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

Stay curious, be resilient, and never stop learning. Always aim to make a positive impact.

~ Vipula Liyanaarachchi ~

Faculty of Computing
Sabaragamuwa University of Sri Lanka

Sabaragamuwa University of Sri Lanka
IEEE Student Branch

Sabaragamuwa University of Sri Lanka
IEEE Student Branch

SOCS

With the aim of exploring today's world-changing sciences and technologies 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 knowledge base through submitting articles on technology insights, research investigations and experiences in the domain of computing.

CALL FOR ARTICLES
VOLUME 05 | ISSUE 02

ComSpective

Enlightening perspectives on computing today and tomorrow

WE SEEK ORIGINAL SUBMISSIONS ON THE FOLLOWING TOPICS OF INTEREST

- *Information Systems*
- *Software Engineering*
- *Pattern Analysis and Machine Intelligence*
- *Security and Privacy*
- *Signal Processing*
- *Networking and Telecommunications*
- *Human Informatics*
- *Internet Computing*
- *Pervasive Computing*
- *Affective Computing*
- *Knowledge and Data Engineering*
- *Industrial Informatics*
- *Robotics and Automation*
- *Image processing and Computer Visions*
- *Services Computing*
- *Multimedia Technologies*
- *Cloud Computing*
- *Visualization and Computer Graphics*

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

IMPORTANT DATES

SUBMISSION DEADLINE
30TH AUG 2025

PUBLICATION DATE
30TH NOV 2025

ARTICLE CATEGORIES

Technical Articles
Columns
Features

Profiles/Personalities
Historical Events
News/Achievements
Photo Features

Industry Articles - *Emerging Technologies, Current Trends and Professional Development.*

Best of Student Articles
Alumni Views
Entrepreneurial and Startup Ideas
Software Projects

CONTACT US

Faculty of Computing,
Sabaragamuwa University of Sri Lanka,
P.O. Box 02,
Belihuloya, 70140,
Sri Lanka.

TELEPHONE

*Editor-in-Chief: Mrs. R.M.K.K. Wijerathne (**+94 (0) 74 3357835**)*
*Deputy Editor: Mrs. W.T.S. Somaweera (**+94 (0) 71 305 3443**)*

EMAIL

editorial@comspective.sab.ac.lk (Articles)
advertising@comspective.sab.ac.lk (Advertising/Sponsorships)

Faculty of Computing
Sabaragamuwa University of Sri Lanka

Sabaragamuwa University of Sri Lanka
IEEE Student Branch

Sabaragamuwa University of Sri Lanka
IEEE Student Branch

SOCS

For author guidelines and additional information, please visit: **https://www.sab.ac.lk/computing/comspective**

EDITOR'S NOTE

Dear Reader,

It's amazing how far we've come and how much further we can go when research and innovation lead the way. These two forces are constantly shaping our world, helping us solve big challenges and creating better lives for people everywhere.

I'm truly excited to share with you Volume 05, Issue 01 of ComSpective, the bi-annual technical magazine of the Faculty of Computing, Sabaragamuwa University of Sri Lanka. Each issue reflects creativity, curiosity, and commitment within our academic community, and this one is no exception.

ComSpective is more than just a magazine. It's a space where bright minds come together to share ideas, explore emerging technologies, and inspire each other. Whether you're a student, a researcher, or simply someone passionate about tech, we hope these pages give you something to think about and something to be inspired by.

As you read through the articles, I encourage you to reflect on the stories and innovations featured here. Let them challenge your thinking, spark your curiosity, and remind you of the incredible possibilities in the field of computing.

Thank you for being with us. Let's keep pushing the boundaries together.

Thank you.

Mrs. R.M.K.K. Wijerathna
Editor-in-Chief

FEATURES

CONTENT

The Faculty of Computing is pleased to present the 1st Issue of the Volume 05 of ComSpective, the bi-annual ICT magazine published by the Faculty of Computing.

We dedicate ourselves to making the world smarter, with each and every Issue of the Magazine, spanning a broad range of computing disciplines.

How Self-Supervised Learning is Unlocking the Power of Unlabeled Data in Computer Vision

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.

Imagine you're trying to solve a jigsaw puzzle, but instead of having a picture to guide you you're figuring out where each piece fits by comparing it to the others. Over time, you learn patterns that allow you to complete the puzzle without ever seeing the final image. Self-Supervised Learning (SSL) in machine learning works in a similar way, learning patterns from data without requiring explicit labels. SSL is revolutionizing computer vision by unlocking the vast potential of unlabeled data. This article explains the concept of SSL and explores its achievements in computer vision.

SSL is a machine learning approach that began being used in computer vision around 2015. In SSL, the learning model creates 'pseudo-labels' by utilizing the natural connections or dependencies within the data. For example, in an image, neighboring pixels of an object are spatially related. SSL uses this relationship by masking a portion of the image and training the model to predict the missing pixels based on the surrounding ones. SSL offers several advantages over supervised, unsupervised, and semi-supervised learning in computer vision. Unlike supervised and semi-supervised learning, SSL trains models without requiring extensive labeled data, which is a significant benefit in computer vision since collecting and annotating large datasets is often costly and time consuming. In addition, SSL learns more generalized features than supervised learning, as it relies on the structural and semantic information within the data itself rather than on narrowly defined labels. Furthermore, compared to unsupervised learning, SSL creates a stronger structure for learning by using tasks that it defines to help the model learn effectively. Additionally, SSL models are often more robust and less prone to overfitting in vision tasks, as they rely on broad patterns across data rather than fitting to specific labeled examples.

Contrastive learning [1] [2] is one of the

most significant breakthroughs in SSL for computer vision. A contrastive learning model is trained to bring similar (positive) samples closer in the feature representation space while pushing dissimilar (negative) samples farther apart. SSL generates positive and negative pairs by applying different augmentations to the same image and to different images from unlabeled data, respectively. Recent SSL-based contrastive learning approaches, such as SimCLR [1] and MoCo [2], have significantly reduced the performance gap between SSL and supervised learning on image classification tasks. Also, the trained contrastive learning model can be used in downstream tasks by being fine-tuned with smaller labeled datasets.

Masking and reconstruction mechanism is another recent breakthrough in SSL for computer vision. In this technique, parts of input image are masked and then the model is trained to reconstruct the missing parts based on the visible information. During training, the model learns the structural relationships and patterns within the image, as it must accurately infer missing areas to minimize the reconstruction loss. The recently proposed Masked Autoencoders (MAE) [3] randomly mask parts of the input image and then train an autoencoder to reconstruct the missing patches. This approach forces the model to learn global visual patterns by predicting the masked parts from the unmasked portions. MAE demonstrated strong performance across various vision tasks, including image classification, segmentation, and object tracking. Recently, Vision Transformer models trained on the MAE mechanism have shown outstanding results.

In the near future, SSL is expected to enhance its capabilities, link ing vision with other data types, such as text and audio, to enable cross-modal applications where models can seamlessly integrate information from various sources. Furthermore, SSL models are anticipated to become both data- and computationally efficient, making them more accessible and practical for a wider range of applications.

References

[1]. T. Chen, S. Kornblith, M. Norouzi, and G. Hinton, "A simple framework for contrastive learning of visual representations," in International conference on machine learning, pp. 1597-1607, 2020.

[2]. K. He, H. Fan, Y. Wu, S. Xie, and R. Girshick, "Momentum contrast for unsupervised visual representation learning," in Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, pp. 9729-9738, 2020.

[3]. K. He, X. Chen, S. Xie, Y. Li, P. Dollár, and R. Girshick, "Masked autoencoders are scalable vision learners," in Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, pp. 16000-16009, 2022.

Congratulations

Celebrating Excellence: Minuri Hewage Receives Dean's List Medal for Outstanding Academic Achievement

We extend our heartfelt congratulations to Minuri Hewage, a talented undergraduate from the Department of Software Engineering of the Faculty of Computing, for her remarkable achievement in receiving the prestigious Dean's List Medal awarded to the best student in the year 2024 of 19/20 Batch. This was presented to her at the 29th University Day Celebration, held on 6th of February, 2025.

ICARC 2025

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

Converging Horizons: Uniting Disciplines in Computing Research through AI Innovation

By Dr. Sugeeswari Lekamge and Mrs. Saranga Somaweera

The 5th International Conference on Advanced Research in Computing (ICARC) 2025 organized by the Faculty of Computing at Sabaragamuwa University of Sri Lanka was successfully concluded on the 19th and 20th of February 2025 under the theme "Converging Horizons: Uniting Disciplines in Computing Research through AI Innovation."

ICARC 2025 consisted of formal inauguration, technical sessions, keynote speeches, a graduate colloquium, and networking sessions. The event featured plenary talks by renowned scholars and industry leaders, along with oral presentations, pre-conference workshops, and tutorials offering diverse opportunities for knowledge exchange and collaboration across computing disciplines.

ICARC 2025 showcased an outstanding lineup of keynote speakers who brought valuable insights to the forefront of computing research. Among them was Prof. Mahesan Niranjan from the University of Southampton, United Kingdom, who delivered a keynote address highlighting cutting-edge developments in the field of computing. The Women in Engineering track was enriched by two distinguished speakers: Dr. Grace A. Lewis, IEEE Computer Society President-Elect for 2025 (and President 2026), who shared valuable insights under the theme "Women in STEM," and Ms. Mary Ellen Randall, IEEE Fellow and 2025 IEEE President-Elect, who addressed the gathering under the theme "Women in Engineering and Technology." ICARC 2025 successfully fostered collaboration between academia and industry to advance computing research and explore emerging trends in the field. The conference introduced eight tracks across a broad spectrum of computing disciplines: 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 Enhanced Teaching and Learning, Digital Transformation and Industry 5.0, Digital Transformation in Healthcare, and Open Track. The event attracted a diverse audience, including researchers, academics, and students eager to engage with cutting-edge advancements, as well as industry professionals interested in the practical applications of computing technologies.

The conference received 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, the IEEE Geoscience and Remote Sensing Society (GRSS) Sri Lanka Chapter proudly served as the official mer-

chandise partner for ICARC 2025, enhancing the event.ICARC 2025 partnered with the Sri Lanka Medical Association (SLMA) as the Knowledge and Innovation Partner, enriching the conference's collaborative spirit.

Marking its fifth consecutive year, ICARC continued to highlight outstanding research and innovation in computing. All accepted papers presented at the conference were submitted for inclusion in the IEEE Xplore Digital Library.

The Faculty of Computing extends its sincere gratitude to all who contributed to the success of ICARC 2025 and looks forward to upholding this tradition of research excellence in future editions of the conference.

Congratulations
Ishan Randika for Your Exceptional Achievement

It is with immense pride that we extend our congratulations to one of the final-year undergraduates from the Faculty of Computing, Ishan Randika, for his remarkable achievement at the Ruhuna Innovation and Invention Exhibition 2023. Ishan clinched 1st place in the highly competitive University and Tertiary Education Category, showcasing exceptional talent and innovation. His award-winning software product, "SL Rideshare", is a testament to his dedication, creativity, and problem-solving abilities.

It is a cutting-edge solution designed to revolutionize ride-sharing in Sri Lanka, blending technology and user-centric design to address real-world transportation challenges. This groundbreaking project not only highlights the caliber of talent nurtured within the Faculty of Computing but also sets a benchmark for innovation and excellence in higher education.

PERSPECTIVES ON COMPUTING

Semantic Communications: Meaning Over Data

Dr. Samiru Gayan, (Email: samirug@uom.lk) Department of Electronic and Telecommunication Engineering, University of Moratuwa, Sri Lanka.

Dr Samiru Gayan is a Senior Lecturer in the Department of Electronic and Telecommunication Engineering at the University of Moratuwa, Sri Lanka. His main research interests are in wireless communications and machine learning for wireless communications.

In a world drowning in data, imagine a communication system that doesn't just send bits but understands meaning. Enter semantic communications, a paradigm shift from traditional networks that shuttle raw information to ones that prioritize intent, context, and relevance. Rooted in cutting-edge information theory, this technology promises to make our digital world smarter, leaner, and more human-centric.

Traditional vs Semantic Communications

Traditional systems, built on Shannon's 1948 framework, focus on transmitting every bit, regardless of its purpose. They're like postal services delivering every letter, even junk mail.

Figure 1: Traditional communication system model.

Semantic communications, however, act like a savvy assistant: they extract what matters and deliver only that. This goal-oriented communication, where the system interprets data based on its intended use, slashing bandwidth needs and boosting efficiency.

How does it work?

Imagine sending a photo of a cat. Today's networks transmit every pixel. A semantic communication system first analyzes the image and grasps that it's a cat. Then, it sends just "cat" plus key characteristics such as "colour", "pose" and lets the receiver reconstruct the photo. This relies on three pillars: knowledge bases (KB) which is the shared understanding between sender and receiver, semantic encoding which is responsible for turning data into meaning, and semantic decoder which is responsible for rebuilding it contextually. Artificial intelligence (AI), especially deep learning, powers training systems to recognize patterns and intent [1].

Figure 2: *Semantic communication system model.*

Applications

Semantic communications can enhance video streaming by prioritizing the transmission of visually significant data, improving quality while reducing bandwidth usage. In autonomous vehicles, it enables efficient exchange of intent and context between cars, improving real-time decision-making and safety. Healthcare systems can use semantic communications to transmit critical patient data more effectively, focusing on relevant medical information for faster diagnosis. In smart cities, it optimizes IoT networks by filtering and sending only meaningful data, reducing congestion and energy consumption. Virtual reality applications benefit from semantic communications by delivering immersive experiences with lower latency, emphasizing key sensory details over redundant data[1].

Challanges

Semantic systems demand shared knowledge bases which is tricky when devices differ. AI models must be flawless, or errors cascade (imagine "cat" becoming "dog"). Security is another challenge as if meaning is exposed, hackers can twist it.

Still, the researchers are refining algorithms to make semantic communication a key technology in 6G. For this purpose, AI will be heavily used. Semantic communication is not just a technical evolution, it is a rethink of communication itself. In a noisy digital age, semantic systems whisper what matters most.

References

[1]. Z. Qin et al., "AI Empowered Wireless Communications: From Bits to Semantics," in Proceedings of the IEEE, vol. 112, no. 7, pp. 621-652, July 2024.

Congratulations
the Winners of the Prestigious Code with WIE 2024

With immense pride we announce that team "Dream Coders" comprising three talented undergraduate girls from the Faculty of Computing has emerged victorious in the prestigious Code with WIE 2024 Competition, organized by the WIE Sri Lanka Section. The event took place on December 15, 2024, at Curtin University Colombo, showcasing remarkable talent and innovation from participants across the island. Talented team members of Dream Coders include Mary Angel Anton Premathas, Vaishaly Mahendrarajah and Anathil Sainuka and they stood out with their brilliant solution, exceptional teamwork, and innovative thinking, setting a benchmark for excellence in the competition.
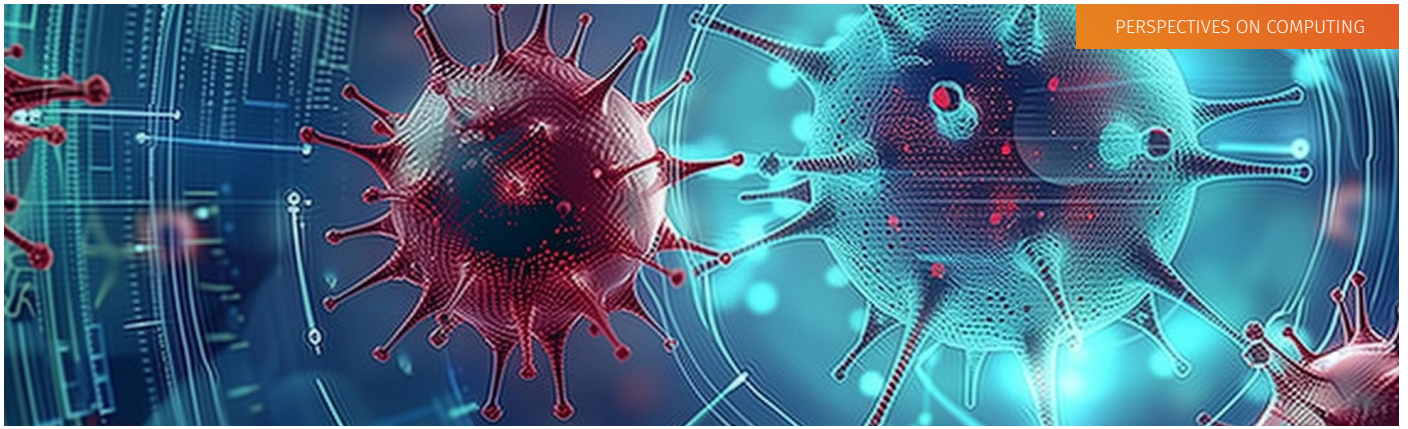
AI in Cancer Diagnosis: From Promise to Progress

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

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

Artificial intelligence (AI) is rapidly changing how cancers are detected and characterized. Early on, dramatic claims about "teaching machines to see" promising breakthroughs, but recent reviewers have urged a more measured tone. Today's AI systems act as powerful assistants in pathology rather than supreme saviors. They are increasingly tested on large, diverse datasets and evaluated in clinical settings. For example, a versatile new model from Harvard ("CHIEF") was evaluated on 19 different cancer types and achieved nearly 94% accuracy in detecting malignancies (Pesheva, 2024). These results highlight real advances in AI for histopathology but reported in clear, evidence-based terms rather than hype.

CHIEF: A "ChatGPT-like" Pathology AI

One notable recent advancement is the development of CHIEF (Clinical Histopathology Imaging Evaluation Foundation) at Harvard Medical School. Unlike earlier AI tools limited to single tasks or cancer types, CHIEF was trained on tens of thousands of whole-slide tumor images spanning 19 cancer types. Its design lets it analyze both local regions and whole images, capturing tumor cells and their microenvironment simultaneously. In rigorous tests on over 19,000 slides from 32 datasets worldwide, CHIEF attained about 94% accuracy in cancer detection (Pesheva, 2024). This outperformed prior AI methods by a large margin: CHIEF surpassed other state-of-the-art models on key tasks (cancer cell detection, tumor origin, outcome prediction, and biomarker identification) by up to 36%. In practical terms, it means CHIEF could flag cancers in settings where older models might miss them.

