, W. Kashiwa, M. Tsukamoto, S. Sato, S. Ota, N. Kobayashi, H. Masauzi and K. Okada, "Evaluation of two semi-supervised learning methods and their combination for automatic classification of bone marrow cells," Scientific reports, vol. 12, no. 1, p. 16736., 2022.*

*[2].* X. Li, X. Wang, X. Chen, Y. Lu, H. Fu and Y. C. Wu, "Unlabeled data selection for active learning in image classification.," Scientific Reports, vol. 14, no. 1, p. 424, 2024.

*[3].* M. J. Mahmood, P. Raj, D. Agarwal, S. Kumari and P. Singh, "SPLAL: Similarity-based pseudo-labeling with alignment loss for semi-supervised medical image classification.," Biomedical Signal Processing and Control, vol. 89, p. 105665, 2024.

*[4].* K. Sohn, D. Berthelot, N. Carlini, Z. Zhang, H. Zhang, C. Raffel, E. Cubuk, A. Kurakin and C. Li, "Fixmatch: Simplifying semi-supervised learning with consistency and confidence.," Advances in neural information processing systems, vol. 33, pp. 596-608, 2020.

*[5].* G. Min-soo, https://wikidocs.net/book/11816, 2024.

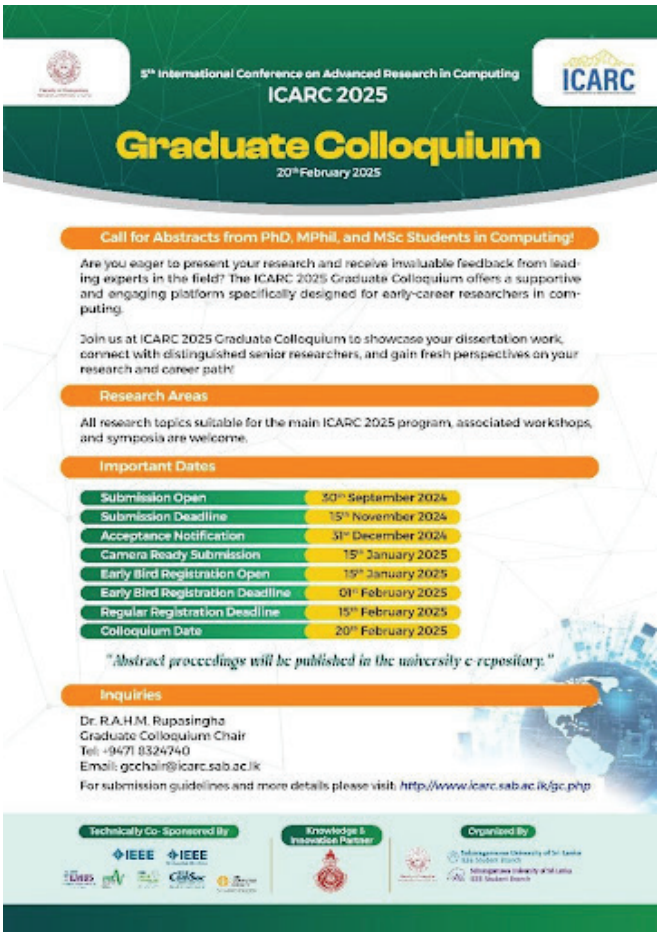
# ICARC 2025 GRADUATE COLLOQUIUM

## GRADUATE COLLOQUIUM AT ICARC 2025: AN UNMISSABLE OPPORTUNITY FOR EARLY-CAREER RESEARCHERS IN COMPUTING

*Composed by Mrs. J.D.T. Erandi, Faculty of Computing, Sabaragamuwa University of Sri Lanka*

*The Graduate Colloquium is an event dedicated to supporting, inspiring, and connecting early-career researchers in computing from around the world. Hosted as part of the prestigious International Conference on Advanced Research in Computing (ICARC) 2025, this colloquium offers PhD, MPhil, and MSc students a unique platform to showcase their dissertation research in a welcoming and constructive environment. The colloquium is designed to foster both academic and professional growth, by enabling participants to receive detailed feedback on their research direction, benefit from personalized mentorship from senior experts, and deepen their understanding of the computing field.*

*In addition to research presentations, the colloquium will feature expert-led panels and roundtable discussions that provide guidance on research methodologies and career planning, helping students navigate their early-stage careers in computing. The colloquium's friendly and collaborative atmosphere warmly welcomes participants from diverse backgrounds and regions, fostering a community among new and experienced researchers. The event will feature selected oral presentations, allowing participants to present their work to a panel of senior researchers and receive constructive feedback. Proceedings will be published in the university e-repository, and an award will honor the most innovative presentation, celebrating creativity and depth in research efforts.*




*The Graduate Colloquium is open to PhD, MPhil, and MSc students in computing who have not yet defended their dissertations. Participants from any field related to ICARC 2025 topics, workshops, or symposia are encouraged to join, making it an ideal venue for sharing ideas across disciplines. The event will be held in a hybrid format, accommodating both in-person and online participation to ensure accessibility for students worldwide. To participate, interested students should submit an abstract, an extended abstract, and a brief bio via the CMT system, selecting the "Graduate Colloquium" track.*

*Whether you seek to refine your research, gain career insights, or expand your professional network, the ICARC 2025 Graduate Colloquium provides a supportive environment to advance your work and connect with others in the field of computing research.*

# ICARC 2025

## THE 5TH INTERNATIONAL CONFERENCE ON ADVANCED RESEARCH IN COMPUTING - ICARC 2025

**"Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation"**

*Composed by Dr. Sugeeswari Lekamge and Mrs. Saranga Somaweera,*
*Faculty of Computing, Sabaragamuwa University of Sri Lanka*

