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# NEWSLETTER

## UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

June 2024 | Volume 10 | Issue No 01






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# University of Colombo Vice Chancellor's Award for Research Excellence (Research Award) - 2022



*Figure: Dr. Ajantha Atukorale receiving the Vice Chancellor's Award for Research Excellence 2022.*

Dr. Don Ajantha Sanjeewa Atukorale, Director of University of Colombo School of Computing, has been honored with the Vice Chancellor's Award for Research Excellence at the University of Colombo Postgraduate Convocation 2022 which was held on the 12th of January 2024.

Ajantha Atukorale received his B.Sc. Honours Degree in Computer Science from the Faculty of Science, University of Colombo, in 1995 with a First Class. His outstanding academic performance earned him three awards at the undergraduate degree convocation, placing him at the top of his batch. In 1997, he secured a highly esteemed full scholarship known as the International Postgraduate Research Scholarship (IPRS) from the Australian Department of Education, Training and Youth Affairs to pursue his postgraduate studies. In 2002, he successfully completed his Ph.D. in Neural Pattern Recognition at the University of Queensland, Australia.

During his 26 years as an academic and Wadministrator at the University of Colombo, he has served as the coordinator of the UoC and UCSC Network Operations Centres, the coordinator of the Master of IT degree program, the Secretary to the Board of Study for Research and Higher Degrees from its inception for about 8 years, the Master's Project Coordinator, the Coordinator of the third country training program in Computer Networking, and the Head of the Department of Computational and Intelligent Systems of the UCSC from 2015 to 2022 . He served as the acting Head of the Department of Information and Communication Technology, Faculty of Technology, University of Colombo from 2017 to 2018. Also, he was the Deputy Director of the UCSC from 2016 to 2022. Currently, Dr. Atukorale is the Director at the University of Colombo School of Computing (UCSC). His research interests include Neural Networks, Pattern Recognition, Machine Learning, Data Analytics, Computer Networks, and Network Virtualization.

For the Vice Chancellor's Award for Research Excellence 2022, he has published

- Three Journal publication in International Index Journals
  - Journal of Expert Systems with Applications, Elsevier Publisher, CiteScore = 12.2, Impact Factor = 8.665
  - Journal of Information Sciences, Elsevier Publisher, CiteScore = 12.1, Impact Factor = 8.233
  - Journal of Information Processing & Management, Elsevier Publisher, CiteScore = 11, Impact Factor = 7.466

- One Journal publication in a National non-index Journal
  - Sri Lankan Journal of Applied Sciences

- Three (3) International Conference publications
  - IEEE International Workshop on Big Data for Financial News and Data
  - 32nd Workshop on Information Technology and Systems
  - International Conference on Advances in ICT for Emerging Regions

He served as the Editor-in-Chief for the Research Colloquium of the Computer Society of Sri Lanka (CSSL), a key element of the National Information Technology Conference (NITC) that originated in the early 1980s.

In 2020 and 2021, he earned Senate Commendations for Research Excellence, followed by the Senate Award for Research in the General Category in 2022.

# UCSC Orientation and Inauguration for the Academic Year 2022/2023



*Figure: New UCSC students at the 2022/2023 Inauguration Ceremony.*

The University of Colombo School of Computing (UCSC) recently conducted an enlightening orientation program for its new students, designed to provide them with crucial insights and knowledge. The orientation program took place from May 13th to 22nd, 2024, serving as a crucial prelude to the eagerly awaited Inauguration Ceremony. It featured numerous informative sessions with distinguished speakers from various backgrounds, ensuring students were well-prepared for their academic journey and personal development.

During the orientation, students had the privilege of hearing from a remarkable number of speakers, including UCSC's Senior Lecturers, successful alumni, professional counsellors, a renowned gynaecologist, and a senior deputy inspector general. Each speaker offered unique perspectives and valuable insights, enriching the students' understanding of important aspects of university life.

The sessions covered a diverse range of topics, including career opportunities in the computing industry, the degree programs available at UCSC, the significance of mental health and well-being, and strategies for managing university challenges



*Figure: Guest speakers addressing new students during orientation.*

while maintaining a healthy balance. Students were also informed about examination processes, criteria for awards, extracurricular activities, sports, and clubs that enhance the overall university experience. The program emphasized the importance of a healthy lifestyle, focusing on alcohol and drug prevention, and provided guidance on making responsible choices along with information on available support services within the university community.