Key highlights of the CHIEF study include:

Broad Scope: Tested on 19 cancer types, making it a generalist tool

rather than a narrow specialist.

High Accuracy: Achieved nearly 94% accuracy across 15 datasets (covering 11 types) in cancer detection.

Improved performance: Outperformed existing AI approaches by up to 36% on critical tasks.

Together, these findings suggest that large, multitask AI models (sometimes likened to "ChatGPT for cancer") can add robust decision support in pathology. CHIEF's holistic image analysis (looking at cells and surrounding tissue) also helped it make novel connections between tissue features and patient outcomes, hinting at new clinical insights.

Transformer-Based "Foundation" Models

Beyond single-purpose tools, the field is shifting toward transformer-based foundation models trained on vast datasets of pathology images. These models are built using similar designs as large language models, which helps them work well on many different tasks. Some well-known examples from 2024–2025 include:

Virchow: A million-slide vision-transformer model (632 million parameters) trained on 1.5 million whole-slide images. In benchmark tests, Virchow embeddings enabled a pan-cancer detection model with a specimen-level AUC of 0.949 across 17 cancer types (and 0.937 across 7 rare types). It set new state-of-the-art performance on internal and external image-level benchmarks and on slide-level biomarker prediction tasks (e.g. predic

ting gene mutations). Clinical assessments showed that a Virchow-based cancer detector could match or exceed the performance of approved AI tools, especially for uncommon cancer subtypes (Vorontsov et al., 2024).

UNI - A self-supervised pathology transformer that achieved similar high performance with lower computational cost. In pan-cancer testing, UNI-based embeddings yielded an overall AUC of ~0.940 (compared to 0.950 for Virchow). This indicates that transformer models even with moderate size can approach the best results in cancer detection (Vorontsov et al., 2024).

Prov-GigaPath - A "whole-slide" transformer trained on 1.3 billion image patches from over 170,000 slides. Prov-GigaPath achieved state-of-the-art accuracy on 25 out of 26 standard digital pathology tasks (cancer subtyping, pathomic features, etc.). Its large-context design (using techniques like LongNet to model entire gigapixel slides) showed clear gains over previous methods (Xu et al., 2024).

These transformer-based models consistently outperform older CNN (convolutional neural network) systems. For example, comparison experiments found that Virchow and UNI features led to higher AUCs than ResNet-based extractors across diverse cancers. In the Nature Medicine study, Virchow's embeddings generalized well to new data and boosted biomarker prediction accuracy compared to CNN approaches. In short, scaling up both data (hundreds of thousands of slides) and model size (hundreds of millions of

parameters) has delivered tangible improvements in diagnostic tasks.

Clinical Adoption and Market Growth

The clinical use of AI in pathology is also accelerating. Market analysts project the global AI pathology market to grow from $1.22 billion in 2024 to $1.39 billion in 2025, with a compound annual growth rate of about 13.5%. By 2029 it is forecast to reach $2.31 billion (MarketsandResearch, 2025). This growth is driven by more hospitals adopting AI tools and new solutions entering the workflow. For example, DeepHealth's AI system for breast cancer screening has demonstrated a 21% increase in detection rates in one large screening program. By flagging subtle lesions on mammograms, the AI helps radiologists catch cancers they might have missed (DeepHealth, n.d.). Similar advancements have emerged from AI assistance in prostate and lung cancer screening. Overall, these trends indicate that AI is transitioning from research into real-world clinical practice.

Despite this progress, challenges remain. Researchers must conduct further validation studies across different institutions to ensure that findings can be generalized. Regulatory agencies are working on approval processes, and clinicians need to undergo training and build trust to integrate AI into clinical workflows. However, the combination of technological advancements, such as CHIEF and other foundational models, along with increasing clinical evidence, suggests that AI's role in pathology is developing. Careful, evidence-based messaging

grounded in peer-reviewed results will ensure that AI tools are adopted responsibly.

In summary, the narrative surrounding AI in cancer diagnosis has shifted from unrealistic optimism to tangible progress. Recent studies demonstrate that advanced AI models can recognize tumor features with remarkable accuracy. Transformer-based foundational models (such as Virchow, UNI, and Prov-GigaPath) outperform older convolutional neural network (CNN) methods and enable analyses across various types of cancer. Clinicians are rapidly expanding clinical implementations; markets are growing, and AI-assisted breast cancer screening showcases a significant impact on patient care. The field now focuses on rigorously validating

and refining these tools rather than making dramatic promises. In this way, AI in pathology can provide more accurate and consistent diagnoses and uncover new biomarkers, realized step by step through careful scientific collaboration between engineers and clinicians.

References

[1]. *AI is transforming cancer detection – what's next? (n.d.). DeepHealth. Retrieved June 16, 2025, from https://deephealth. com/insights/ai-is-transforming-cancer-detection-whats-next/*

[2]. *Markets, R. and. (2025, June 5). Artificial intelligence in pathology market report 2025. GlobeNewswire News Room. https://www.globenewswire.com/en /news-release/2025 /06/05/3094448/ 28124/en/Artificial-Intelligence-in-Pathology-Market-Report-2025.html*

[3]. *Pesheva, E. (2024, September 4). New AI tool can diagnose cancer, guide treatment,*

predict patient survival. Harvard Gazette. https://news.harvard.edu/gazette/story/2024/09/new-ai-tool-can-diagnose-cancer-guide-treatment-predict-patient-survival/

[4]. *Vorontsov, E., Bozkurt, A., Casson, A., Shaikovski, G., Zelechowski, M., Liu, S., Severson, K., Zimmermann, E., Hall, J., Tenenholtz, N., Fusi, N., Mathieu, P., Eck, A. van, Lee, D., Viret, J., Robert, E., Wang, Y. K., Kunz, J. D., Lee, M. C. H., … Fuchs, T. J. (2024). Virchow: A million-slide digital pathology foundation model (No. arXiv:2309.07778). arXiv. https://doi.org /10.48550 /arXiv.2309.07778*

[5]. *Xu, H., Usuyama, N., Bagga, J., Zhang, S., Rao, R., Naumann, T., Wong, C., Gero, Z., González, J., Gu, Y., Xu, Y., Wei, M., Wang, W., Ma, S., Wei, F., Yang, J., Li, C., Gao, J., Rosemon, J., … Poon, H. (2024). A whole-slide foundation model for digital pathology from real-world data. Nature, 630(8015), 181–188. https://doi.org /10.1038/s41586-024-07441-w*

Congratulations

Team "CodeCasters" – 1ˢᵗ Runners-Up at Code with WIE 2024

The Faculty of Computing is excited to celebrate the great achievement of team "CodeCasters", who has secured the 1st Runners-Up position at the prestigious Code with WIE 2024 Competition. This remarkable event, organized by the WIE Sri Lanka Section, was held on December 15, 2024, at Curtin University Colombo.

These undergrads from the Faculty of Computing, Hashini Wickramasinghe, Warushika Dahanayaka and Kushana Senadheera have showcased their exceptional teamwork, innovative ideas, and technical expertise at the competition earning them this well-deserved recognition.

FORGING THE FUTURE: IEEE CAREERFORGE V2.0

FORGING THE FUTURE: IEEE CAREERFORGE V2.0
EMPOWERS FUTURE PROFESSIONALS

Composed by Ms. B.M. Dulari Wathsala Dayananda (dulariwathsala824@gmail.com),
IEEE Student Branch, SUSL

The IEEE Student Branch at Sabaragamuwa University of Sri Lanka is set to host IEEE CareerForge V2.0, an interactive online career guidance program designed to bridge the gap between academia and industry. This event, primarily targeting undergraduates preparing for internships, aims to equip students with essential career insights and industry connections.

IEEE CareerForge V2.0 will feature a Mini Career Fair, where top companies will introduce their organizations, internship opportunities, and career paths. Students will engage in career counseling workshops, covering resume building, job search strategies, and personal branding. Additionally, industry partners will share valuable insights into the latest trends and expectations, offering a unique opportunity to expand professional networks.

Through strategic collaborations with young professionals, university alumni, and industry leaders, this event ensures a comprehensive career development experience. By fostering networking, mentorship, and skill-building, CareerForge V2.0 is committed to empowering students for a successful transition into the professional world.

With its mission to prepare students for the future, IEEE CareerForge V2.0 promises to be a transformative experience, unlocking new career possibilities for aspiring professionals.
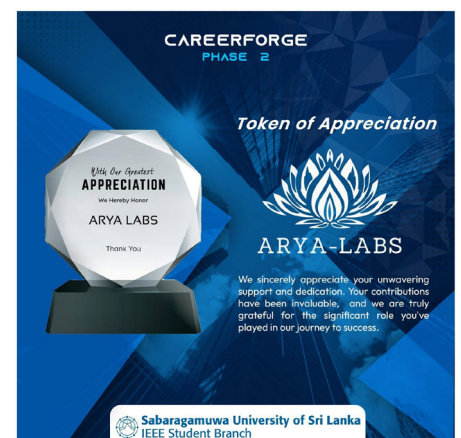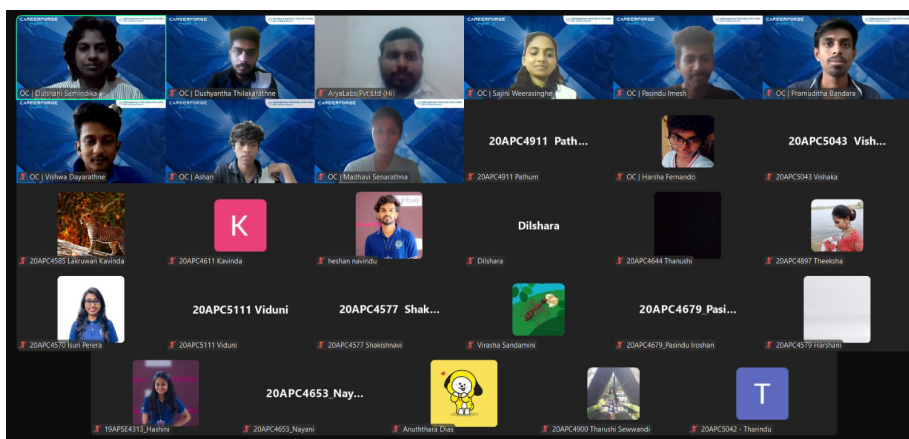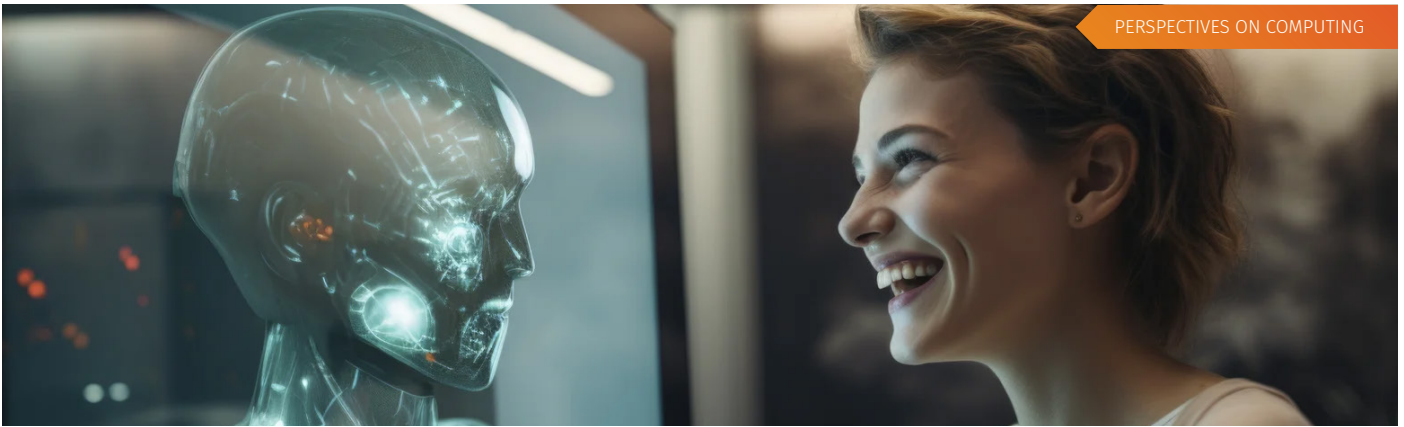
Emotional AI: Navigating the Ethical Challenges of Affective Computing in Modern Software Systems

Ms. N.S.S Weerasinghe (nssweerasinghe@std.appsc.sab.ac.lk), Department of Software Engineering, Sabaragamuwa University of Sri Lanka

Ms. N.S.S Weerasinghe is an undergraduate at the Department of Software Engineering, Sabaragamuwa University of Sri Lanka, with an interest in AI ethics and human-computer interaction.

Emotional AI, also known as affective computing, is revolutionizing the way humans interact with technology. By enabling software systems to detect, interpret, and respond to human emotions, Emotional AI aims to create more natural, empathetic, and adaptive digital experiences. Imagine a smartphone or virtual assistant that not only processes your words but also analyzes your tone, facial expressions, or physiological signals to sense whether you're happy, frustrated, or stressed.

While the integration of Emotional AI into modern software systems unlocks exciting possibilities across fields like healthcare, education, and customer service, it also introduces critical ethical challenges. These include concerns over privacy, consent, algorithmic bias, cultural misinterpretation, and the misuse of sensitive emotional data. To responsibly harness the power of affective computing, developers and stakeholders must carefully navigate the-

se ethical dilemmas to protect individual rights and ensure fairness and transparency.

While many studies have explored the capabilities and risks of Emotional AI, this article focuses on key ethical challenges that deserve more attention and offers practical guidance for responsible development.

This article contributes to the ongoing discussion on Emotional AI by synthesizing recent global research with a focus on the ethical challenges in culturally diverse societies. It brings attention to less-explored issues like emotional bubbles, where AI systems may create a false sense of emotional support. The article stresses the importance of ethical design practices, including transparency in handling emotional data, the use of diverse and inclusive datasets, and giving users control over their information. By addressing these points, it aims to guide developers and stakeholders in building

Emotional AI systems that balance innovation with respect for privacy, fairness, and user well-being.

What Emotional AI Can Do

Emotional AI is about teaching machines to recognize emotions through things like facial expressions, voice tones, and even the words we type. For example, if we're using a mental health app, it might notice that we seem down based on the way we speak and suggest helpful resources. In customer service, a chatbot could tell if we're frustrated and try to ease the situation.

Imagine being able to talk to a device that understands your mood and responds in a way that makes you feel heard and understood. Emotional AI holds a lot of potential, especially in areas like healthcare, entertainment, and customer service.

The Ethical Dilemma: Privacy, Bias, and Manipulation

While the idea sounds great, there are serious concerns. For one, privacy is a big issue. Emotional AI needs personal data like how we speak, what makes us happy or sad, and even our health information. If this data is mishandled, it can lead to privacy breaches, leaving people vulnerable.

Another concern is bias. Just like other AI systems, Emotional AI can make mistakes if it's trained on limited or biased data. For example, if the system only understands emotions based on Sri Lankan cultural norms, it might misinterpret emotions from people in other parts of the world. This is especially problem-

atic in sensitive fields like mental health, where understanding emotions accurately is crucial.

Then, there's the potential misuse of emotional data. Imagine an ad that pops up on your phone, perfectly timed when you're feeling lonely or stressed, using your emotional state to sell you something. This raises questions about whether companies should have the power to manipulate your emotions for profit.

Emotional Bubbles: The Deceptive Side of AI

"A particularly troubling effect of Emotional AI is the creation of "emotional bubbles." This happens when the system mimics our emotions so well that we start to think the AI is really feeling them too. For instance, if a chatbot mirrors our frustration, we might believe it's empathetic toward our situation when, in reality, it's just a reflection of our own feelings. This can give a false sense of emotional support, which can prevent us from growing emotionally. We might avoid confronting difficult feelings or discussing emotions with others because we feel validated by an AI that's simply echoing our own mood.

Furthermore, emotional bubbles might undermine moral thinking. If an AI always agrees with our feelings and thoughts, it could make us less open to challenging or rethinking our views. This is a dangerous path, as it can prevent us from having healthy, meaningful conversations about moral or ethical issues [2]".

Establishing Ethical Guidelines for Emotional AI in Software

Building on the concerns identified, this article proposes a set of ethical guidelines that prioritize transparency, fairness, and user control—focusing especially on preventing emotional manipulation and promoting user autonomy in emotionally responsive systems.

Users should always know and understand how their emotional data is being handled. For example, a mental health chatbot might track users' moods based on their messages. If the chatbot doesn't clearly explain whether it stores this data or shares it with therapists or advertisers, users could unknowingly expose private emotions. Ethical AI should provide clear information about what happens to emotional data.

Bias in AI can lead to unfair decisions. For example, if a job interview AI analyzes facial expressions but is trained mostly on Western candidates, it might misread emotions of people from other cultures. This could result in qualified candidates being unfairly rejected. To avoid this, Emotional AI should be trained on diverse datasets to ensure fair treatment of all users.

People should have control over their emotional data. Imagine a fitness app that tracks stress levels through heart rate and breathing patterns. If the app sells this data to health insurance companies, users might end up with higher premiums without realizing it. Ethical AI should give users the option to opt in or out of data tracking and decide who can access their emotional information.

Balancing Innovation with Responsibility

Emotional AI presents an opportunity to create more human-centered software experiences, but this innovation must not come at the cost of ethics. Developers, researchers, and industry leaders have a shared responsibility to implement affective computing technologies thoughtfully and carefully, ensuring respect for privacy, fairness, and user autonomy.

While Emotional AI has the potential to enhance human-computer interactions, it also presents serious ethical challenges. The future of affective computing relies on balancing technological advancement wit responsible design. By prioritizing transparency, fairness, and privacy in emotional AI software systems, we can create tools that genuinely support users without compromising their emotional well-being or fundamental rights.