*The rapid evolution of artificial intelligence (AI) is revolutionizing computing research and creating exciting opportunities for interdisciplinary collaboration. The 5th International Conference on Advanced Research in Computing (ICARC) 2025, organized by the Faculty of Computing at Sabaragamuwa University of Sri Lanka, will take place under the theme "Converging Horizons: Uniting Disciplines in Computing Research through AI Innovation."*

*Scheduled for the 19th and 20th of February 2025, ICARC 2025 will feature a formal inauguration, technical sessions, keynote speeches, an industrial product showcase, a graduate colloquium, and networking sessions. The event will include plenary talks from renowned scholars and industry leaders, oral presentations, pre-conference workshops, tutorials, and public discussions, offering diverse opportunities for knowledge exchange and collaboration across computing disciplines.*

*The journey toward ICARC 2025 began with the official website launch on the 15th of August 2024, hosted by the Faculty of Computing at Sabaragamuwa University of Sri Lanka. The launch ceremony was graced by the Vice Chancellor, Professor M. Sunil Shantha; the Dean of the Faculty of Computing, Professor S. Vasanthapriyan; and a distinguished gathering of local and international guests.*

*ICARC 2025 aims to advance computing research by fostering interaction between academia and industry. It will serve as a platform for presenting groundbreaking ideas, approaches, and projects while promoting multidisciplinary integration of research findings from diverse geographical, institutional, and sectoral perspectives. The conference will encourage the exploration of emerging themes in computing.*

**Tracks open for contributions include:**

- ***Artificial Intelligence and Machine Learning***
- ***Text Analytics and Natural Language Processing***
- ***Computer Networks and the Internet of Things***
- ***Knowledge Management and Software Engineering***
- ***Generative AI in Teaching and Learning***
- ***Digital Transformation and Industry 5.0***
- ***Digital Transformation in Healthcare***
- ***Open Track***

*Researchers and practitioners are invited to contribute their innovative findings and insights across these themes.*

*ICARC 2025 seeks to attract a broad audience, including researchers, academics, and students eager to engage with cutting-edge advancements, as well as industrialists and professionals interested in practical applications of computing technologies. Policymakers and developers will also participate to discuss regulatory and developmental aspects critical to the growth of computing technologies. This diverse mix of attendees will create a vibrant exchange of ideas and foster cross-sector collaboration.*

*The conference will receive technical co-sponsorship from esteemed organizations, including IEEE Global, IEEE Sri Lanka Section, IEEE Computer Society Sri Lanka Chapter, IEEE Engineering in Medicine and Biology Society (EMBS) Sri Lanka Chapter, IEEE Industry Applications Society (IAS) Sri Lanka Chapter, IEEE Signal Processing Society Sri Lanka Chapter, and IEEE Communications Society Sri Lanka Chapter. Additionally, ICARC 2025 has partnered with the Sri Lanka Medical Association (SLMA) as the Knowledge and Innovation Partner, enriching the conference's collaborative spirit.*

*Now in its fifth consecutive year, ICARC highlights outstanding research and innovation in computing. Accepted papers will be presented at the conference and submitted to the IEEE Xplore Digital Library. Selected papers will also be invited for publication in the Sabaragamuwa University Journal of Computer Science (SUJCS). Don't miss this opportunity to engage with the latest advancements and innovations in the dynamic field of computing.*

## Congratulations to Team Inception

**- Grand Finalists at HackVenture -**

*Warmest congratulations to "Team Inception," a remarkable group of second-year undergraduates from the Faculty of Computing at Sabaragamuwa University of Sri Lanka for making a significant win by reaching the grand finals of HackVenture, a prestigious inter-university hackathon hosted by the Faculty of Computing and Technology at the University of Kelaniya, in collaboration with AIESEC.*


# Unlocking the Potential of FPGA-Based Hardware Acceleration

***Mr. Kavinga Upul Ekanayaka,*** *(kavinga@ieee.org), Head of Hardware Acceleration at ACCELR.*

*Mr. Kavinga Upul Ekanayaka, is Head of Hardware Acceleration at ACCELR, specializes in FPGA-based hardware acceleration, high-performance computing, and RISCV ISA design, with experience at several Silicon Valley companies. He is an active IEEE volunteer, currently serving as the Sri Lankan Liaison Chair for DVCon India, Industry Relations Chair of IEEE Sri Lanka Section, and Chair of IEEE IES Sri Lanka Chapter.*

In the rapidly evolving landscape of computing, the demand for higher performance, energy efficiency, and scalability has driven the adoption of hardware accelerators. Among these, Field-Programmable Gate Arrays (FPGAs) stand out as a versatile and powerful solution for various computational challenges.

**What Makes FPGAs Unique?**

FPGAs are semiconductor devices that can be programmed post-manufacturing, enabling tailored solutions for specific applications. Unlike traditional CPUs and GPUs, which are optimized for sequential and graphical parallel processing, respectively, FPGAs offer highly parallel, custom-configurable architectures. This flexibility allows them to excel in applications requiring low latency, high throughput, and reduced power consumption.

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**Why Hardware Acceleration?**

Modern workloads, from machine learning to real-time data analytics, often involve computationally intensive tasks. CPUs struggle with these tasks due to software and memory overheads. FPGAs, with their ability to implement custom logic and deep pipelining, provide significant performance improvements while maintaining energy efficiency. By carefully selecting tasks for offloading, organizations can achieve unparalleled performance gains.