References

[1]. Nizamani, M., Ramzan, F., Fatima, M., & Asif, M. (2024). Investigating How Frequent Interactions with AI Technologies Impact Cognitive and Emotional Processes. Bulletin of Business and Economics (BBE), 13(3), 316-325.

[2]. Mlonyeni, P. M. T. (2024). Personal AI, deception, and the problem of emotional bubbles. AI & SOCIETY, 1-12

[3]. Stark, L., & Hoey, J. (2021, March). The ethics of emotion in artificial intelligence systems. In Proceedings of the 2021 ACM conference on fairness, accountability, and transparency (pp. 782-793).

Congratulations

Mohamed Nafris for Your Outstanding Achievement

We are extremely proud to congratulate Mohamed Nafris, an undergraduate from the Faculty of Computing, for being the winner of the "Short Video Competition 2025 "organized by the Central Bank of Sri Lanka.

His powerful video on the theme "Protect Your Money; Say No to Financial Scams" was selected as the top entry in the competition and the award ceremony took place in Nuwara Eliya on March 24th, 2025, where top officials from the Central Bank were present.

Impact Factors of AI/ML Workload Optimization in Cloud Environment

Dr. J. Jananie (*jananie@eng.jfn.ac.lk*) *Department of Computer Engineering, University of jaffna.*

Dr.J.Jananie, Department of Computer Engineering, Faculty of Engineering, University of Jaffna. Her research interests are Cloud and Distributed Computing, and Natural language Processing.

Artificial Intelligence (AI) and Machine Learning (ML) workloads, when executing in the cloud environments, demand the infrastructure as a Service (IaaS) and Function as a Service (FaaS) for efficient resource allocation, scheduling, and parallel computing capabilities. Generally, there is a need for workload optimization for AI/ML workloads like training and inference to ensure that services are utilized correctly, maximizing profit while minimizing the wastage of resources such as Compute instances and storage. The challenge is navigating the trade-off between performance and other impact factors. The jobs of image processing, natural language processing, and Data Analytics, and workloads of deep learning training, inference serving, and data-parallel systems require more parallel processing capabilities and the ability to handle complex computations. Deployment will be a challenge in IaaS or FaaS. IaaS- public, private, and hybrid cloud platforms needs wise selection of all resources depending on the requirements of workloads and handling them without degrading the performance. FaaS, for any serverless application in a large configuration space with latency or budget-driven requirements, the salient features of the serverless computing are useful without concerning the underlying complexities. Now, from the user, configuration decisions and orchestration are the questions in both platforms to handle any AI/ML workloads.

Performance Factors: Any ML/AI workloads, model factors are batch Size, matrix size, kernel size, input and output depth, stride size, and input padding. Factors like memory, core count, and clock speed of clusters lead to rapid processing and computations. On the other hand, serverless enable finegrained functions in cloud computing, developers are free from the responsibility of configuring environments, managing virtual clusters, and paying idle time. Factors like maximum concurrency, storage, deployment size,

and memory determine the performance.

Resource Configuration: IaaS/FaaS resource configurations of the AI/ML models include the number of stages in the workflow, the degree of parallelism in each stage, the type of cluster, memory and are associated with the cluster orchestration. The approach for performance analysis [1], addresses the computational and model factors to improve the predictive performance. It highlights the importance of tailoring predictive models to the specific hardware and model complexity to optimize resource allocation and efficiency. On the other hand, serverelss environment like in Amazon Web Services lambda, the CPU capacity of a lambda function is proportional to the allocated function memory.

Parallelism and Scheduling: Large-scale training and inference in IaaS or FaaS platforms become promising when the trade-off of optimizing performance factors is handled perfectly with model and/or data distribution. Here, AI/ML model is partitioned and assigned to different machines or devices or functions. If it's a large-scale training/ inference, each machine [2] or function [3] processes a mini-batch of data for the submodel and sends back the computed result to the next. This process effectively distributes the computational workload across multiple functions/ machines, enabling parallel performance.

Optimize ML/AI Workload: Optimizing the AI/ML workload when executing on IaaS/FaaS platforms with CPU/GPU clusters or serverless functions, and minimizing the end-to-end completion time is the key to improving performance. It is determined by the performance factors and the resource constraints, depending on the chosen platform. The constraints defined by the cloud providers considered to balance with performance and the cost trade-off.

References

[1]. M. Elapatha et al, *GPU-Based Performance Analysis of Deep Learning Training, In CICT, 2024*

[2]. G. Nakuleswaran et al, *Distributed Deep Neural Networks Training in a Multi-Worker Environment, In ICITR, 2024*

[3]. J. Jananie et al, *AMPS-Inf: Automatic Model Partitioning for Serverless Inference with Cost Efficiency, ICPP, 2021.*

Congratulations

Thishmi Amaya Gunawardhana on being recognized at the STEMUP Volunteer Summit 2025

We are proud to celebrate the achievement of Thishmi Amaya, a dedicated student of the Faculty of Computing, for being honored with the Rising Star Award at the STEMUP Volunteer Summit 2025. This recognition reflects Thishmi's exceptional dedication, leadership, and contributions in advancing STEM education through the STEMUP Educational Foundation, empowering young minds and championing change in the tech community.

SOCS - SUSL

SOCIETY OF COMPUTER SCIENCE (SOCS)
SABARAGAMUWA UNIVERSITY OF SRI LANKA

Composed by Mr. T.A.D.R.P. Chandrarathna (ravinduchan15@gmail.com), Society of Computer Science (SOCS), SUSL

Bringing Technology and Innovation to Campus Life

The Society of Computer Science (SOCS) at Sabaragamuwa University of Sri Lanka is a student-led group that inspires and supports students interested in IT and computer science. Founded in 2012 by students from the Department of Computing and Information Systems (now the Faculty of Computing), SOCS has grown into a lively community that helps students learn new skills, explore technology, and work together on exciting projects.

What Does SOCS Do?

SOCS organizes many activities and events throughout the year to help students grow, both academically and personally. Here are some of the main events and programs:

■ *Fortnight Meetup Sessions:*

Every two weeks, SOCS hosts meetups where students can learn from guest speakers and each other. Topics range from the latest tech trends like Artificial Intelligence and real-time web communication to project management. These sessions help students gain new skills and prepare for careers in IT.

■ *Tech Talk :*

In this series, industry experts visit the university to share their experiences and advice. Students get to learn about the latest trends in technology and how to prepare for the workplace. We recently organized the latest TechTalk V1.0 in collaboration with Econ-Labs.

■ *Vidunena*

Vidunena is a special program for advanced-level students preparing for the G.C.E. (A/L) ICT exam. The webinars cover important topics from the curriculum and offer guidance on IT careers. Vidunena V4.0 was successfully concluded and next version is to be released.
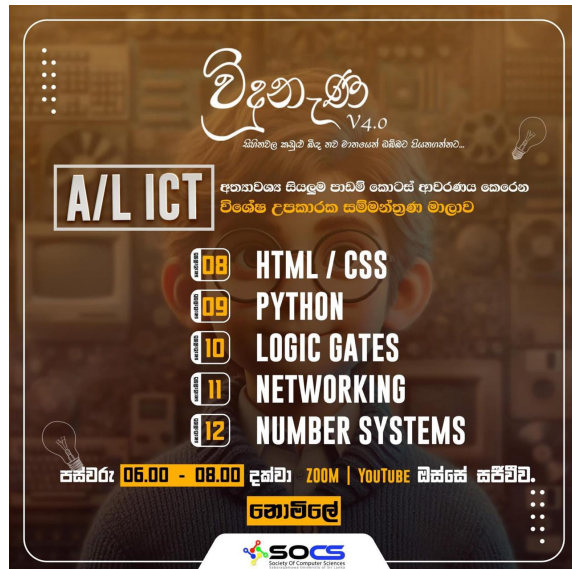
■ *Why SOCS Matters*

SOCS is more than just a club. It's a community where students support each other, share knowledge, and build leadership skills. By organizing these events and activities, SOCS helps students prepare for the future, connect with industry professionals, and make a positive impact on the university and beyond.

Whether you're passionate about coding, gaming, or just curious about technology, SOCS is the place to be at Sabaragamuwa University of Sri Lanka.

CROSS-PLATFORM BATTLE BETWEEN FLUTTER AND KMP

Pramith Wijethunga (wmpkw96@gmail.com), Arimac Lanka (PVT) Ltd

Pramith Wijethunga is currently employed as a Software Engineer at Arimac Lanka (PVT) Ltd. I hold a Bachelor of Science (Honors) degree in Computing and Information Systems from the Faculty of Computing, Sabaragamuwa University of Sri Lanka.

Usually, developers build software for each specific platform, such as destop, web, and mobile. All these platforms have their native way of developing software. For example, Windows applications do not run on Mac OS, and Android apps do not run on iOS. Many examples of the same application running on different platforms exist. Developers must maintain different code bases for each platform to run the same application. But today, thanks to cross-platform development, there is an opportunity to use the same code base for an application to build on different platforms. Several frameworks allow cross-platform development, such as Flutter, React Native, and Kotlin Multiplatform (KMP). Flutter and KMP have recently become famous cross-platform development frameworks in the industry. This article will distinguish between Flutter and KMP, which framework will become more popular.

Kotlin Multiplatform is a trending technology developed by JetBrains

that introduced popular Integrated Development Environments (IDEs) such as Android Studio and IntelliJ. KMP allows the sharing of the same Kotlin code base on different platforms. Flutter is also a popular Software Development Kit (SDK) that Google created. It uses Dart programming language to build applications on various platforms.

1. Communication on different platforms

The first and foremost comparison between Flutter and KMP is their communication on different platforms. Different platforms have their preferred way of understanding codes. For example, Android runs in Java Virtual Machine (JVM), and iOS works with native binaries, and files with zeros and ones. KMP communicates both these platforms by converting Kotlin code directly to Java bytecode for Android and native binaries for iOS. However, Flutter is not clever enough to convert Dart code directly into different languages. Therefore, flutter uses platform channels to communicate with nati-

ve platforms. This will reduce the efficiency of code compiling compared with KMP.
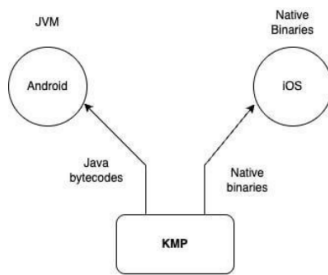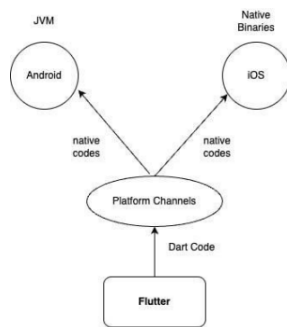

Figure 1: *KMP Communication*

Figure 2: *Flutter Communication*

2. UI rendering.

KMP allows developers to build native User Interface (UI) toolkits for different platforms. For example, using Jetpack Compose for Android UI implementation and SwiftUI/UIKits for iOS UI implementation. Thanks to this technology, developers can create an application with a platform-specific look. On the other hand, Flutter uses its UI rendering engine and draws every pixel from scratch. Flutter does not allow the use of native UI kits like KMP, and it uses the same UI widgets for all platforms.

3. Communication with Native Application Programming Interfaces (APIs)

Native APIs are essential when running applications on different platforms. For example, native notification-based APIs from each platform must execute notifications am-

ong different platforms. KMP can communicate directly with these native APIs' of each platform. KMP uses Kotlin for Android and Swift/Objective-C for iOS platforms, and so on. Flutter communicates with native APIs indirectly via platform channels, and it is required to set up method channels to communicate with native APIs. These channels translate Dart codes to the native codes.

4. Performance

KMP used the same memory space to run applications and translate them to native platforms. Therefore, KMP has a high performance for building applications on different platforms. Since Flutter uses a bridge layer (Platform/Method channels) to translate Dart code to Native code, and Flutter uses an isolated environment called "Dart Virtual Machine" for building applications, It does not share the same memory space to build applications on various platforms. This will reduce the application performance compared with KMP.

5. Popularity

KMP is still gaining popularity in the cross-platform development world. Furthermore, it is creating more communities and groups that support KMP development. KMP has a lesser market share and community support than Flutter today. More applications are built with Flutter in the present market than KMP, especially mobile applications. Also, Flutter has over 168k Github stars and a sprawling library of plugins and tools that can improve project levels. Flutter is still more popular than KMP.

6. Google Support

Google introduced Flutter, and JetBrains introduced KMP. However, the interesting incident is Google promoted KMP as a better cross-platform application development technology than Flutter. This behaviour of Google has created a crucial opinion among the IT community that KMP will play a significant role in the cross-platform application development industry in the Future.

Conclusion

Cross-platform development is highly popular in the software engineering industry. As an emerging cross-platform technology, Kotlin Multiplatform (KMP) significantly impacts applications because of its unique ability to communicate directly with multiple native platforms with high performance and native UI rendering feeling. KMP has to improve its community and support because Flutter has a more extensive range of applications and support in the market. With the support of Google, some believe KMP will become more popular in the future than Flutter. According to the present statistics Flutter is more prevalent in today's industry.

References

[1]. Flutter, Flutter Documentation. Accessed: Mar. 23, 2025. [Online]. Available: https://docs.flutter.dev/

[2]. Kotlin, Kotlin Multiplatform Documentation. Accessed: Mar. 23, 2025. [Online]. Available: https://kotlinlang.org/docs/multiplatform.html

[3]. droidcon, "State of Kotlin Multiplatform in 2023," YouTube, Sep. 11, 2023. [Online Video]. Available: https://www.youtube.com/ watch?

Navigating the Future of Digital Ownership using NFTs

Dr. Jeyakumar Samantha Tharani (samantha@univ.jfn.ac.lk), *Department of Computer Science, University of Jaffna*

Jeyakumar Samantha Tharani received a Ph.D. in the School of Information and Communication Technology, Griffth University, Gold Coast, Australia. Her research interests include blockchain technology, cybersecurity, graph modelling, and machine learning.

Blockchain is a distributed digital ledgers of cryptographically signed transactions that are grouped into blocks. Each block is cryptographically linked to the previous one after validation and undergoing a consensus decision. A distributed ledger is a network where every participant can communicate with one another without going to a centralised point. It allows network participants to establish a shared and immutable record of ownership and to share a database of electronic records and build consensus regarding the validity of transactions through cryptographic algorithms. Blockchain has many uses, and is not limited to money; virtually anything of value (assets) can be tracked and traded on a blockchain. Crypto assets can be defined as a type of private asset that depends primarily on blockchain to secure digital value or contractual rights; they can be transferred, stored or traded electronically. There is a wide variety of crypto assets, including payment/exchange tokens. NFTs are one-of-a-kind crypto assets that exist on the blockchain technology. Due to their uniqueness, NFTs are non-fungible, which means they are not mutually interchangeable. This contrasts with fungible assets such as a bill for one-dollar, a piece of gold or a bitcoin each of which can be interchanged with like items. The properties of NFTs offering opportunities for monetization, traceability, and tracking. Further, it can provide superior transparency, asset management, and intellectual property protection. These properties make NFT as primary applications for digital art, fashion and sports, finance and real estate. In recent years, Non-Fungible Tokens (NFTs) have taken the digital world by storm, transforming everything from art to entertainment and even real estate. For many, including myself, NFTs represent more than just a trend, they are a window into a new digital landscape, where ownership and creativity are redefined. The journey with NFTs has been nothing short of fascinating, filled with discoveries, challenges, and a deeper understan-

ding of how technology is reshaping our world. This article facilitates to explore the highs and lows of navigating the NFT space and reflect on what it means for the future of digital assets.

Life cycle of NFT

The life cycle of NFT involves three phases such as creation, minting, and auction as shown in Figure 2. The details of these each phases detailed is as follows:

Creation: The creation of a digital asset begins with capturing a photo, writing a poem, or composing a song. Once you've created something, you have a unique piece to sell.

Minting: Once the asset is created, it is tokenized through a process known as "minting." This process makes the asset transferable on the blockchain. Similar to how banks mint currency, minting gives NFTs their life. After minting, the asset becomes a tradeable NFT.

Auction: Once the asset is minted, it becomes tradable on a marketplace. To trade or sell NFTs, you need a crypto wallet. These wallets function like regular wallets, but instead of holding money, they store private keys for cryptocurrency or crypto assets. The private keys are the unique strings that point to your digital assets.

Use cases of NFTs

The NFTs deployed in the blockchain network cannot be copied, removed or destroyed. Blockchain also enables NFTs to be tracked back to their owners and eliminates the need for third-party verification. Fu-

rther, the properties of the blockchain technology protects the ownership of the NFT, giving the owner the exclusive right to conduct transactions and transfer the token. Even the issuer of the NFT cannot replicate or transfer it without the owner's permission. These unique characteristics generated a lot of attention in the following industrial use cases:

Figure 2: Life Cycle of NFT

Digital Art.

NFTs initially gained popularity in collectibles, art, gaming, and virtual worlds. Early examples include ***Cryptopunks***, algorithmically generated pixel images, and ***Cryptokitties***, a virtual game. NFTs ensure that digital art cannot be altered or copied, preventing plagiarism and theft while helping artists monetize their work. They give digital art the qualities of originality and rarity, similar to physical art, and can be tracked from their origin, showing details like the selling price and transaction history.

Digital Fashion: Digital fashion can be authenticated and traded on the blockchain, similar to artwork, without being copied. Major fashion brands like Adidas and Forever 21 use NFTs to enhance brand awareness. These NFTs represent virtual -

garments for virtual environments, interactive digital content, and digital twins of real-world items. NFT fashion includes digital collectibles, wearables, and fractional ownership, where multiple creators can contribute to a single virtual garment and share royalties each time the NFT is sold.

Identification, certification and documentation: NFTs have potential in personal identity management, though it's still an emerging application. They can tokenise documents like degrees, certificates, licenses, and medical records, storing unique information on the blockchain. This allows identity and certifications to be traced back to the owner, giving users better control over their data and helping to prevent identity theft.

Healthcare and medicine: NFTs in healthcare are an emerging trend, with potential to store medical information such as patient history, lab results, and imaging. They offer patients easier access to their health data, improve transparency in clinical care, and enhance medical research. NFTs can also store unique genetic information, aiding researchers and pharmaceutical companies in treatment development. Additionally, NFTs can help protect intellectual property rights and facilitate licensing and royalty agreements in medical research and discoveries.

Real estate: NFTs have applications in both virtual and real-world real estate. In virtual worlds like ***Decentraland***, NFTs are used to create and trade virtual properties, ensuring original ownership is identifiable. An

example is the **digital Mars House**, which sold for $500K in 2021, though it is a virtual asset. Virtual real estate can also be found on platforms like Twitter and in games like **Superworld**. These NFTs offer more efficient and transparent transactions than traditional real estate, with ownership recorded on a decentralised ledger. However, challenges remain, such as difficulty in selling virtual properties, fluctuating values, and challenges in enforcing terms and conditions due to the decentralized nature of NFT storage.

Finance: The NFT banking is an emerging application in which users create an account on a platform that supports the technology. This type of banking is designed to be more secure and private than traditional banking because NFTs are built on blockchain, which uses cryptography and usually can't be altered or reversed. Only the asset's sender and recipient can access the transaction details. However, for NFT banking to be more widely adopted, security and scalability concerns must be addressed. Also, the technology must be more user-friendly and accessible.

Supply Chain and Logistics

NFTs in supply chains primarily authenticate products, ensure quali

ty, and verify their origin. Although still in early stages, NFTs are valuable for logistics due to their immutability and transparency, which keep supply chain data reliable. In industries like food and luxury fashion, N-NFTs help trace goods' movement, prevent counterfeiting, and confirm uniqueness. In the auto industry, NFTs can track materials and components, aiding cost control. Additionally, NFTs are useful for tracking ethically sourced, recyclable, and sustainable materials in various industries.

Challenges and Limitations NFTs

The challenges in NFT mainly highlighting the privacy and scalability issues. If a user's wallet address becomes linked to their real-world identity (via a social media profile, marketplace, or other means), their entire NFT collection and transaction history become visible. This can lead to privacy violations or even the targeting of high-value collectors. NFT platforms, while not necessarily directly involved in minting NFTs, often collect personal data for analytics, advertising, and user engagement. Depending on how this data is managed, it can lead to privacy concerns regarding who controls and uses the data. As detailed above the NFT created f

via smart contracts. The code behind an NFT's smart contract can potentially expose sensitive information. I the smart contract is not designed properly, it could allow for vulnerabilities that affect users' privacy.

Another well know issues in the adoption of digital tokenization is scalability. The high demand NFTs like event tickets result in delayed transaction confirmations. This can create a poor user experience, especially when people are trying to buy or sell NFTs quickly. The another concern is high energy consumption during the minting of NFTs. Many NFTs are minted on proof-of-work (PoW) blockchains like Ethereum. PoW blockchains require significant computational power, leading to high energy consumption, which raises environmental concerns and contributes to inefficiency in scalability.

Navigating the future of digital ownership detailed the properties, use cases and challenges of NFTs. As we adapt to these changes, it's clear that the future of ownership will be defined by transparency, decentralisation, and a deeper integration of the digital and physical realms.

Digital tokens are reshaping ownership and value in a decentralized, transparent world

IEEE WIE - SUSL

EMPOWERING WOMEN INNOVATORS: THE TRANSFORMATIVE JOURNEY OF IEEE WIE AFFINITY GROUP AT SABARAGAMUWA UNIVERSITY OF SRI LANKA

Composed by Ms. Tharani De Silva (tharanidulyana19@gmail.com),
IEEE WIE Student Branch Affinity Group, SUSL

The IEEE Women in Engineering (WIE) Affinity Group at Sabaragamuwa University of Sri Lanka has become a driving force for change, empowering young women to break barriers and lead with confidence in the world of STEM. With a mission rooted in equity, empowerment, and innovation, the WIE group continues to cultivate an environment where female undergraduates thrive academically and professionally.
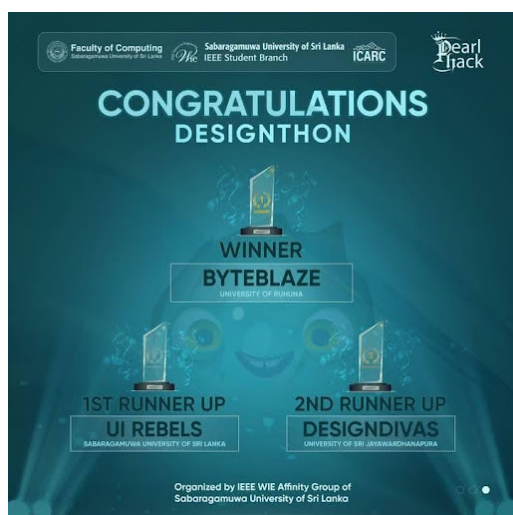
One of the most significant highlights for the IEEE WIE Affinity Group at Sabaragamuwa University has been its signature event PearlHack. Now in its third chapter, PearlHack 3.0 was held alongside ICARC 2025, the International Conference on Advanced Research in Computing. This special collaboration gave participants an incredible opportunity to be part of an amazing stage, where their ideas could shine among some of the most exciting innovations in tech.What makes PearlHack truly special is how it brings together bright, passionate female undergraduates from all over the island , giving them the space to think big, solve real-world problems, and turn

creative ideas into real impact. From the supportive guidance of industry-aligned mentors to the thoughtful evaluation by expert judges, everything about PearlHack 3.0 was designed to empower. It wasn't just a competition it was a space to grow, to collaborate, and to believe in what's possible when young women are given the tools and the trust to lead in tech.

Alongside PearlHack, the group has introduced a variety of enriching initiatives aimed at nurturing both technical and personal growth. Among them is Path-Forward 2.0,which was initiated as series of events to continue annually. According to that order, in this year a powerful panel discussion was conducted where IT professionals shared their personal journeys, career milestones, and the challenges they faced while rising in their.It served as an inspiring platform for students to gain firsthand insight into the tech industry and better understand the pathways to success.

Looking ahead, the student branch is preparing for Aureliya 2.0, a celebration of IEEE WIE Day that will feature motivational sessions, interactive workshops, and networking opportunities to highlight the achievements of women in engineering and inspire the next generation.

Meanwhile, Hope 2025 stands as a beautiful reflection of the group's deep-rooted commitment to giving back. This upcoming charity initiative will reach out to underprivileged students in the Balangoda region, aiming to uplift their educational journey in both practical and meaningful ways. Beyond donating essential school supplies, the program will bring the magic of technology to life through fun, hands-on programming workshops sparking curiosity, confidence, and joy in young hearts. It's not just about giving gifts; it's about planting seeds of hope, possibility, and a brighter future.
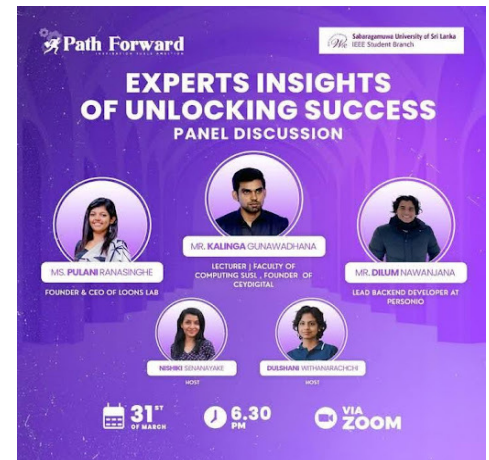
Since its beginning in 2021, the IEEE WIE Affinity Group at Sabaragamuwa University has been more than just a student society ,it has been a movement built on passion, purpose, and progress. Each year, its leadership has passed the torch to a new generation of changemakers, and the legacy continues to grow stronger with every term. The executive committee appointed for the 2024/25 term, officially announced on September 10, 2024, carries that legacy forward with fresh energy and unwavering dedication. This passionate team brings together students from across all faculties with the Faculty of Computing taking the lead, working hand in hand to drive WIE's vision of empowerment and inclusivity.

The executive committee for the this term is fortunate to be guided by Mrs. W.V. S.K. Wasalthilake, a probationary lecturer at Sabaragamuwa University of Sri Lanka, who continues to serve as the Counselor of the IEEE WIE Affinity Group. Her mentorship and support have been instrumental in shaping the group's direction. And Ms. Warushika Dahanayake leads the committee this year as Chairperson, supported by a dedicated team working collectively to advance the group's mission of empowering women in engineering.

By the time this term concludes, another appointed executive committee will be to carry the legacy forward, bringing with them fresh ideas, renewed energy, and a continued commitment to driving meaningful impact through the IEEE WIE Affinity Group.

PERSPECTIVES ON COMPUTING

Sri Lanka's Personal Data Protection Act: Challenges of Compliance and Way Forward

Ms. Vishvadini Kurukulasooriya (vishvadini.20@cse.mrt.ac.lk), Department of Computer Science and Engineering, University of Moratuwa

Ms. Vishvadini Kurukulasooriya is from the Department of Computer Science and Engineering, University of Moratuwa.

Data privacy is a growing global necessity as political, social, and ethical pressures motivate governments into legislation. While the majority of countries, especially in the West and the continent of Europe, have enacted data protection laws, Sri Lanka pioneered South Asia in enacting this when the Personal Data Protection Act (PDPA), No. 9 of 2022, came into force from March 19, 2022[1]. It is aimed at protecting the privacy of the individuals by regulating processing of personal data by processors and controllers, ensuring rights for individuals on their information, and imposing penalties for non-compliance. The scope of the PDPA confirms that the law applies not only to organizations operating in Sri Lanka but also to those outside the country that target Sri Lankan residents through goods, services, or behavior tracking[1]. It overrides any other Sri Lankan law that may conflict with its provisions, making it the supreme legislative instrument on personal data protection in the country.

Who has to comply?

The PDPA applies to organizations based on two factors: the type of the data processed and the physical location of the organization[1]. Whether personal data is processed within Sri Lanka, the business is incorporated in Sri Lanka by law, or goods or services are offered to individuals residing in Sri Lanka or their behavior is monitored, the organization is mandated to comply with this legislation. However, processing purely for personal or household purposes is excluded from the law's scope, ensuring that domestic and informal uses are not unnecessarily regulated.

Lawful Basis for Data Processing

Organizations must meet a set of requirements in order to process data legally under the PDPA, including obtaining express consent, processing data for contracts, legal requirements, or the public interest, and processing data to ensure security or prevent fraud. In addition, organizations are expected to establi-

sh and follow internal data policies, minimize data retention periods, and ensure the accuracy and integrity of data in storage and transmission. In addition companies must conduct Data Protection Impact Assessments (DPIAs) for high-risk processing and appoint Data Protection Officers (DPOs) where required. Personal data cannot be transferred outside Sri Lanka unless the receiving country has similar protection laws or the data subject consents. Controllers and processors are legally required to maintain a Data Protection Management Programme that includes documentation, regular reviews, internal complaint handling, and compliance oversight, as outlined in Part I of the Act. Organizations must also respond to data subject requests transparently and within stipulated timelines, and must refund any improper fees charged in case of delays or invalid rejections.

Security Implications with Data Subject Rights

The PDPA gives several rights to individuals to have control over their personal data[1]. These are the Right of Access to request all information an organization holds on them, the Right to Withdraw Consent to stop additional data collection at any given moment, the Right to Rectification to have false information corrected, the Right to Erasure to request data deletion in certain circumstances, and the Right to Object to Automated Decision Making to object to automated decisions, such as profiling, that can affect them. Controllers are obligated to respond to data subject requests within 21 working days and, if denying a request, must clearly explain their reasons and notify the subject of their right to appeal to the Data Protection Authority[1].

Regulatory Control and Sanctions

The Sri Lanka Data Protection Authority regulates enforcement of PDPA. The authority imposes compliance by issuing sanctions on organizations failing to meet standards of security. Offenders are liable to pay a fine of up to 10 million rupees for the first offense, double the figure for repeat offenses, and suspension of operations in Sri Lanka for non payment of fines[2]. The DPA may impose further sanctions such as suspending a business license or initiating independent regulatory investigations, as the Act does not limit enforcement to monetary fines alone as Section 39 allows the Authority to assess the severity of a violation, how many people were affected, whether there was cooperation, and the effectiveness of the violator's internal management program when determining the penalty.

Recent Amendments and Way Forward

On 19 February 2024, the Cabinet approved a proposal to amend the PDPA, delaying the effective date by six months to give state agencies more time to facilitate compliance[2]. These amendments reflect input from both industry and public sector stakeholders, particularly where greater flexibility is needed to accommodate AI and other emerging technologies while still aligning with the core principles of data protection. As of May 2025, a draft version of the amendment bill was circulated among key stakeholders for final review, ahead of its scheduled second reading in Parliament[2]. The Ministry of Digital Economy is going ahead with the tabling of these amendments in Parliament, signaling Sri Lanka's continued commitment to strengthening data protection and fostering digital innovation.

References

[1]. Parliament of Sri Lanka, Personal Data Protection Act, No. 9 of 2022, 2022. [Online]. Available: https://www.parliament.lk/uploads/acts/gbills/english/6242.pdf. [Accessed: 14-Jun-2025].

[2]. Data Protection Authority of Sri Lanka, Official Website. [Online]. Available: https://www.dpa.gov.lk/. [Accessed: 14-Jun-2025].

A Visionary Leader in Global Engineering and Innovation

"Stay curious, be resilient, and never stop learning. The world of engineering is constantly evolving- embrace change, seek real-world problems to solve, and remember that teamwork and humility are just as important as technical skills. Build with purpose, lead with integrity, and always aim to make a positive impact."

Vipula Liyanaarachchi is a distinguished technical leader with over two decades of experience driving innovation in global engineering organisations. Known for his deep technical expertise, strategic insight, and empowering leadership style, Vipula has played a pivotal role in shaping high-impact technological solutions across a variety of industries.

Vipula's academic journey began at President's College, Maharagama, before he transitioned to Royal College, Colombo, where he completed his Advanced Level examinations. He went on to earn his degree in Electronics and Telecommunication Engineering from the prestigious University of Moratuwa, one of Sri Lanka's top engineering institutions.

He began his professional career as an Electronic Engineer at a local gem cutting company, where he worked on developing an automated robotic solution to enhance the gem cutting process. This early venture into robotics and automation set the tone for his future trajectory in cutting-edge technologies.

Vipula later joined Crossvue, a pioneering Silicon Valley-backed venture in Sri Lanka. Over the years, he witnessed and adapted to the company's evolution through multiple acquisitions, first becoming Symbol Technologies, then Motorola, and finally Zebra Technologies. Throughout these transitions, Vipula held numerous roles of increasing responsibility, allowing him to develop a unique blend of software engineering skills, operational insight, and people management expertise.

Today, he serves as the General Manager at Zone24x7, a renowned technology innovation company with offices in Sri Lanka and Silicon Valley. Under his leadership, the company has developed groundbreaking solutions in areas such as Enterprise Mobile Computing, Embedded Systems, Robotics, Enterprise Software, Computer Vision, and Product Customisation. Vipula plays a central role in shaping the company's technology roadmap, guiding cross-functional teams, and fostering a culture of collaboration and continuous learning.

Leadership Style and Core Strengths

Vipula is widely recognised for his transformational leadership style—one that emphasizes mentorship, team empowerment, and long-term vision. He leads by example, combining technical mastery with strong interpersonal skills to inspire and motivate those around him. His teams describe him as a calm, strategic thinker who encourages innovation while maintaining a sharp focus on practical business outcomes. He leads without a title, one that Zone24x7 encourages in its culture.

Through his career, Vipula has built an impressive track record of guiding teams through major transitions, overseeing product development life-cycles from ideation to deployment, and building strong client relationships across the globe. His experience spans not just the technical side of innovation but

also the strategic execution of business goals in highly dynamic environments.

A natural problem-solver, Vipula is known for his ability to bridge the gap between complex technical challenges and strategic business needs. His deep understanding of both hardware and software ecosystems enables him to lead multidisciplinary teams with agility and precision.

He is also a strong advocate for continuous professional development and frequently mentors young engineers and future leaders in the industry.

Linkedin: https://www.linkedin.com/in/vipulasrilanka/

Preventing Cyber Threats with Vulnerability Assessments

Mr. Udara Wijesinghe (udara.20@cse.mrt.ac.lk), Department of Computer Science and Engineering, University of Moratuwa

Mr. Udara Wijesinghe is from the Department of Computer Science and Engineering, University of Moratuwa.

Cyber attacks are becoming more frequent and sophisticated than before, putting businesses at risk of system downtimes, data breaches, and financial loss. A striking example is the 2021 Microsoft Exchange Server breach, where threat actors exploited unpatched vulnerabilities to access thousands of organizations' email systems worldwide[1], highlighting the urgent need for timely vulnerability assessments and remediation. Vulnerability Assessment (VA) is a structured testing approach for discovering, analyzing, and mitigating security flaws in systems before they can be exploited by an attacker. It uses manual and automated scanning for the detection of network, application, and IT infrastructure vulnerabilities. Engaging actively in vulnerability assessments can improve overall security resilience and minimize attack surfaces for businesses.

Importance of Conducting Regular Assessments

Organizations that heavily depend on IT assets and infrastructure must conduct regular vulnerability assessments to address security flaws in outdated software, system misconfigurations, and weak authentication procedures that attackers could exploit to carry out an attack. Frequent VAs assist in maintaining adherence to regulations including GDPR, HIPAA, PCI DSS, and ISO 27001, while avoiding associated regulatory penalties[2]. Prioritizing vulnerability assessments in the organizational information security strategy helps organizations increase threat detection and mitigation while lowering incident response costs. Regular assessments also improve visibility across complex IT environments, allowing organizations to detect gaps before attackers can exploit them. Gartner's 2024 cybersecurity report also observed that organizations with mature VA programs experienced 30% fewer critical incidents compared to those with reactive strategies[3].