**Applications and Real-World Use Cases**

The scope of FPGA-based acceleration spans diverse industries:

**Machine Learning:** Efficient execution of neural network operations like matrix multiplication.

**Video Processing:** Real-time compression and transcoding.

**Financial Technology:** High-speed packet parsing and market data processing.

**High-Performance Computing**: Applications in genomics, molecular dynamics, and oil reservoir modeling.

**Networking:** Accelerating data packet processing for reduced network latencies.

At ACCELR, we have harnessed the power of FPGAs to optimize workloads such as Spark processing, Solr-Lucene search engines, and market data handling.

The future of FPGA acceleration is intertwined with the rise of AI and 5G technologies. Innovations in FPGA design tools, such as Xilinx's Vitis and Vivado, coupled with the availability of FPGA-based cloud solutions (e.g., AWS and Alibaba), are democratizing access to hardware acceleration. Moreover, integrating machine learning algorithms directly into FPGA designs is unlocking new frontiers in performance optimization and energy efficiency.

### Challenges and the Path Ahead

Despite its advantages, FPGA acceleration faces challenges such as steep learning curves in hardware description languages and integration complexities with existing software ecosystems. However, high-level synthesis tools and frameworks like OpenCL are bridging these gaps, making FPGAs more accessible to developers.

In conclusion, FPGAs are not just reshaping high-performance computing; they are paving the way for a sustainable and efficient computing paradigm. As industries continue to push the boundaries of computational demands, the role of FPGAs will undoubtedly expand, heralding a new era of hardware innovation.

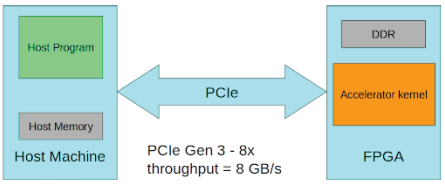



***Figure 1:*** *FPGA based Hardware Acceleration Model (Author's image)*

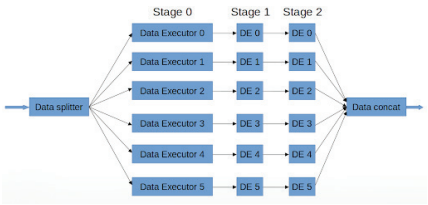



***Figure 2:*** *How acceleration works inside FPGA (Author's image)*

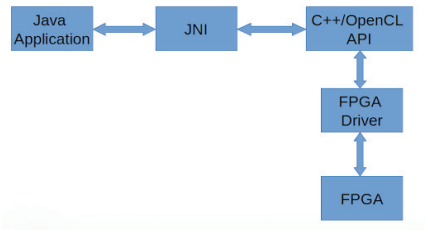



***Figure 3:*** *Accelerating a Java application using FPGA (Author's image)*


***Figure 4:*** *Xilinx Alveo data center FPGA accelerator*

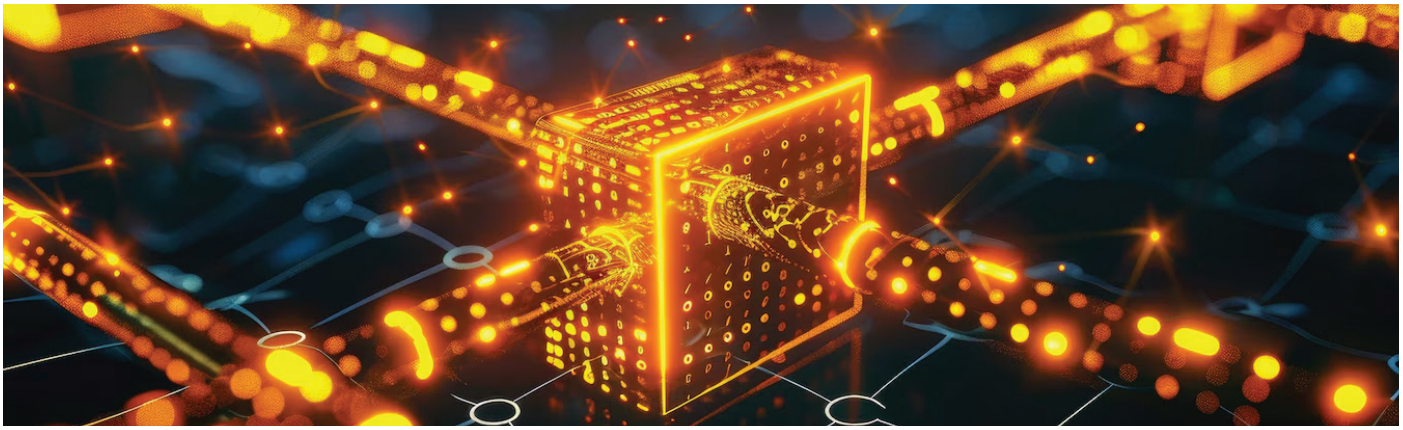
**(Original Source: https://www.mouser.in/new/xilinx/xilinx-alveo-accelerator-cards)**

## Congratulations to Team Vanguard

**- "Most Innovative Team" Award at hackX 9.0 -**

*The Faculty of Computing of Sabaragamuwa University of Sri Lanka is proud to extend its warmest congratulations to Team "Vanguard" for being awarded the "Most Innovative Team" at hackX 9.0, organized by University of Kelaniya.*

*The hackX series, hosted annually by the Industrial Management Science Students' Association (IMSSA) of the Department of Industrial Management at the University of Kelaniya, is a prestigious inter-university startup challenge. Its grand finale took place on September 29, 2024, at the Ideamart Auditorium of Dialog Axiata, where Team "Vanguard" stood out among 15 top finalists, showcasing their exceptional skills and creativity.*



# The Evolution of Quantum Computing: Modular Systems and the Path to Error-Tolerant Technologies

***Hansika Ukgoda,*** *(hansikauggoda@gmail.com), Uva Wellassa University of Sri Lanka*

*Hansika Ukgoda is a Temporary Lecturer at Uva Wellassa University of Sri Lanka. Her research interests include Human-Computer Interaction (HCI), Cybersecurity, Artificial Intelligence (AI), and Machine Learning (ML).*

Quantum computing's trajectory is shifting from competitive hardware advancements to practical, interconnected applications. The industry is pivoting towards modular quantum computing, emphasizing scalability and enhanced qubit quality. IBM's introduction of the Heron processor, which features 133 high-fidelity qubits, represents a strategic move away from merely increasing qubit counts toward creating systems capable of interconnecting multiple processors. This transition aims to mitigate noise, a significant barrier to effective quantum computing (McDowell, 2023).