Key Stages of a Vulnerability Assessment

Referring to figure 01, the VA process begins with reconnaissance activity to identify targeted systems, networks, and applications.
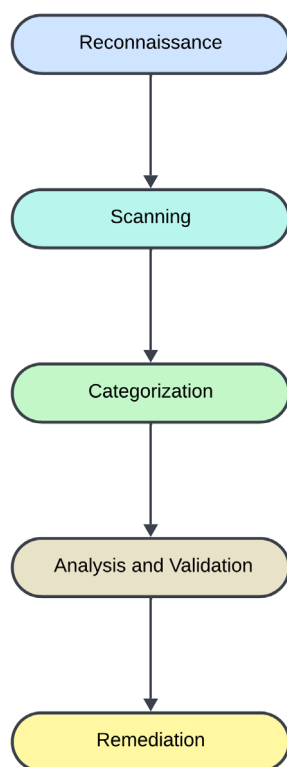

Figure 1: *Vulnerability Assessment Process Flow*

Automated tools are then used to scan for security vulnerabilities, which are categorized according to risk levels often based on the Common Vulnerability Scoring System (CVSS), wherein remediation is ranked by the impact of exploitation[2]. In the analysis and validation phase, security experts review each finding and verify it to eliminate false positives. Finally, remediation involves patching vulnerabilities, updating configurations, and adding more security controls. Many organizations integrate these findings into ticketing systems or dashboards, enabling better tracking and timely resolution.

Vulnerability Scanning Tools

A specific set of tools is necessary for conducting effective vulnerability assessments[4]. To find security flaws in various devices and operating system services, Nessus conducts comprehensive scanning, whereas OpenVAS is an open source alternative offering similar scanning capabilities. To obtain real time security insights, Qualys offers cloud based solutions for vulnerability management. Acunetix specializes in identifying web application vulnerabilities such as XSS and SQL injection through automated scans. Burp Suite is a frequently used tool for sophisticated and deep web security testing in penetration testing scenarios. By incorporating proper utilization of these tools into an organization's cybersecurity strategy, comprehensive risk detection and mitigation can be ensured. For organizations with limited funds and expertise, vulnerability assessments can be purchased as a service from managed security service providers.

An increasing number of enterprises now use a layered toolset combining dynamic scanning with AI based anomaly detection to uncover both known and emerging threats. Use of machine learning models enhance these tools by enabling faster analysis of large datasets, identifying subtle patterns, and predicting potential vulnerabilities before they can be exploited.

In summary, vulnerability assessments proactively safeguard organizations by identifying security weaknesses and mitigating them. Through automated scanning, struc-

tured analysis, and applying patches, they help safeguard digital assets and infrastructure in the company while ensuring operational continuity. Thus, an effective vulnerability management process strengthens the cybersecurity posture of organizations to adapt to evolving threats and maintain cyber resilience. When embedded as part of a continuous risk management cycle, vulnerability assessments empower organizations to stay ahead of cyber adversaries and reduce the long term cost of breaches.

References

[1]. Cybersecurity News, "Microsoft Exchange Server Breach," Mar. 2021. [Online]. Available: https://www.cybersecuritynews.com/microsoft-exchange-server-breach-2021/ [Accessed: 12-Jun-2025].

[2]. Qualysec, "Vulnerability Assessment Report: A Complete Guide," [Online]. Available: https://qualysec.com/vulnerability-assessment-reports-a-complete-guide/ [Accessed: 25-Mar-2025].

[3]. Gartner, "Cybersecurity Report 2024," Jan. 2024. [Online]. Available: https://www.gartner.com/en/documents/2024-cybersecurity-report-vulnerability-assessment [Accessed: 14-Jun-2025].

[4]. Qualysec, "Vulnerability Scanning Tools: Top 10 You Need to Know in 2025," [Online]. Available: https://qualysec.com/vulnerability-scanning-tools/[Accessed: 25-Mar-2025].
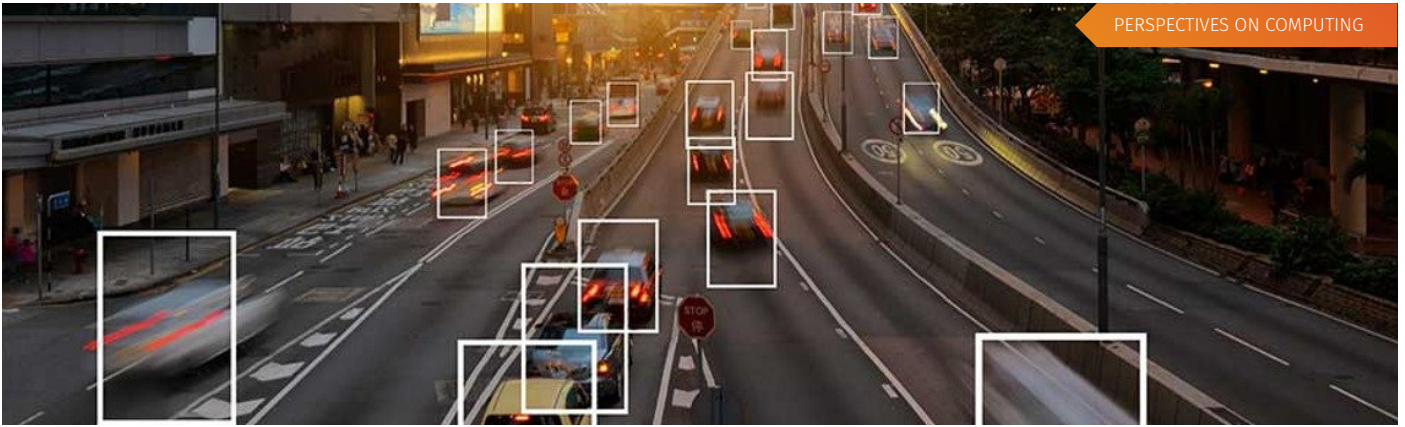
Exploring the Capabilities of You Only Look Once (YOLO) Algorithm in Object Detection

Ms. Laksana Sriharan (laksana.sriharan@gmail.com), Department of Computer Science at the University of Jaffna

Ms. Laksana Sriharan is attached to the Department of Computer Science at the University of Jaffna. Her research interests include image analysis, machine learning, and deep learning.

Object detection is a key task in computer vision that involves identifying nd locating objects within an image or video. It goes beyond simple image classiication by not only predicting the class of the objects but also determining their location in the form of bounding boxes. Object detection holds signiicant value across various industries by enabling machines to perceive and understand their surroundings. Imagine a self-driving car that needs to understand its surroundings. It needs to not only recognize that there's a pedestrian, a car, and a trafic light but also pinpoint their exact locations on the road to navigate safely. In surveillance and security, object detection automates the monitoring of security cameras. It helps identify intruders or abnormal behavior in real-time, thereby improving response times and enhancing safety. In healthcare, it aids in the detection of tumors, fractures, and other medical conditions in imaging scans, assisting in early diag nosis and treatment. In recent years, researchers have focused on developing CNN-based object detectors to enable real-time detection. Among these, You Only Look Once (YOLO) has gained widespread popularity for its ability to strike an optimal balance between performance and eficiency.

What is YOLO?

YOLO, which stands for "You Only Look Once", is a state-of-the-art deep learning algorithm designed for real-time object detection. It is a single-stage object detector that uses a convolutional neural network (CNN) to simultaneously predict bounding boxes and class probabilities for objects in input images.

YOLO is signiicantly faster than traditional object detection models as it processes an image in a single pass, making it ideal for real-time applications. Despite its speed, it maintains high accuracy, particularly in detecting large and well-deined objects, with continuous improvements in newer versions like

YOLOv8, YOLOv9, and YOLOv10.

Architecture of YOLO

The latest evolution, YOLOv10, introduces signiicant enhancements over its predecessors. It reines the detection pipeline with a Non-Maximum Suppression (NMS)-free training strategy, improved feature extraction, and a optimized dual-head architecture [1]. Traditionally, YOLO models use a one-to-many assignment strategy during training, where multiple positive samples are allocated for each ground truth instance. This method is known as Task-Aware Learning (TAL). However, it requires NMS during inference to remove duplicate detections, which slows down processing and reduces eficiency. YOLOv10 solves this problem by adding an extra "one-to-one" head (as shown in Figure 1) which works similarly to the original "one-to-many" head. During training, both heads are used together, allowing the model to learn from more detailed data. However, during inference, the model only uses the one-to-one head, avoiding the need for NMS, which makes the process faster and more efficient without additional computational costs.
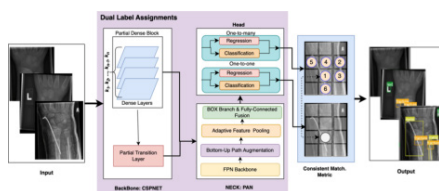

Figure 1: *YOLOv10 Architecture depicting the input, backbone, neck, head, and output. (Image source: [1])*

Experiment on a Self-Collected Currency Dataset

To evaluate the object detection capabilities of YOLOv10, we conducted an experiment using a dataset consisting of self-collected images and images sourced from[4]. The goal was to test how well the model detects currency notes in varied real-world conditions. We split the dataset into 80% for training and 20% for testing to evaluate detection performance. The training was conducted using PyTorch for 40 epochs. After training, the model was tested on unseen images, achieving an overall accuracy of 97.14%.

The following confusion matrix, shown in Figure 2, provides details on how well the model distinguishes objects from the background:
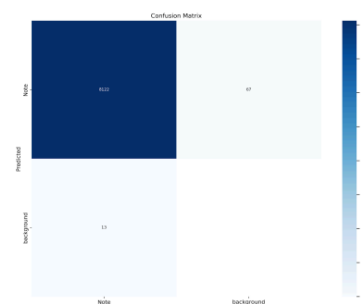

Figure 2: *Confusion Matrix*

Below are the images showcasing YOLOv10's detection performance on test images:

Figure 3: *Detection Results on Unseen Test Images*

Discussion and Conclusion

The YOLOv10 model demonstrated exceptional performance in object detection, achieving an overall accuracy of 97.14%. By using a dual-label assignment strategy, the model effectively eliminated the need for NMS, resulting in faster inference. The confusion matrix demonstrates the model's ability to accurately distinguish objects, supporting its suitability for real-time detection applications.

Comparison to Other Detection Models

YOLOv10's innovative architecture provides distinct advantages when compared to other established object detection models:

Faster R-CNN: While known for its high detection accuracy, Faster R-CNN employs a two-stage detection process, involving initial region proposal followed by classiication. This inherently leads to slower inference speeds. Consequently, Faster R-CNN is often impractical for real-time applications such as currency counting or automated checkout systems, where rapid processing is mandatory.

Single Shot Detector (SSD): SSD offers improved inference speeds over Faster R-CNN due to its single-stage design. However, it often struggles with the accurate detection of smaller or highly similar-looking objects. This limitation can pose signiicant challenges in scenarios like currency recognition, where distinguishing between notes with subtle design differences is crucial.

Previous YOLO Versions (e.g., YOLOv4, YOLOv5, YOLOv8): Earlier iterations of YOLO models marked signiicant advancements in speed and eficiency. Nevertheless, these versions still necessitated the use of Non-Maximum Suppression (NMS) during inference to eliminate redundant detections. This additional processing step could introduce delays, potentially hindering the performance of currency recognition tasks within fast-moving systems.

Discussion of Societal Implications

The deployment of advanced object detection models like YOLOv10 has the potential to transform several critical sectors. In autonomous driving, YOLOv10's fast and accuratedetection capabilities can improvevehicle reaction times, enhancing road safety by enabling real-time identiication of pedestrians, vehicles, and trafic signals. In healthcare, YOLOv10's speed and accuracy could assist in the timely detection of tumors, fractures, or abnormalities, potentially improving early diagnosis and treatment outcomes. In currency detection, which is the focus of our experiment, YOLOv10 can be applied to automated cash handling systems, counterfeit currency detection, and inancial automation.

References

[1]. A. Wang, H. Chen, L. Liu, K. Chen, Z. Lin, J. Han, and G. Ding, "Yolov10:Real-time end-to-end object detection," 05 2024.

[2]. M. Pasumarthy, R. Padhy, R. Yadav, G. Subramaniam, and M. Rao, "An indian currency recognition model for assisting visually impaired individuals," in 2022 IEEE International Conference on Recent Advances in Systems Science and Engineering (RASSE), pp. 1–5, 2022. .

[3]. P. Jiang, D. Ergu, F. Liu, Y. Cai, and B. Ma, "A review of yolo algorithm developments," Procedia Computer Science, vol. 199, pp. 1066–1073, 2022. The 8th International Conference on Information Technology and Quantitative Management (ITQM 2020 2021): Developing Global Digital Economy after COVID-19.

[4]. S. Jayakumar, "Sri lankan currency detection dataset." https://www.github.com/Sanjay-dev-ds/SriLankan-Currency-Classiication-dataset, 2023.

Congratulations

Shakishnavi Murugan Receives Dean's List Medal for Outstanding Academic Achievement

We are delighted to congratulate Shakishnavi Murugan, a bright undergraduate from the Department of Computing and Information Systems, Faculty of Computing, on her outstanding achievement in receiving the prestigious Dean's List Medal for the year 2024. Awarded to the top-performing student of the 20/21 Batch, the medal was presented to Shakishnavi during the 29th University Day Celebration on the 6th of February, 2025, by the Vice Chancellor of the University.

This accolade is a reflection of her exceptional dedication, hard work, and commitment to academic excellence. With an impressive GPA of 3.68/4.0, her consistent high performance throughout the year has set a remarkable standard. We are incredibly proud of her accomplishments and eagerly anticipate the valuable contributions she will make in both academic and professional fields in the years ahead.
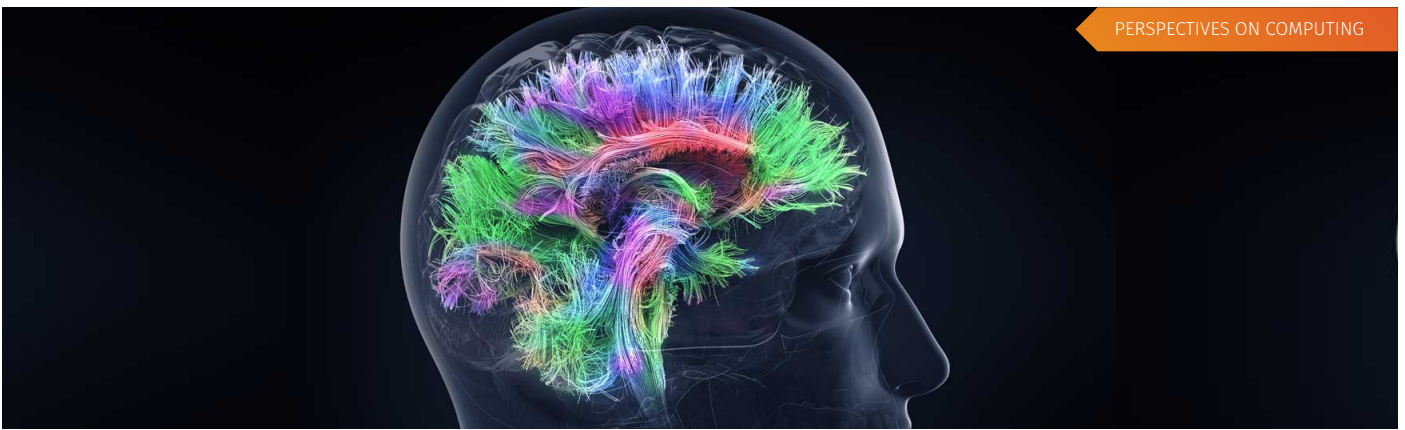
Genome Made You, Connectome Defines You: Exploring the Human Connectome

Dr. R. Nagulan (nagulanr@vau.ac.lk), *Department of Physical Science, Faculty of Applied Science, University of Vavuniya, Sri Lanka*

*Dr. R. Nagulan is a Senior Lecturer (Grade I) in the Department of Physical Science, Faculty of Applied Science, University of Vavuniya, Sri Lanka. He holds a B.Sc. from the University of Jaffna, an M.Sc. in Computer Science from the University of Peradeniya, and a Ph.D. in Medical Image Computing from the University of Kent, UK. He previously served as a Post-Doctoral Research Fellow at the National University of Singapore and has research expertise in neuroimaging, diffusion MRI, and the human connectome. Dr. Nagulan has published in more than 10 well-recognized journals, with over 500 citations.*

We all look different because of our genome, the unique sequence of DNA that determines our physical traits. But have you ever wondered why we think, feel, and behave so differently, even when we share the same genes or grow up in the same environment? While our genes lay the foundation, something deeper and more dynamic, the connectome, shapes who we are.

The connectome is the complete map of neural connections in the brain, a wiring diagram that shapes how we perceive the world, store memories, make decisions, and define our individuality. Just as your fingerprint is unique, so too is your connectome and it holds the key to understanding who we truly are.

At its most fundamental level, the connectome is built at the cellular level, detailing precise connections between individual neurons. But to understand this vast complexity, scientists often describe the connectome in two main forms: the struc-tural connectome, which maps physical links between brain regions, and the functional connectome, which captures how those regions communicate in real time during thought, emotion, or behavior. Together, these perspectives offer a powerful lens into how the brain is both wired and functioning.
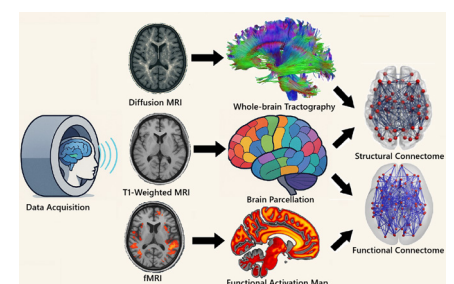
But how do we map a person's connectome without opening the brain? How does a network of 86 billion neurons and 100 trillion synapses give rise to human behavior and the incredible diversity of talent across our species?

This is where medical imaging, graph theory, and high-performance computing come together to make the invisible visible. Since mapping every single neuron is currently imp

ossible, researchers focus on the macroscale connectome, a higher-level view that captures major brain regions and the pathways connecting them. Using advanced techniques like diffusion MRI to trace structural pathways and functional MRI to track brain activity, scientists reconstruct the brain as a network, a graph, where nodes represent brain regions and edges represent the connections between them. Massive computational power is then used to build, visualize, and analyze each individual's connectome.