Companies like PsiQuantum are exploring silicon-based modular chips, focusing on integrating classical electronics to facilitate the communication between quantum processors. These advancements in quantum communication, such as utilizing coherent qubits over long distances, are crucial for achieving large-scale quantum systems. Developments in quantum networking specifically in quantum key distribution (QKD) are also critical, providing secure communication pathways in quantum networks, and ensuring data security across distances. Robust fiber-optic networks and satellite communication further extend the reach of quantum computing by supporting stable qubit transmission.

Simultaneously, the industry is moving away from the "noisy intermediate-scale quantum" (NISQ) model, which had proposed that smaller systems could deliver useful computations despite high error rates (Preskill, 2018). Researchers are now prioritizing error correction techniques, employing additional qubits to compensate for noise. Innovations from companies like Google Quantum AI and IonQ showcase promising approaches to creating fault-tolerant quantum systems, focusing on minimizing operational

errors rather than solely increasing qubit numbers.

In parallel, quantum programming is evolving to meet the demands of hardware progress. Current circuit-based approaches limit flexibility, as they typically process data through predefined operations. Hybrid quantum-classical systems are emerging, allowing complex tasks like optimization and simulation to be addressed by leveraging classical algorithms in combination with quantum systems. Companies like Horizon Quantum Computing and Algorithmic are leading the charge, developing hybrid quantum computing platforms that integrate classical algorithms with quantum computations, thereby expanding the capabilities of current quantum devices.

As quantum technology gains international traction, competition intensifies among global players. Government policies are also evolving, with potential restrictions on quantum technologies being discussed in the U.S. This could have significant implications for supply chains and collaborative efforts across countries.

However, despite the competitive landscape, the quantum computing community recognizes the importance of collaboration. Standards for quantum encryption and cross-border quantum communications are currently being discussed to foster secure and interoperable quantum systems. Researchers understand that advancing the field requires shared knowledge and cooperative innovation, even as the race to achieve practical quantum advantages heats up.

Currently, quantum computing is entering a critical phase, marked by a shift towards modular architectures and advanced error correction techniques. Instead of focusing solely on increasing qubit counts, the industry emphasizes creating scalable systems capable of integrating multiple quantum processors. The emphasis on quality and interconnectivity signifies a maturation of the field, steering clear of hyperbolic claims of record-setting hardware. A promising focus lies on the convergence of quantum, cloud, and AI technologies, which could redefine how industries manage computationally intensive problems, laying the foundation for scalable, effective quantum computing solutions.

### *References*

*[1].* McDowell, S. (2023). Ibm advances quantum computing with new processors & platforms. Forbes. Retrieved 13 October 2024

*[2].* https://www.forbes.com/sites/stevemcdowell/2023/12/05/ibm-advances-quantum-computing-with-new-processors--platforms.

*[3].* Preskill, J. (2018). Quantum Computing in the NISQ era and beyond. Quantum, 2, 79. https://doi.org/10.22331/q-2018-08-06-79

## Team "RootNode" Secures 1st Runner-Up at MoraUXplore 2.0

*With immense pride, the Faculty of Computing at SUSL extends its heartfelt congratulations to Team "RootNode" for achieving the 1st Runner-Up position at MoraUXplore 2.0.*

*This is one of the largest inter-university UI/UX designathons that was organized by the IEEE Student Branch of the University of Moratuwa. The grand finale of this prestigious competition took place on August 24, 2024.*

# COMURS 2025

## THE 2ND COMPUTING UNDERGRADUATE RESEARCH SYMPOSIUM - COMURS2025

*Composed by Mrs. S. Adeeba, Faculty of Computing,*
*Sabaragamuwa University of Sri Lanka*

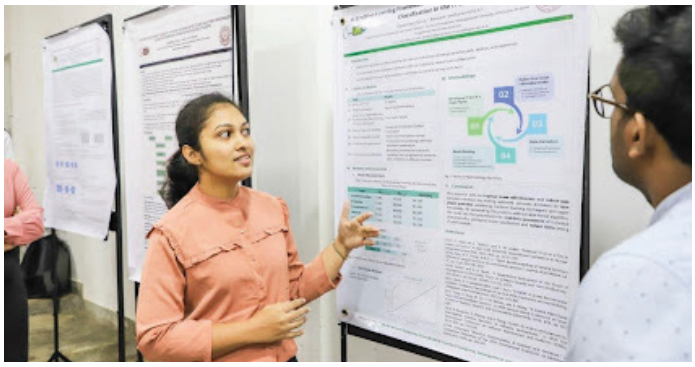
*The* **Computing Undergraduate Research Symposium 2025 (ComURS 2025)**, *organized by the Faculty of Computing at Sabaragamuwa University of Sri Lanka, will take place on* **February 19, 2025**. *This year's symposium will once again offer a platform for final-year undergraduates to showcase their research, fostering a culture of academic excellence and collaboration. The theme for ComURS 2025,* **"Data-Driven Approaches to Global Sustainability,"** *reflects the increasing importance of computing and data science in addressing critical global challenges such as climate change, healthcare, and resource management.*