Macroscale connectomes have become essential to understanding the brain as an integrated system. The concept was pioneered by Olaf Sporns, who introduced the idea of modeling the brain as a complex network. Since then, the field has rapidly advanced with innovations in neuroscience, imaging, and modeling. Today, macroscale connectom

es are powerful tools used to study brain development, aging, and disorders. From autism and schizophrenia to Alzheimer's disease, they provide insights into how brain wiring affects cognition and behavior. In essence, the connectome bridges biology and behavior, revealing how the brain's structure shapes who we become.

Today, many researchers aim to uncover the individual connectome at the cellular level. Such a map would reflect the full complexity of one's thoughts, memories, and cognitive architecture. These efforts are already underway through global collaborations like the Human Connectome Project, one of the most ambitious neuroscience initiatives to date.

The vision is bold: to one day map the human brain in such fine detail that we truly understand how each

mind is wired. Imagine if we had preserved the connectomes of Darwin, Einstein, Newton, or Ramanujan—what might we learn from the architecture of their minds? Could we discover the neural basis of genius? Could we create a model of an ideal connectome, one that fosters creativity, intelligence, or empathy?

These questions, once science fiction, are now part of serious scientific conversation, pushing the boundaries of neuroscience, computing technology, and even identity. And one day, with a well-mapped expert connectome, we may not need to train AI from scratch. Algorithms could simply mimic expert brain networks, bringing artificial intelligence one step closer to human intelligence.

Congratulations
Piumi Yasodhara for Your Outstanding Achievement!

The Faculty of Computing is proud to congratulate Ms. Piumi Yasodhara, a talented 3rd-year undergraduate, on receiving a Special Recognition award at the "Short Video Competition 2025" organized by the Central Bank of Sri Lanka. The award ceremony, held on March 24th, 2025, in Nuwara Eliya, was attended by distinguished officials from the Central Bank. In a competition focused on raising awareness about financial scams under the theme "Protect Your Money; Say No to Financial Scams," Piumi's video caught the judges' attention for its outstanding creativity and impactful message.

GRADUATE COLLOQUIUM - ICARC 2025

GRADUATE COLLOQUIUM - ICARC 2025: A PLATFORM FOR EARLY-CAREER RESEARCHERS IN COMPUTING

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

The Graduate Colloquium held in parallel with the 5th International Conference on Advanced Research in Computing (I-CARC) 2025 was successfully concluded on the 19th of February 2025 at the Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka. Organized under the theme "Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation", the event provided a vital platform for early-career researchers to showcase their work, receive expert feedback, and engage in meaningful academic discussions.
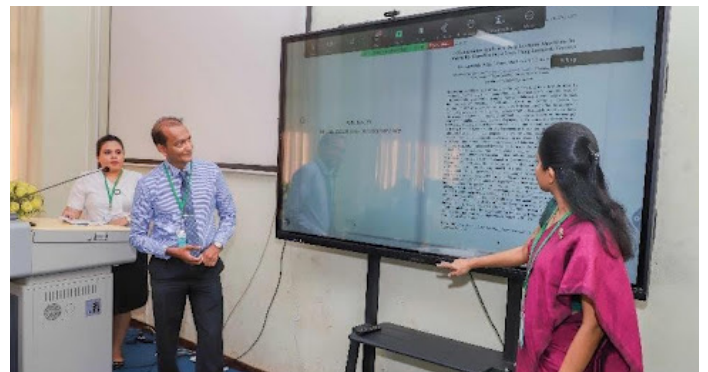
Chaired by Dr. R. A. H. M. Rupasingha (Sabaragamuwa University of Sri Lanka) and co-chaired by Dr. S. Wickramasinghe (ESOFT Metro Campus) and Ms. K. T. Dananjali (Sabaragamuwa University of Sri Lanka), the colloquium fostered collaboration, mentorship, and knowledge sharing. It enabled young researchers to refine their research focus while expanding their professional networks. Participants had the opportunity to present their dissertation research in a supportive, intellectually stimulating environment and receive valuable insights from senior academics and domain experts.

The event featured distinguished academics, including session chair Prof. H. S. R. Rosairo, Dean of the Faculty of Graduate Studies at Sabaragamuwa University of Sri Lanka. The expert panel, comprising Prof. P. K. W. Abeygunawardhana (Sri Lanka Institute of Information Technology), Prof. R. M. K. T. Rathnayaka (Sabaragamuwa University of Sri Lanka), and Dr. S. Gayan (University of Moratuwa), provided in-depth evaluations and cons-

tructive feedback to the participants. Additionally, Prof. E. P. N. Udayakumara, Dean of the Faculty of Applied Sciences at Sabaragamuwa University of Sri Lanka, along with members of the Board of Study of the Faculty of Graduate Studies, academic reviewers, and faculty members, attended the event to support and encourage young researchers.

To ensure inclusivity and accessibility, the colloquium was conducted in a hybrid format, allowing both in-person and virtual participation. This approach enabled researchers from various institutions and countries to contribute to and

benefit from the discussions, reinforcing the colloquium's commitment to fostering a global research community.

Building on its success in 2025, the Graduate Colloquium is set to continue as a cornerstone event, inspiring and supporting the next generation of computing researchers.

PERSPECTIVES ON COMPUTING
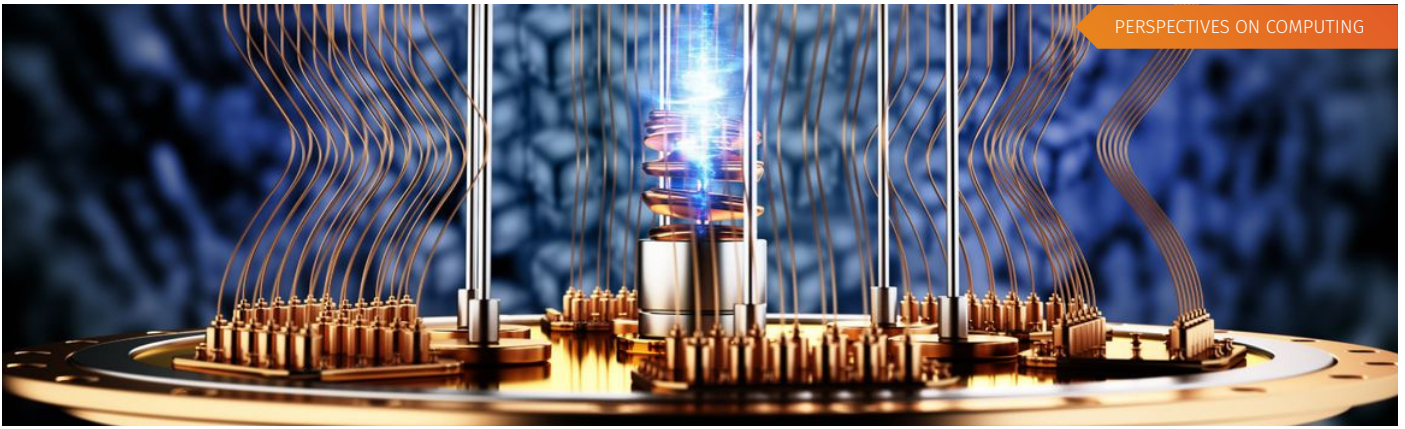
The Rise of Quantum Computing: What Sri Lankan Software Engineers Need to Know

Mrs. W.T. Saranga Somaweera (ssomaweera@foc.sab.ac.lk), *Department of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka*

Mrs. W.T. Saranga Somaweera is a Lecturer (Probationary) in Information Systems at the Department of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka. Her research interests include Information Systems Development, Artificial Intelligence, Machine Learning, Software Engineering, Kansei Engineering, Knowledge-Based Systems, Information Systems Economics, and Emerging IS Technologies.

Quantum computing is revolutionizing information processing by addressing and solving complex problems that are intractable for classical computers. Quantum software development is becoming an integral part of the evolving software industry landscape. Software engineers must integrate quantum computing fundamentals into their skill set to align with future technological advancements.

Quantum Computing Landscape in South Asia

South Asia has become a blooming center for quantum computing research and development. India stands out in the region with its National Quantum Mission which aimed to establish specialized hubs that will focus on quantum computing. In Sri Lanka, University of Colombo was added quantum computing to its Computational Mathematics honors program. The Colombo Quantum Computing Meetup 2024 and in 2023, University of M-

oratuwa organized a workshop titled "Introduction to Quantum Computing" in collaboration with the UBC Quantum Club, IEEE Sri Lanka Section, and Skill Surf. This attracted a diverse audience showcasing Sri Lanka's growing quantum computing engagement.

Essential Quantum Computing Fundamentals for Sri Lankan Developers

Classical computers process data in binary form (0s and 1s), but quantum computers work with quantum bits or qubits that utilize two key quantum mechanics principles. Superposition lets qubits exist in multiple states at once and provides faster processing capabilities. Entanglement creates strong connections between qubits that boost computational potential substantially, even across large distances.

Development Tools Available to Sri Lankan Developers

Cloud-based services make quantum computing platforms avai-

ilable to Sri Lankan developers without high initial costs. IBM's Qiskit is an open-source framework for creating and running quantum algorithms. Google's Cirq allows developers to create, edit, and run quantum circuits. Microsoft's Q# is a domain-specific language integrated with the Quantum Development Kit. Also, it includes tools such as ProjectQ, PennyLane, and Quantum Playground for simulation work.

Skills, Certifications, and Training Opportunities in Sri Lanka

A strong foundation in mathematics, physics, Python, and specialized quantum languages form the core requirements. Sri Lankan developers can join the IBM Quantum Developer Certification and Microsoft Azure Quantum Developer Certification to improve their career prospects. Developers can gain practical experience through cloud platforms such

as IBM Quantum Experience to run experiments on real quantum processors. Building local quantum computing talent will need specialized training programs and university initiatives to address the skills gap.

Key Career Pathways for Software Engineers with the right quantum computing skills

As quantum computing moves from theory to real-world use, the need for skilled software engineers is growing quickly. Experts estimate the global quantum computing market will reach $65 billion by 2028, showing how fast the technology is advancing. Career paths like Quantum Software Engineer, Algorithm Developer, Hardware Engineer, Machine Learning Engineer, and Quantum Cryptographer are becoming essential across many industries. Salaries are strong, starting around

$110,000 and going over $250,000 for specialized roles. Research and development roles in academia, industry, and government offer opportunities to contribute to quantum computing advancements. Quantum startups, major corporations such as IBM, Google, Microsoft, Intel, and consulting firms, seek talented people to develop and implement quantum solutions.

Conclusion

Sri Lankan developers can stay ahead in this ever-evolving field by utilizing cloud platforms to overcome the local infrastructure limitations and with the quantum computing skills they can provide greater contributions to the global tech revolution. By investing in quantum knowledge now, we can ensure that Sri Lanka is not just a user of the future, but a builder of it.

Congratulations
Gaviru Bihan for Your Outstanding Achievement

We proudly congratulate Gaviru Bihan, a first-year student from the Faculty of Computing, for emerging as the 1st Runner-Up at the prestigious Edify Inter-University Article Competition – Exposition Issue 20. This event, hosted by the Industrial Management Science Students' Association of the University of Kelaniya, brought together exceptional student voices from universities across the island. Gaviru's achievement as a first-year student highlights his remarkable potential and talent in academic writing.

Cracking the Code: Multimodal Biometrics in the Fight against Crime

Mrs. W.V.S.K. Wasalthilaka (*subodhi@foc.sab.ac.lk*), *Department of Software Engineering, Faculty of Computing, Sabaragamuwa University of Sri Lanka.*

Mrs. W.V.S.K. Wasalthilaka serves as a Lecturer (Probationary) in the Department of Software Engineering, Faculty of Computing, Sabaragamuwa University of Sri Lanka. Her research interests primarily focus on computer vision, machine learning, and artificial intelligence, with a particular emphasis on developing innovative computational methods to address complex real-world problems.

The number of criminals worldwide continues to rise daily due to various f-factors, including economic disparities, cultural conflicts, technological advancement, and ineffective criminal justice systems and many more. Many law enforcement agencies struggle to accurately identify both victims and perpetrators due to sophisticated criminal tactics, limited evidence, and emerging technological threats. Despite using a variety of procedures to discover and analyze evidence, law enforcement organizations continue to encounter significant hurdles. Issues such as inadequate or low-quality evidence, identity fraud, spoofing attacks, and the manipulation of erroneous data frequently impede effective identification. To solve these issues, biometric technologies provide a powerful answer by precisely identifying biological and behavioural aspects such as facial features, iris patterns, palm veins, voice, ECG, fingerprints, gait, DNA, signatures, and keystrokes, among others. These dis

tinct biometric traits allow law enforcement to accurately identify both victims and perpetrators. Compared to traditional methods like passwords or tokens, biometrics cannot be easily reproduced, exchanged, lost, forgotten, manipulated, or fabricated, making them a reliable and effective tool for criminal identification.

Despite the widespread adoption of biometric systems over time, the majority of conventional implementations rely on unimodal techniques, which examine a single biometric characteristic, such as voice authentication, palm vein patterns, finger

print recognition, or facial recognition. Number of investigations were carried out to improve the uni-modal biometric authentication. For an instance, Apoorva et al.[1] investigated on automated criminal identification by face recognition using open computer vision classifiers. Similarly, Pavithra et al. [2], Ramya et al.[3], and Sreevani et al. [4]investigated on face detection and recognition systems for identifications. On the other hand, Anap et al. [5] and Shaima et al. [6] investigated on different other biometrics like retina and iris. However, all these unimodal systems reported number of significant drawbacks due to various uncontrolled reasons. Since their accuracy typically decreases in uncontrolled or unpredictable environments, they are less reliable in real-world scenarios. Additionally, they are more vulnerable to sophisticated spoofing techniques like deepfakes and phony biometric samples. Moreover, noisy, incomplete, or momentarily unavailable data due to injuries, background noise, or poor lighting may cause for various recognition errors. These limitations resulted directly for reducing the performances and the recognition capabilities of biometric authentication systems, which are used for criminal identification and detection.

In order to overcome the issues arisen in unimodal systems, Multimodal biometric authentication which integrates two or more biometric features, such as voice and iris scans or fingerprint and facial recognition can be used. This combination greatly increases the precision, robustness, and security of the system. If one type of modality becom-

es compromised, the system can still make a decision sufficiently accurate by utilizing other characteristics (for instance, a cut on the finger or dark room that affects facial scans). This also reduces the impact of the data that might be missing or noisy. Plus, multimodal systems increase the resistance to spoofing attacks as it is unlikely that the attacker can replicate multiple biometric traits simultaneously. Thus, Multimodal biometrics come as a necessary thing to protect sensitive systems in today's digital world due to its multi-layered nature. It not only makes verification in a variety of environments that are realistic, but also increases the capability to fight back against the latest threats such as deepfakes and synthetic identities.

Many people tested multimodal bio-metric authentication by using different techniques and technologies. Jagadiswarya et al.[7] looked into a fused multi-modal biometric system by integrating fingerprint, retina, and finger vein characteristics with RSA encryption. Similarly, Mohamed et al. [8] used convolutional neural networks (CNNs) with fingerprint and ECG fusion to create a multi-modal biometric identification system. Shende et al. [9] integrated facial, fingerprint, and palm vein biometrics to study a deep learning-based feature-level fusion technique. More recently, Jeong et al.[10] investigated a multi-modal authentication model that combined voice and face recognition for occluded faces in difficult settings. Despite the progress made through these investigations, there remains significant room for improvement,

particularly in terms of accuracy under real-world conditions, robustness against spoofing, and efficient data fusion strategies for real-time applications.

Advancements in multimodal biometric systems have demonstrated clear superiority over traditional unimodal methods by significantly improving the accuracy of criminal identification. By integrating complementary biometric modalities, these systems offer enhanced reliability, minimize error rates, and strengthen resistance against spoofing and fraudulent activities. Despite these promising developments, several critical challenges persist, particularly in relation to limited access to comprehensive datasets, as well as the demands of high-performance computing and real-time processing capabilities. Addressing these obstacles is crucial for the continued evolution of the field. Recent research findings and strategic recommendations provide valuable pathways to bolster the protection, stability, and scalability of future multimodal biometric systems. Key among these are the expansion of diverse and representative biometric datasets, refinement of feature extraction techniques, and the adoption of advanced deep learning frameworks. Through these innovations, biometric technologies are poised to play an increasingly vital role in enhancing monitoring systems, strengthening forensic investigations, and supporting law enforcement operations with greater precision and effectiveness.

References

[1]. P. Apoorva., H. . Impana., S. . Siri., M. . Varshi

tha., and B. Ramesh., "Automated Criminal Identification by Face Recognition using Open Computer Vision Classifiers," in 2019 3rd International Conference on Computing Methodologies and Communication (ICCMC), IEEE, Mar. 2019, pp. 775–778. doi: 10.1109/ICCMC.2019.8819850.

[2]. P. M. J, "Face Detection And Recognition Technology For Effective Criminal Identification And Tracking System," 2019. [Online]. Available: www.ijcrt.org

[3]. K. Ramya, V. Pavankalyan, A. Someshwar, and G. Ranjith, "FACE RECOGNITION SYSTEM FOR CRIMINAL DETECTION."

[4]. V. Sreevani, N. E. Kumar, B. R. Nayak, H. S. Shashank, and Vyeshikha, "Feasible Criminal Identification using Image Recognition," in E3S Web of Conferences, EDP Sciences, Oct. 2023. doi: 10.1051/e3sconf/202343001054.

[5]. S. H. Shaker, F. Q. Al-Kalidi, and R. Ogla, "Identification Based on Iris Detection Technique," Int. J. Interact. Mob. Technol., vol. 16, no. 24, pp. 154–169, 2022, doi: 10.3991/ijim.v16i24.36433.

[6]. S. H. Shaker, F. Q. Al-Kalidi, and R. Ogla, "Identification Based on Iris Detection Technique," Int. J. Interact. Mob. Technol., vol. 16, no. 24, pp. 154–169, 2022, doi: 10.3991/ijim.v16i24.36433.