*Building on the success of ComURS 2024, which was held on February 21, 2024, the upcoming symposium is co-located with the* **International Conference on Advanced Research in Computing (ICARC 2025).** *By co-locating with ICARC 2025, ComURS 2025 leverages shared resources and heightened participation, providing students with an even larger platform to present their research to both academic and industry professionals. This collaboration enriches the overall experience, creating greater opportunities for networking, knowledge exchange, and potential future collaborations.*

*The inaugural* **ComURS 2024** *was a landmark event, featuring final-year undergraduates from the 2017/2018 batch who showcased their research to a distinguished audience. The theme,* **"Bridging the Future with Innovative Minds,"** *resonated with both students and attendees, marking a significant milestone for many budding researchers. Students gained recognition for their work, leading to further research opportunities and professional engagements. ComURS 2024 successfully connected students with industry leaders, providing a platform to explore both academic and industrial research.*

*For ComURS 2025, a range of research tracks will be featured, including Information Systems, Software Engineering, and Data Science. These tracks will provide a structured space for students to present their research findings, which address real-world problems through innovative technological solutions. The symposium will also serve as a bridge between academia and industry, with keynote speeches and panels involving experts from both fields.*

*By co-locating with ICARC 2025, ComURS 2025 promises to enhance the visibility and impact of undergraduate research. The combined audience of both events will allow for greater exposure and collaboration, helping students connect with international scholars, industry professionals, and potential employers. This unique setup will elevate the symposium, ensuring that the student's research contributes not only to academic discussions but also to practical solutions in the tech industry.*



*ComURS 2025 is set to be an inspiring event, continuing the tradition of excellence established by its predecessor while exploring new ways to address global sustainability challenges through computing. The symposium provides students with a unique opportunity to showcase their work, gain valuable feedback, and contribute to shaping the future of technology and sustainability.*

# Congratulations

## -Team BabyChart-

*Warm congratulations to Team BabyChart from the Faculty of Computing, Sabaragamuwa University of Sri Lanka, for their remarkable achievement in securing a place among the Top Ten Finalists at the prestigious Dialog Innovation Challenge organized by Dialog Axiata PLC, winning the golden ticket to the final round.*

*This highly competitive event attracted widespread attention, with over 1,200 initial proposals, from which 50 teams advanced to the semi-finals. Team BabyChart's innovative solution, a digital child health development record system, stood out among the top ten finalists for its potential to transform pediatric healthcare. The grand finale of the Dialog Innovation Challenge took place on 13th August 2024, and the initial presentation of the team was broadcasted on TV Derana on 7th September 2024 at 10:30 PM.*

*Brilliant girl undergraduates from the Faculty of Computing,* ***Nipuni Nadeeshani****,* ***Dulshani Samindika****,* ***Tharani Dulyana*** *and* ***Nayani Tharushika*** *have demonstrated exceptional skills within this team.*

# IEEE COMPUTER SOCIETY STUDENT BRANCH- SUSL

## "BUILDING TOMORROW'S TECH LEADERS": IEEE COMPUTER SOCIETY STUDENT BRANCH CHAPTER AT SABARAGAMUWA UNIVERSITY OF SRI LANKA

*Composed by Mrs. W.T. Saranga Somaweera (ssomaweera@foc.sab.ac.lk), and Mr. Mohamed Shabeeb (aimsaeeb@std.appsc.sab.ac.lk), IEEE Computer Society Student Branch Chapter, Sabaragamuwa University of Sri Lanka.*

*The IEEE Computer Society is a well-known global organization that focuses on the advancement of computer science and technology fields. For over 75 years, it has partnered with engineers, scientists, scholars, and industry professionals from all over the world. Through conferences, publications, programs, and committees, the IEEE Computer Society has been instrumental in energizing the community of computer science and technology.*

*In this spirit of innovation and collaboration, the IEEE Computer Society Student Branch Chapter at Sabaragamuwa University of Sri Lanka was officially inaugurated under the IEEE Student Branch Chapter of Sabaragamuwa University in 2022, with the support of the IEEE Sri Lanka Section. The IEEE Computer Society Student Branch Chapter at Sabaragamuwa University was established to promote interest in computer science and related technologies among the students. This includes providing knowledge on both the theoretical foundations and practical uses of computer science, arranging opportunities for academic and professional development, and organizing activities that yield opportunities for networking between students and industrial professionals.*

*The IEEE Computer Society Student Branch Chapter at Sabaragamuwa University of Sri Lanka is dedicated to empowering students and professionals in computer science by providing relevant resources, stimulating innovation, and supporting ethical practices. As a critical hub for information sharing and professional development, it enhances members' ability to make important contributions to the global technological scene. The chapter is committed to excellence in research, education, and collaboration. It aims to be the leading network for aspiring computing professionals while cultivating an inclusive community where ideas can thrive, allowing members to drive transformative initiatives that benefit society.*

*The first Executive Committee of the IEEE Computer Society Student Branch Chapter, for the first term of 2024/2025, was officially elected on September 10, 2024, at the Annual General Meeting of the IEEE Student Branch of Sabaragamuwa University of Sri Lanka.*

*The establishment of the IEEE Computer Society Student Branch Chapter at Sabaragamuwa University of Sri Lanka marks a significant milestone in promoting innovation, networking, and collaboration in computer science. The executive committee of the chapter aims to empower students through professional growth, networking, and knowledge exchange.*

*The IEEE Computer Society Student Branch Chapter at Sabaragamuwa University has outlined several initiatives in its action plan, including organizing technical workshops, webinars, charity work, promotional activities, mentorship programs, and hackathons, aligning with the mission of the IEEE Computer Society.*

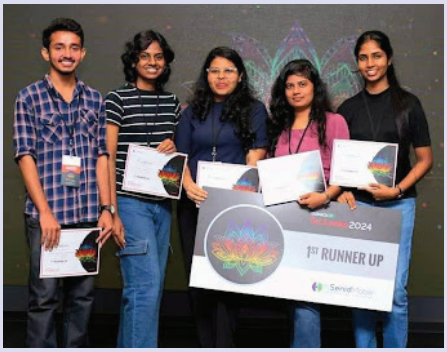
***IEEE Computer Society Student Branch Chapter at Sabaragamuwa University will always remain an ideal platform for undergraduates to develop their skills in computing and pursue a career with opportunities for leadership and career development.***


*Executive Committee 2024/2025 - IEEE Computer Society Student Branch Chapter of SUSL*

## Congratulations to Team Digital Diamonds

### - 1st Runners-Up at TADHack Sri Lanka 2024 -

*With immense pride, the Faculty of Computing at SUSL congratulates Team Digital Diamonds for securing the 1st Runner-Up position at the prestigious TADHack Sri Lanka 2024. This proud team of students from the Faculty of Computing have showcased their talent at this global hackathon's 17th edition and it was successfully held on October 16, 2024, at the Dialog Axiata PLC Auditorium in Colombo. Organized by Ideamart and hSenid Mobile, TADHack Sri Lanka has brought together developers, innovators, and tech enthusiasts to design cutting-edge solutions in communications technology.*




### - Winners at Hack Like a Girl 2.0 -

*Team Digital Diamonds comprising the brilliant undergraduates from the Faculty of Computing, Nipuni Nadeeshani, Dulshani Samindika, Tharani Dulyana, and Nayani Tharushika secured first place at the Hack Like a Girl 2.0 competition. This prestigious event, organized by SLASSCOM, was held on December 3, 2024, at the Jetwing Colombo Hotel.*

*Warmest congratulations to the Team Digital Diamonds who showcased their outstanding skills and brought honor to the university by winning this competition.*

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# Affective Computing: Revolutionizing Human-Computer Interaction through Emotion AI

***Rukshika Premathilaka,*** *(itt1617059@tec.rjt.ac.lk), Department of Information and Communication Technology, Faculty of Technological Studies, Uva Wellassa University of Sri Lanka*

*Rukshika Premathilaka is a Lecturer (Temporary) at the Department of Information and Communication Technology, Faculty of Technological Studies, Uva Wellassa University of Sri Lanka. Her research interests are Image Processing, Natural Language Processing, Data Mining and Machine Learning.*

In today's time of technology forward lives, everyone looks to carry out their work progressively. That is why Industry experts and developers always trends to invent new technologies and systems to make better lives for users. One of these is Affective Computing also called Emotion AI. It a groundbreaking technology that has contributed to the creation of more personalized and descriptive interactions between users and machines. Affective computing works together with computer science, psychology, and cognitive science to produce better outcomes for its users as they expect.

***"How do you feel when you work for several hours straight? You will hide your real expression from your supervisor or those around you, but the system that uses affective computing can generate subtitles for your hidden expressions. Then the system will adjust your working portal according to your mood."***

Affective computing is sub domain of Artificial Intelligence that allows us to develop systems or programs to recognize, interpret, process, and respond to human emotions. This technology utilizes a number of existing AI technologies such as robotics, neural networks, machine learning and natural language processing to enhance the interactions between user and computer by recognizing emotions and responding them. This technology always strives to ensure that their responses are personalized and sensitive.

***You may wonder, if we can already detect emotions using existing AI technologies, what is the specialty of affective computing?***

Affective computing is several steps ahead of systems that used previous technologies. Existing emotion detection systems typically identify only basic emotions based on the data obtained from the user and do not respond to these emotions. However, affective computing technology goes further by detecting

even the emotions the user may be hiding, rather than just the ones they express openly. Additionally, it provides a personalized and empathetic response by incorporating an Emotional Intelligence Layer.

A person's response is determined according to the emotions they feel in a certain situation. Affect refers to the response a person makes based on their emotions. Therefore, in the concept of "Affective Computing," the affect part expresses the emotions or moods.

Although technology is advanced, it is essential to have a psychological understanding when dealing with people's emotions. Affective computing basically uses two models called ***Ekman Discrete Model and Russel's Dimensional Model for Emotion Classification*** to get the basic physiological foundation.

**Ekman Discrete Model:** This is a theoretical framework proposed by psychologist ***Paul Ekman***. This framework works only six emotional states, regardless of any specific condition such as skin tone, nation, hair color, etc. These emotions are ***Happiness, Sadness, Anger, Fear, Disgust, and Surprise.*** In this model, Ekman used facial muscle movements to classify those six emotions.

**Russell's Dimensional Model for Emotion Classification:** To more clearly classify the emotions identified in the discrete model, psychologist James A. Russell introduced this dimensional model. Valence and arousal are the specific dimensions used in this model. Valence measures the positivity or negativity of an emotion, while arousal measures the intensity or activation level of an emotion. This framework enables users to understand and represent emotions in more accurate manner.