[7]. D. Jagadiswary and D. Saraswady, "Biometric Authentication Using Fused Multimodal Biometric," in Procedia Computer Science, Elsevier B.V., 2016, pp. 109–116. doi: 10.1016/j.procs.2016.05.187.

[8]. M. Hammad, Y. Liu, and K. Wang, "Multimodal biometric authentication systems using convolution neural network based on different level fusion of ECG and fingerprint," IEEE Access, vol. 7, pp. 25527–25542, 2019, doi: 10.1109/ACCESS.2018.2886573.

[9]. P. Shende and Y. Dandawate, "Multimodal biometric identification system with deep learning based feature level fusion using maximum orthogonal method," Int. J. Knowledge-Based Intell. Eng. Syst., vol. 25, no. 4, pp. 429–437, 2021, doi: 10.3233/KES-210086.

[10]. D. Jeong, E. Choi, H. Ahn, E. Martinez-Martin, E. Park, and A. P. del Pobil, "Multi-modal Authentication Model for Occluded Faces in a Challenging Environment," IEEE Trans. Emerg. Top. Comput. Intell., 2024, doi: 10.1109/TETCI.2024.3390058.

Congratulations

Congratulations to Ravindu Sandaruwan Dharmadasa for Your Outstanding Academic Achievement

It is with great pride that we extend our heartfelt congratulations to Ravindu Sandaruwan Dharmadasa, a bright undergraduate from the Department of Computing and Information Systems, Faculty of Computing, for his remarkable achievement in receiving the prestigious Dean's List Medal for the year 2024. This esteemed honor, presented to the top-performing student of the 18/19 Batch, was awarded to him during the 29th University Day Celebration on 6th of February, 2025, by the Vice Chancellor of the University.

This award stands as a testament to Ravindu's unwavering commitment, diligence, and pursuit of academic excellence. With a perfect GPA of 4.0/4.0, his outstanding performance throughout the year has set an inspiring benchmark for others as well.

COMURS 2025

COMURS 2025: A RESOUNDING SUCCESS IN FOSTERING UNDERGRADUATE RESEARCH

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, Sabaragamuwa University of Sri Lanka, was successfully held on 19th February 2025 as a parallel event to ICARC 2025. Under the theme "Data-Driven Approaches to Global Sustainability," the symposium provided a premier platform for undergraduate students to present their research findings and engage in meaningful discussions with academia and industry professionals.

This year, 49 research papers were accepted and presented as poster presentations by final-year undergraduates, covering a diverse range of topics in Information Systems, Software Engineering, Data Science, and Open Research Tracks. Notably, ComURS 2025 attracted participation from undergraduates of various universities, fostering a collaborative environment that encouraged the exchange of ideas and innovative solutions to real-world challenges.

The symposium was enriched by the presence of 12 esteemed panel members, who meticulously evaluated the student presentations and provided constructive feedback to enhance the quality of their research. Their expertise and insightful comments not only guided the students in refining their work but also helped them gain a broader perspective on research methodologies and industry expectations.

A significant highlight of the event was the distinguished speaker lineup. Professor S. Vasanthapriyan, Dean of the Faculty of Computing, delivered an inspiring speech emphasizing the importance of research-driven solutions in computing. Several keynote addr-

esses and panel discussions took place throughout the symposium, featuring experts from both academia and industry, who shared their knowledge and experiences, further enriching the academic discourse.

As ComURS 2025 was co-located with ICARC 2025, the event witnessed participation from numerous researchers, faculty members, and industry professionals, creating valuable networking opportunities for students. Many industry experts attended the symposium, providing students with exposure to industry trends, career guidance, and potential collaboration opportunities.

The success of ComURS 2025 stands as a testament to the dedication of the organizing committee, panelists, reviewers, and student volunteers who worked tirelessly to make the event a reality. By fostering a culture of academic excellence, knowledge sharing, and industry collaboration, ComURS 2025 has once again reinforced its position as a premier platform for undergraduate research, paving the way for future advancements in computing and information systems.

Congratulations

Manusha Jayasinghe for Being the Champion at the PixelEye V5.0

We are thrilled to celebrate the achievement of Manusha Sathsara Jayasinghe, a first-year undergraduate from the Faculty of Computing, for showcasing creative excellence at PixelEye V5.0 – the Inter-University Graphic Design Competition. The event was organized by the Business Information Technology Students' Association, Department of Information Systems, Faculty of Management Studies, Rajarata University of Sri Lanka.

IEEE CS CHAPTER

EMPOWERING FUTURE INNOVATORS: THE JOURNEY OF IEEE COMPUTER SOCIETY AT SABARAGAMUWA UNIVERSITY

Composed by Mevini Silva(mdnishshanka@std.foc.sab.ac.lk) Vice Secretary ,and Mrs. W.T. Somaweera (ssomaweera@foc.sab.ac.lk) Counselor ,IEEE Computer Society Student Branch Chapter, Sabaragamuwa University of Sri Lanka.

The IEEE Computer Society is one of the world's largest professional associations for computerists. For more than seven decades of its existence, it has been at the forefront of fostering innovation and the exchange of knowledge, as well as networking for professionals from all corners of the world. The society hosts numerous conferences, publishes journals, and offers educational activities which serve to motivate companies and individuals to advance technology while observing the highest ethical standards. Sabaragamuwa University of Sri Lanka (SUSL) made a significant leap in 2022 by establishing the IEEE Computer Society Student Branch Chapter.

This project was made possible by the kindness of the IEEE Sri Lanka Section, a milestone in the university's journey towards technological excellence. The chapter was founded with a vision, to inspire students to pursue the vast potential of computer science, bridge the gap between the business and academic communities, and cultivate a culture of innovation and teamwork. The chapter is an active platform for students to engage in technical workshops, hackathons, mentorship sessions,

Connect with CS (Awareness Session) *- IEEE Computer Society Student Branch Chapter of SUSL*

and networking events. By being consistent with the global vision of the IEEE Computer Society, the SUSL chapter strives to equip its members with the skills, knowledge, and opportunitie-

to thrive in an ever-evolving technological landscape. The pillar of any successful organization is leadership, and the IEEE Computer Society Student Branch Chapter at SUSL is no exception.

Its first major event, "Connect with CS," on April 5th marked the beginning of its aggressive action plan. The awareness session was aimed at acquainting students with the IEEE Computer Society and its various benefits. It featured an informative lecture by Prof. Anuradha Jayakody, Past Chair of the IEEE Computer Society Sri Lanka Chapter, as he shared his experience and knowledge with the audience. He covered the broad spectrum of opportunities available through the IEEE Computer Society, including scholarships, awards, and grants that encourage academic and research work. Networking and professional growth were highlighted, with examples demonstrated of how involvement in IEEE activities can result in opportunities in global collaborations and career advancement. The attendees were motivated and inspired to be actively engaged in the chapter's future activities.

The IEEE Computer Society Student Branch Chapter at SUSL is not merely a student society but also an assembly of up-and-coming technologists and prospective leaders. Education, innovation, and ethics as its focus point, the chapter is set to make an impactful contribution towards the university as well as the rest of the technology community.

Future initiatives include technical workshops, hackathons, and community programs that are designed to enhance students' competence and prepare them with the skills to meet the challenges of the digital age. As the chapter continues to grow, it remains true to its mission of empowering students, developing talent, and driving technological innovation. The journey has just begun, and the future holds boundless possibilities for the IEEE Computer Society members at Sabaragamuwa University.

The Fashion meets Intelligence future outlook and key takeaways

Mrs. KG Lohara Chathumini (lohara@foc.sab.ac.lk), *Département of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka.*

Mrs. K G Lohara Chathumini, Lecturer (Probationary) attached to the Département of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka. Her research interests are Information Systems, Artificial Intelligence, Computer Vision, Machine Learning, Deep Learning, Natural Language Processing, Image Processing, E-commerce, and Digital Transformation.

The global appeal market and fashion industry account for 1.63% of the World's Gross Domestic Product (GDP) and it hits after the COVID-19 outbreak people's clothing buying behavior increased by 60%. Now it is worth nearly $1.84 trillion in 2025 account and according to professionals, the technological innovations made this vast change. The apparel market is projected to experience a Compound Annual Growth Rate (CAGR) of 2.81% between 2025 and 2028. The Apparel market accounts for 1.65% of the world's GDP.

The fashion industry has long been recognized for its adaptability and innovation. From the creation of the sewing machine to the emergence of fast fashion, technology has consistently revolutionized how clothing is designed, manufactured, and marketed. Today, the impact of Artificial Intelligence (AI) marks an even more profound transformation. Utilizing technologies such as Computer Vision (Comput. Vis.), Deep Learning (DL), and Machine Learning (ML), AI is enabling fashion brands to operate with greater intelligence, speed, and a stronger focus on customer needs.

AI touches every corner of the Fashion world starting from simple chatbots, and recommendation systems to predict the future trends of the industry. In fashion prediction, AI tools analyze a huge amount of data at a glance and work out for projects the best results satisfactory. In the production process, AI trims the tasks such as fabric inspection, color matching, and pattern generation. Meanwhile, (Comput. Vis. systems play a huge role in proper supply chain management, waste-minimizing, & management, and quality-controlling processes. Also, ML aids in inventory management, pricing and demand prediction. This results in a faster, more efficient fashion value chain in meeting consumer demand.

On the other hand, customers are no longer satisfied with just browsi-

ng, they expect more and more personalized experiences based on their individual interests. AI brings the fitting room experience to the consumer's doorstep and the technologies like Virtual Reality (VR) express a more realistic experience. Meanwhile, AI-empowered chatbots help to make more user-friendly conversations by providing more instant support for offering style advices, provide suggestions and comparisons.

With the rise of augmented reality (AR) and AI integration, virtual try-With the rise of augmented reality (AR) and AI integration, virtual try-on technology has matured. Shoppers -

can now use 3D avatars that mirror their exact body shape and size to try on clothes virtually. This trend not only boosts online conversion rates but also reduces return rates significantly. Retailers are increasingly embedding this feature into mobile apps and e-commerce sites, creating an immersive shopping experience that rivals in-store fitting rooms. Some examples like Digital Self, CAD software and 3D Printing made new revenues to the industry.

Not only this, but also AI expressed its hand in brand mark identification and protection, smarter inventory management, supply chain optimization, improving work

force efficiency, and finally building a greener and more ethical future.

Finally, in the future, AI is no longer just a tool — it is a collaborative partner shaping the future of fashion. From personal styling to sustainable production, AI-driven innovations are creating more responsive, creative, and ethical fashion systems. As the industry continues to adapt, brands that effectively harness AI technologies will not only stay competitive but also help shape a smarter and more inclusive fashion future.

Congratulations

Imasha Samarasinghe, the Winner of Edify Inter University Article Competition

We are delighted to announce that Imasha Samarasinghe, a final-year undergraduate from the Faculty of Computing, has been recognized as a winner in the Edify Inter-University Article Competition – Exposition Issue 20. This national-level competition, organized by the Industrial Management Science Students' Association of the University of Kelaniya, showcased exceptional student writing and thought leadership from across Sri Lanka. Imasha's accomplishment reflects the academic excellence and critical thinking nurtured within our faculty, and we congratulate her on this well-deserved recognition.

AI Meets the Lean Startup: A New Era of Agile Innovation

Dr. Krishantha Wisenthige (krishantha.w@sliit.lk), Faculty of Business, Sri Lanka Institute of Information Technology (SLIIT)

The writer is a Lecturer in Business Management, Faculty of Business, Sri Lanka Institute of Information Technology (SLIIT). With a strong background in industry-engaged teaching and research. His research interests include Entrepreneurship, SMEs, Social Commerce, Social Media and Social Entrepreneurship.

In today's fast-paced digital landscape, startups face immense pressure to innovate quickly while minimizing waste. The Lean Startup methodology, a framework designed to help entrepreneurs build businesses efficiently through rapid experimentation, customer feedback, and iterative development. Now, with the advent of artificial intelligence (AI), Lean Startup principles are being supercharged, enabling companies to achieve unprecedented levels of agility and efficiency by automating decision-making, optimizing workflows, and accelerating the learning cycle. AI helps startups process vast amounts of data in real-time, reducing the time required to analyze market trends, identify customer preferences, and refine product offerings. This enhanced speed and precision allow companies to pivot or adapt their strategies with minimal resource expenditure, fostering a more dynamic and responsive innovation process.

Understanding the Lean Startup Methodology

The Lean Startup, pioneered by Eric Ries, emphasizes a cycle of "Build-Measure-Learn" to develop products and services that truly resonate with customers. Instead of spending years perfecting an idea before launching, entrepreneurs create a Minimum Viable Product (MVP), a simple version of their concept designed to test key assumptions. By analyzing real-world feedback, businesses can pivot or persevere based on data-driven insights, ensuring they are not investing resources into ideas that lack traction. When feedback indicates that a product is not meeting customer needs, AI-driven analytics can identify specific shortcomings, helping businesses determine whether a minor iteration will suffice or if a complete strategic shift is necessary. Conversely, if data confirms strong engagement and demand, startups can confidently scale their efforts, using AI to further optimize custom -

er acquisition strategies and enhance user experience. This ability to pivot or persevere with precision enables startups to minimize waste and maximize growth opportunities.

Traditional business models often rely on intuition or long-term projections, which can be risky in uncertain markets. The Lean Startup approach reduces this risk by ensuring continuous adaptation based on real user needs. However, the process of collecting, analyzing, and acting on data can be time-consuming, requiring businesses to sift through massive amounts of customer interactions, survey responses, and market insights. Manually processing this information can lead to delays in decision making, making it difficult to respond to changes in real time. Additionally, human biases may distort interpretations, leading to misguided pivots or product developments.

This is where AI steps in. AI-powered tools can automate data collection, extract meaningful insights from complex datasets, and provide real-time recommendations, allowing startups to make informed adjustments with greater speed and accuracy. By leveraging AI-driven analytics, businesses can process customer feedback instantly, detect emerging trends, and implement changes proactively, thereby ensuring their products and services stay relevant and aligned with market demands. AI driven transformation startups can have a very high impact on following key business functions.

Market Research: Understanding cu -stomer needs is at the core of Lean Startup. AI-driven analytics tools, s-

uch as natural language processing and sentiment analysis, allow startups to analyze vast amounts of consumer data in real time. Startups can gain deep insights into market trends, customer pain points, and competitive landscapes with minimal manual effort. AI scrapes data from social media platforms, online reviews, and industry reports to detect patterns and emerging trends, providing a more comprehensive view of consumer behavior. This automated research process helps businesses identify unmet needs, assess brand perception, and benchmark against competitors—all without the need for extensive manual research or traditional market surveys. The ability to extract and interpret vast datasets quickly ensures that startups remain agile and can adjust their strategies before the market shifts.

Automated MVP Testing: AI can str -eamline A/B testing by running simulations and predicting outcomes before products are even launched. This allows startups to refine their MVPs faster and more accurately, reducing the cost of trial-and-error development. Traditional A/B testing requires launching multiple versions of a product to real users and collecting feedback over time, which can be costly and slow. AI-driven A/B testing, on the other hand, uses predictive modeling and reinforcement learning to simulate different variations of a product in virtual environments. These simulations can analyze user engagement patterns, forecast customer behavior, and determine the most promising version before deployment. As a result, star-

tup can test multiple iterations in parallel, optimizing features and designs without significant delays or expenses. This AI-driven approach ensures that the final MVP is more refined and aligned with market demand from the outset, enhancing its chances of success.

Intelligent Customer Feedback Loops: Chatbots, AI powered surveys, and social media monitoring tools help startups collect real time customer feedback. Machine learning algorithms can process this data to identify patterns and actionable insights, allowing startups to iterate on their products more efficiently. By leveraging these AI-driven tools, startups can continuously refine their products based on customer needs, ensuring that every iteration brings them closer to market fit.

Personalized User Experiences: AI enables hyper-personalization by analyzing user behavior and adapting digital experiences in real time. From product recommendations to dynamic pricing strategies, AI helps startups create offerings that are uniquely tailored to individual customers.

Predictive Analytics for Strategic Pivoting: Startups must decide when to pivot or persevere. AI-driven predictive analytics help founders make data-backed decisions by forecasting market demand, customer behavior, and potential business risks.

As the pace of change accelerates, the fusion of AI and the Lean Startup methodology marks a transformative shift in how startups innovate, adapt, and scale. By automating decision-making, accelerating f-

eedback loops, and enabling real-time personalization, AI empowers entrepreneurs to move beyond guesswork and build businesses grounded in data-driven precision. The ability to test, learn, and pivot faster than ever before allows startups to navigate uncertainty with confidence and creativity. Yet, the journey demands more than just technology, it calls for responsible leadership. Founders must strike a -

balance between automation and human judgment, ensuring ethical AI use and safeguarding customer trust.

The startups that thrive in this new era will be those that harness AI not as a replacement for human ingenuity, but as a catalyst for it. By integrating AI into the heart of the Lean Startup cycle, these ventures will be better equipped to solve real

problems, seize emerging opportunities, and create lasting value. In the age of AI, the most successful startups won't just be lean, they'll be intelligently lean, dynamically responsive, and relentlessly customer-focused. The future belongs to those who can learn fast, adapt faster, and scale smartly with AI as their co-pilot

Congratulations

Zulfa Zulfikar on being recognized at the STEMUP Volunteer Summit 2025

We are proud to celebrate the remarkable achievement of our final-year student, Zulfa Zulfikar, who has been honoured with the Rising Star Award at the STEMUP Volunteer Summit 2025, organized by the STEMUP Educational Foundation.

This award recognises Zulfa's exceptional dedication, impactful contributions, and inspiring leadership in promoting STEM education. Her commitment to empowering the next generation through volunteerism and innovation truly exemplifies the spirit of excellence we encourage at our institution.

AI-Powered Network Security: A Modern Defense Strategy

Mrs. W.M.L.S.Abeythunga (shehara.lsa@gmail.com), Department of Software Engineering, Faculty of Computing, Sabaragamuwa University of Sri Lanka.

Mrs. W.M.L.S.Abeythunga, Assistant Lecturer (Temporary) in Software Engineering attached to the Department of Software Engineering, Faculty of Computing, Sabaragamuwa University of Sri Lanka.