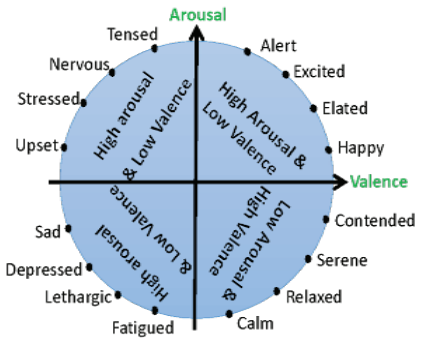


***Figure 1:*** *Russell's Dimensional Model for Emotion Classification*

**How does Affective computing work?**

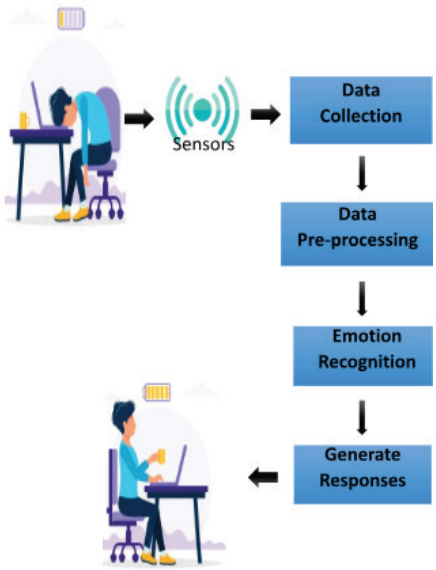


***Figure 2:*** *The Affective Computing Working Process*

This diagram illustrates the step-by-step procedure of an affective computing system. At the beginning, it takes inputs such as facial expressions, voice, and physiological signals through sensors or other sensing hardware devices that capture micro-level expressions (e.g., webcams). This is followed by data preprocessing to filter and organize the collected information.

Then, the computing device gathers cues about the emotional status by analyzing facial expressions, sentiments, etc. In the last phase, these inputs are analyzed using machine learning and artificial intelligence to decipher nine major traits based on Ekman's model: age, gender, pose, face detection, emotions, arousal, valence, attention, wishes, and other features. Based on the recognition from the previous stage, the system generates appropriate responses to enhance user experience, facilitating a transformation from a low-energy state to a recharged, positive state.

With the use of computers becoming a common practice in all sectors, all those activities have been made more personalized and emotionally responsive through the use of affective computing technology. Here are a few demonstrations:

**1. Emotional State Recognition for Adaptive Teaching and Learning**

The success of education is determined by the amount of knowledge a learner acquires. Not every student gains the same amount of knowledge in the same way or within the same time frame. Affective computing can identify hidden emotions in students during the learning process. If emotions like frustration, depressed, boredom, or nervous are detected, the teaching content can be modified or simplified accordingly. Otherwise, additional tutorials and exercises can be recommended. Furthermore, if students appear interested and highly engaged, the system using affective computing can enhance the content by recommending more references and adding supplementary exercises. Using this technology students can get

personalized feedback from the system. Mursion is an AI-driven platform that uses affective computing to create immersive simulations for soft skills training. It helps educators, corporate trainers, and healthcare professionals practice emotional intelligence and communication in real-life scenarios by interacting with AI avatars that react emotionally to the users' responses.

**2. Emotional Analysis for Financial Services and Marketing**

There are many instances of fraud and deception in the financial sector. Affective computing technology is used to prevent or reduce the occurrence of such fraud by identifying hidden emotions in individuals' minds. In addition, financial experts use this affective computing technique to make forecasts according to the emotion trends. Furthermore, this affective computing technique can be used to generate financial forecasts about future trends by identifying the emotions of investors and market participants, such as fear, greed, optimism, or uncertainty.

Affective computing can detect consumers' real-time emotional states. By tracking how consumers react to online content, affective computing can also gain insights into their preferences. Based on these insights, online marketing platforms can provide personalized promotions and recommendations to consumers. ***Affectiva Emotion*** is an AI-driven software that utilizes affective computing in the Marketing industry. Affectiva's software can generate subtitles for the nuanced emotions of individuals. It can measure consumer satisfaction and reactions to ads and content by emotional responses.

**3. Affective Computing in Diagnosis and Treatments**

In many cases, due to fear and curiosity about society, many people show reluctance to get proper treatment for their illnesses and mental disorders. They also try to hide information about their diseases. Because of this, doctors do not have the opportunity to provide proper treatment for these conditions. However, with affective computing, it is possible to identify many symptoms of patients by detecting their emotions. This can help detect their diseases at an early stage. Opportunities to address personalized threats are also available through affective computing. Cogito is real world use case of affective computing in diagnosis. It uses speech patterns analysis and sentiment analysis to help monitor the patient's mentality.

***Figure 3:*** *Logo of Cogito*

**4. Affective Computing in Entertainment Applications**

Affective computing can determine the mood, tempo, and key idea of a song through techniques like sentiment and sound analysis. Traditional music streams use textual data such as name, artist name, and lyrics to search songs. When we input those textual data into the system it will search those details and provide corresponding songs as a result. However, in affective computing, this process is further streamlined. This affective computing technology can detect the user's real-time emotions and recommend songs that match their real time emotions.

In the very near future innovation in affective computing is going to change various sectors by making human-computer interaction more intelligent on emotional grounds. In the future, systems will be able to interpret and react appropriately to human emotion using AI, machine learning, and sensors which could enable meaningful applications in everything from healthcare, education, financial services, and entertainment.

# HIGHLIGHTS OF STUDENT PROJECTS

## TRANSFORMING CHILD HEALTHCARE WITH BABYCHART

*Composed by M.A. Nipuni Nadeshani, (mannimarasingha@std.appsc.sab.ac.lk. ),*
*Department of Computing and Information Systems, Faculty of Computing ,*
*Sabaragamuwa University of Sri Lanka.*

*BabyChart is a mobile app designed to digitize the traditional Child Health Development Record (CHDR) book, providing a modern solution to streamline child healthcare management in Sri Lanka. The project aims to address significant challenges faced by both parents and midwives, making health record-keeping easier and more efficient.*

*The app includes two major user roles: parents and midwives. BabyChart offers parents a user-friendly, organized platform to track their child's health milestones, vaccination schedules, and growth trends. Timely reminders and notifications help parents stay up-to-date with essential medical check-ups and vaccinations, ensuring proactive engagement in their child's health journey. With digital*