Today's digital infrastructure spans cloud platforms, IoT devices, mobile systems, and hybrid work environments, creating complex attack surfaces that traditional perimeter-based security cannot adequately protect.[1] Static rule-based systems fail against sophisticated threats like advanced persistent threats (APTs), zero-day exploits, and polymorphic malware. Organizations need adaptive, intelligent defense mechanisms that match the sophistication of modern cyber threats.

Smart Threat Detection and Response

Security operations centers process millions of daily events, yet conventional systems produce excessive false positives while missing sophisticated attacks. AI-powered detection systems solve this by establishing baseline behavioral patterns for networks, users, and applications, then identifying anomalies indicating potential threats.[3]

Palo Alto Networks' Precision AI platform demonstrates this capability by using deep learning models to block zero-day threats inline, addressing evolving attack vectors including IoT devices, cloud deployments, and mobile devices[3]. Similarly, SentinelOne's Behavioral AI Engine continuously monitors cloud workload telemetry and can detect when a user attempts to access restricted areas or logs in from unusual locations, automatically flagging these behavioral anomalies for investigation [4].

Machine learning algorithms recognize previously unknown threats by detecting subtle deviations from normal patterns, surpassing signature-based detection limitations. Natural language processing analyzes threat intelligence feeds and dark web communications, correlating external data with internal security events for proactive threat identification.

AI systems reduce alert fatigue by intelligently prioritizing incidents b-

ased on potential impact, threat likelihood, and organizational risk tolerance, ensuring security teams focus on critical threats while automation handles routine events.[4]

Enhanced Vulnerability Management

Traditional approaches rely on generic Common Vulnerability Scoring System (CVSS) ratings without organizational context.[6] AI-enhanced systems incorporate contextual risk analysis, threat intelligence, and asset criticality to predict which vulnerabilities face highest exploitation risk in specific environments.

Machine learning algorithms analyze historical exploitation data and active threat campaigns, enabling risk-based prioritization over theoretical vulnerability scores.[5] Automated scanning identifies configuration weaknesses, missing patches, and attack vectors across complex environments while continuously monitoring infrastructure changes.

IBM's AI-powered vulnerability management system exemplifies this contextual approach by analyzing threat intelligence data alongside asset criticality to prioritize vulnerabilities based on actual exploitation risk rather than generic CVSS scores [5]. This enables organizations to focus remediation efforts on vulnerabilities that pose the greatest threat to their specific environment and business operations.

AI-powered risk assessment considers system interdependencies, providing comprehensive impact analysis for potential incidents and revealing cascading breach effects.

Advanced Authentication Systems

Traditional password-based authentication is vulnerable to credential theft and social engineering. AI-powered systems introduce multiple verification layers that are significantly harder to compromise.

Biometric authentication uses AI to analyze unique physiological characteristics while detecting spoofing attempts and presentation attacks.[7] Behavioral authentication continuously monitors user patterns including typing rhythms, mouse movements, and application usage, triggering additional verification when behavior deviates from established norms.[2]

Veriff's biometric authentication system demonstrates the practical application of AI in fraud prevention, using advanced algorithms to detect spoofing attempts and presentation attacks while analyzing unique physiological characteristics[7]. These systems have proven effective in preventing identity fraud by combining multiple biometric factors with behavioral analysis.

Adaptive authentication assesses real-time risk factors including location, device characteristics, and access patterns, dynamically adjusting authentication requirements based on risk levels.

Comprehensive Security Analytics

AI-powered analytics platforms process vast security data from multiple sources, identifying patterns impossible for human analysts to detect manually. These systems reconstruct attack timelines, identify compromised accounts, and assess breach scope by analyzing network traffic, system logs, and user activities.[2]

Fortinet's AI-powered security analytics platform illustrates this comprehensive approach by integrating threat intelligence with automated incident response capabilities, enabling organizations to isolate compromised systems and revoke credentials within seconds of threat detection [8]. The platform's machine learning algorithms continuously analyze network traffic patterns and system logs to reconstruct attack timelines and identify indicators of compromise.

Automated incident response isolates compromised systems, revokes credentials, and implements containment within seconds of detection.[8] AI-powered forensic tools identify indicators of compromise and threat actor tactics, enabling organizations to strengthen defenses against future attacks.

Implementation Considerations

Deploying AI security solutions requires addressing data quality requirements, computational resources, and potential adversarial attacks against AI systems. Organizations must combine AI-enhanced solutions with traditional controls for comprehensive protection.

As threat actors increasingly use AI for malicious purposes, security systems must evolve to counter AI-powered attacks.[9] This technological competition drives continued innovation in defensive AI capabilities, making artificial intelligence essential for modern cybersecurity.

The future of network security depends on intelligent, adaptive systems that learn, evolve, and respond to emerging threats in real-ti

me, providing organizations with dynamic protection capabilities necessary for safeguarding critical assets in complex digital environments.[10]

References

[1]. A. O. Sodipe, N. O. Abel, H. C. Ntichika, E. E. Daniel, and E. I. Agboare, "The Role of AI in Enhancing Network Security," IRE Journals, vol. 8, no. 3, Sep. 2024.

[2]. M. Binhammad, S. Alqaydi, A. Othman, and L. H. Abuljadayel, "The Role of AI in Cyber Security: Safeguarding Digital Identity," Journal of Information Security, vol. 15, no. 2, Apr. 2024.

[3]. Palo Alto Networks, "What is the role of AI in Threat Detection?" 2024. [Online]. Available: https://www.paloaltonetworks.com/cyberpedia/ai-in-threat-detection

[4]. SentinelOne, "AI Threat Detection: Leverage AI to Detect Security Threats," 2025. [Online]. Available: https://www.sentinelone.com/cybersecurity-101/data-and-ai/ai-threat-detection/

[5]. IBM Security Intelligence, "Vulnerability management empowered by AI," 2025. [Online]. Available: https://www.ibm.com/think/insights/ai-powered-vulnerability-management.

[6]. InfoSecurity Europe, "Beyond CVSS: New Frameworks for Vulnerability Risk Assessment," 2024. [Online]. Available: https://www.infosecurityeurope.com/en-gb/blog/future-thinking/new-frameworks-vulnerability-risk-assessment.html

[7]. Veriff, "Future of Biometrics: AI, Fraud Prevention and Industry Growth," 2025. [Online].

Available: https://www.veriff.com/identity-verification/news/the-future-of-biometric-technology

[8]. Fortinet, "Artificial Intelligence (AI) in Cybersecurity: The Future of Threat Defence," 2024. [Online]. Available: https://www.fortinet.com/resources/cyberglossary/artificial-intelligence-in-cybersecurity

[9]. CISA, "Pilot for Artificial Intelligence Enabled Vulnerability Detection," 2024. [Online]. Available: https://www.cisa.gov/resources-tools/resources/pilot-artificial-intelligence-enabled-vulnerability-detection

[10]. A. H. Salem, S. M. Azzam, O. E. Emam, and A. A. Abohany, "Advancing Cybersecurity: A comprehensive review of AI-driven detection techniques," Journal of Big Data, 2024. [Online]. Available: https://journalofbigdata.springeropen.com/articles/10.1186/s40537-024-00957-y

Congratulations

Tharushi Wijethunga Recognised with the Impact Award for Outstanding Contribution to STEM Education

We are proud to celebrate the remarkable achievement of our final-year student, Tharushi Wijethunga, who has been honoured with the Impact Award at the STEMUP Volunteer Summit 2025, hosted by the STEMUP Educational Foundation. This award is a testament to Tharushi's unwavering commitment and leadership in promoting STEM education over the past three years and beyond. Through her active engagement in mentoring, outreach programs, and community initiatives, she has played a vital role in inspiring and empowering the next generation of innovators and problem-solvers.

STUDENT PROJECT

REVOLUTIONIZING STUDENT PRODUCTIVITY WITH A MOBILE APP - LEARNPRO

Supervisor - *Mr. G. A. C. Anuradha Herath, Lecturer, Department of Computing & Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka.*

Mentor - *Mr.Kasun Hasanga, Mobile Engineer at JIT Resourcing & Consultancy Services.*

Undergraduates - *D.M.E.Madhushan, S.C. Ganegoda, D.R.Nammuni, S.M.N.S.Badara, Faculty of computing, Sabaragamuwa university of Sri Lanka.*

Introduction

In today's modern digitalized world, students face significant challenges in maintaining concentration in their academics. From endless social media notifications and continuous consumption of online content, It seems almost impossible to keep their focus while avoiding distractions. Recognizing this struggle, our team of undergraduate student developers has developed a revolutionized mobile application aimed to transform how students' study and stay motivated.

The Modern Student's Struggle

Distractions aren't the only issue that students face today. Many students also struggle with information overload, ineffective study habits, and a lack of motivation. These problems often result in poor retention, procrastination, and academic burnout. The solution? A return to research-backed study technique enhanced by the power of technology. Scientifically proven study methods—made even better with the help of technology.

Science behind Learnpro

Basically, there are three main study techniques integrated with Learnpro. Those are Pomodoro, Active recall and space repetition. The Pomodoro technique invented by Francesco Cirillo is about a time management method that breaks down the working time into smaller time intervals followed by small breaks, these intervals are usually 25 minutes long. When it comes to studying this method helps students to focus on smaller tasks instead of looking at all work. 25 minutes are considered as a smaller time period that anyone can fully focus on without any distractions. In learn pro there is a timer that can be set to 25minutes it also calculates the total time and the history of the previous session.

This makes students motivated to study instead of thinking about longer study sessions that takes hours. These short breaks are very helpful to give relaxation to student's brain after a fully focused study session. This is the best way to throw procrastination away from students' daily schedule. Also, it helps to avoid burnouts caused by academic stress.

The second technique is space repletion. It is a technique that helps students to memorize things more effectively. It is basically about reviewing what they have learned again and again while increasing intervals over time. For an ex

ample reviewing after an hour, a few hours, after a day, after few days, after 2 weeks, after a few weeks, after few weeks. This made it easier with learnpro flash cards and the quiz feature. Students can create flash cards and quizzes based on their study content using integrated modern LLM model, Gemini AI. Then they can refer them to follow space repetition techniques. Learnpro also offers a cloud space to store students' notes to refer them later while following space repetition. This solves the most common problem of the student which is poor retention.

What is active recall. Active recall is a learning technique that involves actively retrieving information from memory. The best example for active recalling is the answering questions while studying. Learnpro enables you to create quizzes in seconds to actively recall the subjects while studying. Instead of passively retrieving information by reading active recall is a best way to memorize information. This helps in poor retention too.

Is that all Learnpro has to offer? Not quite. Learnpro has a connected and supportive learning community. When a student is stuck somewhere in understanding a particular section of a subject none of those study techniques help. This is where the community support with peer tutoring Is very necessary. Without this feature Learnpro isn't good enough. This feature enables any student to ask for support from clever students in the same major. Instead of studying alone, It has another feature to create small groups where they can share notes or ask short questions. It may help to cope with academic stress.

Another thing that Learnpro motivates its users to study is the user profile where all the activity has been recorded and points have been collected. When every user can see your profile, Users are more likely to build a rich and better profile. This is one of reasons most of social media apps are popular among the younger generation.

Novelty of Learnpro

What makes Learnpro truly special is how it brings together the best study techniques into one simple mobile app. While many apps offer Pomodoro timers, flashcards, or quiz tools separately, Learnpro blends them all into a smooth, guided experience that helps students to be more productive ,find solutions for bad habits and weaknesses and study better. While bringing all study techniques together, it also builds a supportive student community which adds more uniqueness to Learnpro when it compares to other apps in the market. It is more than just a study tool ,It acts like a study partner. It is also a full package of all the things combined. It makes students' life easier than ever.

■ Key Features That Power Learnpro

Pomodoro Timer

Breaks study time into short 25-minute sessions with small breaks in between to follow the pomodoro technique.

AI Flashcards & Interactive Quizzes

Creates personalized flashcards and quiz questions based on what students have studied and information entered to the app end of those study sessions .Flash cards and quizzes help to follow space repetition and active recall technique.

Supportive community

Each user on Learnpro has their own profile that displays their study progress, including Total time of all Pomodoro sessions, count of tutoring, and points earned. Users can search for other students by username and connect with them. If they need help with a difficult section of a particular subject, they can send a Zoom meeting request for a quick

discussion or tutoring session. Learnpro doesn't include its own video streaming to avoid distractions, but it makes it easy to schedule and join meetings using shared links. After a session, users can give feedback with a rating, which is shown on the tutor's profile to build trust in the community. The app also allows users to create small study groups where they can share notes and ask questions, making learning more interactive and supportive.
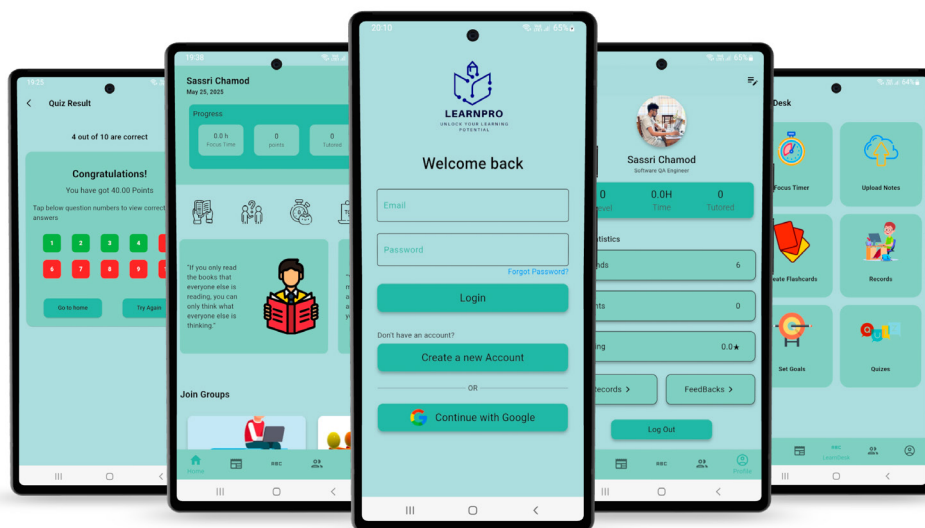

Figure 1: Screenshots of key features

How to Use Learnpro Effectively

Learnpro is designed to make studying smarter, not harder, by guiding students through a structured and efficient study routine. To get started, open the app and activate the Pomodoro timer, which breaks your study time into focused 25-minute sessions followed by short breaks—keeping you productive without burnout. During these focused sessions, dive into your textbooks, notes, or lectures, and once the timer ends, enter key points or summaries into the app This input allows Learnpro to generate personalized learning materials, including AI-powered flashcards and interactive quizzes, which enhance memory retention through spaced repetition and active recall. After a session, take a proper break, step away from your phone and let your mind relax.

Once refreshed, begin another Pomodoro cycle by quickly reviewing your flashcards or taking a short quiz before resuming your studies. If you're stuck on a difficult concept, you can send a tutoring request to a peer right through the app. Learnpro also supports collaborative learning by letting you schedule study sessions, share notes, and connect with friends through video call links for real-time group discussions.

After a study session you should send feedback with a rating to the person who taught you. It will be displayed on their profile. Don't forget to upload your notes and review time to time along with the flash cards and quizzes.
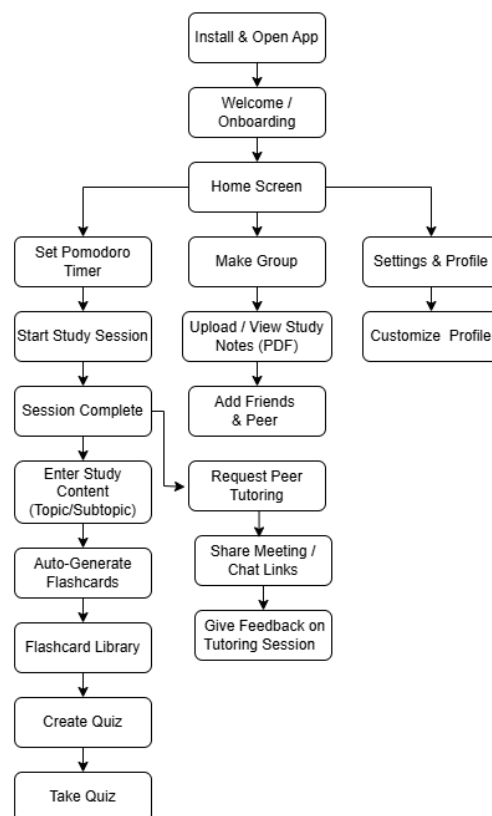

Figure 2: User Flow Diagram

Conclusion

In a world full of distractions, Learnpro can make a significant difference in a student's academic journey. This app brings together proven study techniques with smart technology, and a strong learning community to revolutionize the way students learn. This solves most of the problems students struggle with. It builds a distraction free and motivated environment for students to study while helping to build good study habits, consistency and discipline.

Congratulations
Sajini Weerasinghe for Your Outstanding Achievement

The Faculty of Computing is thrilled to extend its heartfelt congratulations to Ms. Sajini Weerasinghe, a talented 3rd-year under-graduate, for receiving a Special Recognition award at the "Short Video Competition 2025" organized by the Central Bank of Sri Lanka!

The award ceremony, held on March 24th, 2025, in Nuwara Eliya, was graced by esteemed officials from the Central Bank. In a competition focused on raising awareness about financial scams with the theme "Protect Your Money; Say No to Financial Scams," Sajini's video stood out among many entries for its creativity and powerful message.

VOLUNTEER HIGHLIGHTS

J.K.W.Oshen Rashmika Karunathilaka

Department of Computing and Information Systems,
Faculty of Computing
Sabaragamuwa University of Sri Lanka
22FIS0526

Manusha Sathsara Jayasinghe

Department of Computing and Information Systems
Faculty of Computing
Sabaragamuwa University of Sri Lanka
22FIS0478

Pasindu Denuwan

Department of Computing and Information Systems
Faculty of Computing
Sabaragamuwa University of Sri Lanka
22CIS0273