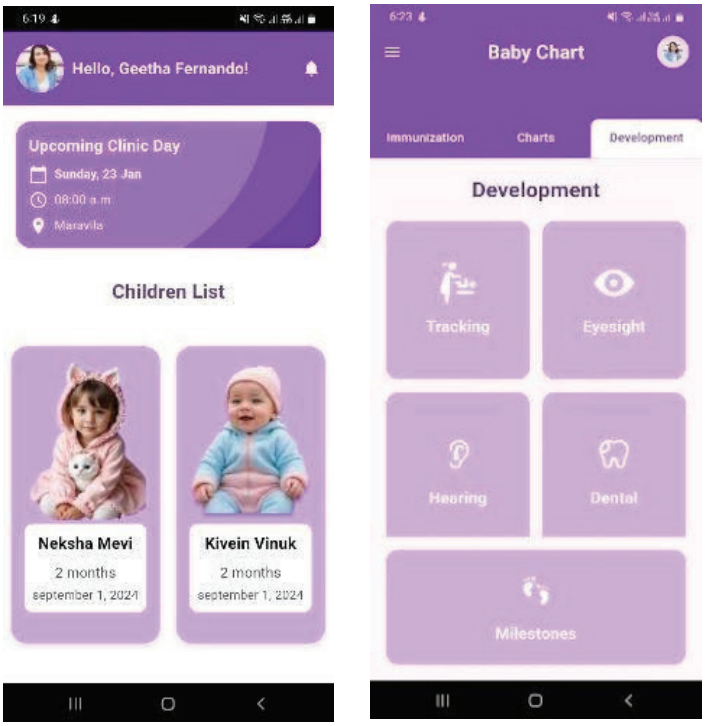


***Figure 1:*** *Screenshots of Parent Profile*

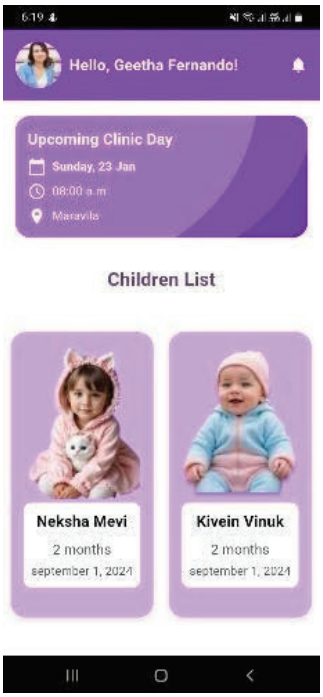


***Figure 2:*** *Screenshots of Midwife Profile*

*storage, parents can access and update records anytime, offering unmatched convenience and peace of mind.*

*BabyChart provides midwives with features to reduce paperwork and manage child health data more efficiently by streamlining the record-keeping process, allowing them to quickly review a child's development history and vaccination status with QR code scanning for efficient data entry. Additionally, midwives can manage home visits and clinic schedules, enhancing their ability to coordinate care and provide timely support.*

*BabyChart comes with AI-powered growth insights that analyze a child's growth trends and provide useful feedback for both parents and midwives. This feature helps detect potential health issues early, allowing for timely action and better care. By integrating AI, BabyChart makes child health management more proactive and informed, supporting better healthcare outcomes.*

*Recognized for its innovative impact, BabyChart has earned awards such as 1st*

*runner-up at TADHack Sri Lanka 2024, 2nd runner-up at PearlHack 2023, and a place in the top 10 finals of the Dialog Innovation Challenge.*

*The development of BabyChart represents a significant step forward in modernizing child healthcare management. Through addressing key challenges and incorporating valuable feedback, the app has evolved into a robust and user-friendly solution for parents and midwives alike. The integration of innovative features, such as QR code scanning and digital record-keeping, ensures accurate and accessible health data that supports informed decision-making. The development journey of BabyChart stands as a testament to the commitment to excellence and the pursuit of a more efficient, tech-driven approach to child health management. BabyChart continues to bridge the gap between traditional practices and modern healthcare solutions, fostering better outcomes for families and healthcare professionals.*

**Team Details:**


- **M.A.N.N.I. Marasingha -** Department of Computing and Information Systems
- **M.T.D.De. Silva -** Department of Computing and Information Systems
- **W.A.D.D.S. Withanachchi -** Department of Software Engineering
- **U.N.T. Abepala -** Department of Computing and Information Systems,


## *Congratulations to the Best Undergraduate Researchers of Computing!*

*Proud to celebrate the remarkable achievements of two outstanding researchers, Mr. Abisheth Varman and Mr. Ashen Iranga Hewarathna, from the Faculty of Computing, for winning the prestigious Best Undergraduate Researcher of Computing Gold Medal. This accolade, presented by the Department of Computing and Information Systems, was awarded at the 25th General Convocation of Sabaragamuwa University of Sri Lanka, held on 13th September 2024.*

*Their exceptional final-year research projects were:*

- **Mr. Ashen Iranga Hewarathna: "A Comprehensive Approach for Detecting Changes and Identifying High-Threat Zones in Forest Ecosystems", supervised by Mr. P. Vigneshwaran.**
- **Mr. Vadivel Abishethvarman: "Detecting and Categorizing Fake News: Machine Learning-Based Approach for User Profiling", supervised by Professor B.T.G.S. Kumara.**

*Both projects, conducted under expert supervision, address critical societal issues by harnessing the power of computing to tackle digital misinformation and environmental conservation. Their groundbreaking research has resulted in several esteemed publications and conference presentations, demonstrating the impact of their work on society today.*

# VOLUNTEER HIGHLIGHTS 2024

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