Following two successful weeks of orientation, the Inauguration Ceremony for the new entrants of the Academic Year 2022/2023 was held on June 3rd, 2024, at the Vidya Jyothi Professor V. K. Samaranayake Auditorium at UCSC. The event was attended by several dignitaries, including Senior Professor (Chair) H. D. Karunaratne (Vice Chancellor), Dr. Ajantha Atukorale (Director of UCSC), Prof. Kasun De Zoysa (Deputy Director of UCSC), Heads of Academic Departments,



*Figure: New students engaging in the orientation program at UCSC.*

Coordinators of Centres, and the academic, administrative, and non-academic staff members of UCSC.
The ceremony commenced with one minute of silence in memory of the late Vidya Jyothi Professor V. K. Samaranayake, the founder of the University of Colombo School of Computing. Dr. Athukorale delivered a welcoming speech, and the Vice Chancellor shared valuable insights into student life at the University of Colombo. Dr. Chamath Keppetiyagama (Head of Internal Undergraduate Studies) provided an introduction to the Undergraduate degree programs. Finally, Dr. Dinuni Fernando, the coordinator of the 2024 Orientation Program, expressed gratitude in the vote of thanks, concluding the ceremony successfully. The event also showcased captivating performances by senior UCSC students, providing entertainment for the audience.

# Nurturing Future Innovators: The YCS Young Computer Scientist Competition

The Young Computer Scientist (YCS) competition has once again highlighted the remarkable talent and innovative spirit of students from across the island. FITIS, the Federation of Information Technology Industry Sri Lanka, in partnership with the Ministry of Education and the University of Colombo School of Computing (UCSC), has been running the Young Computer Scientist (YCS) competition annually. This year's event featured two main categories, Group and Individual, with an impressive initial count of over 1500 projects submitted, spanning both categories.

Applications were invited from students throughout the island, and the selection process involved an initial assessment by a panel of judges. This was followed by student presentations or demonstrations, with the final judgment made by the same panel, which included representatives from both industry and academia. Both Senior and Junior UCSC staff members were selected as the panel members according to their speciality. The projects were categorized into four main areas, catering to three age groups: grades 6-9, 10-11, and 12-13. The categories included Game-AR-VR, IOT-Robotics, AI-ML-DA, and Web-Mobile-App. This diverse range of categories allowed students to explore various technological fields and apply their skills in creative and impactful ways.

To ensure a thorough and fair assessment, projects were evaluated based on several criteria. These included problem identification, innovation and uniqueness, soundness of design and architecture, prototype/working model/proof of concept, sustainability and future potential, and presentation and communication. Each criterion played a crucial role in determining the project's overall quality and feasibility, ensuring that only the most outstanding and innovative projects advanced.

The evaluation process was conducted in two rounds. The first round took place from September 19th to September 25th, 2023, where projects were assessed based on submitted videos and presentation materials. This initial assessment helped identify the most promising projects, which then moved on to the second round. The second round, held on October 5th, 2023, was conducted physically at the UCSC, providing an opportunity for students to present their projects in person and receive direct feedback from the judges.

From the initial pool of submissions, 25 students were selected for the second round of physical evaluations. Ultimately, seven groups emerged as overall winners across three categories: Junior Category (Grades 6-9), Senior Category 1 (Grades 10-11), and Senior Category 2 (Grades 12-13). These winners demonstrated exceptional creativity, technical skill, and the potential to make significant contributions to the field of computing.

The selected students from both the Group and Individual categories have been suggested for the prestigious APICTA (Asia Pacific ICT Alliance Awards), providing them with an excellent opportunity to gain international recognition and further develop their skills. This opportunity not only highlights the achievements of these young innovators but also encourages them to continue pursuing their passion for technology and innovation.

The YCS competition not only highlights the technological prowess of young minds but also fosters a culture of innovation and creativity, essential for the future growth and development of the tech industry. The YCS competition plays a crucial role in shaping the next generation of tech leaders and innovators by encouraging students to think creatively and address real-world problems with innovative solutions.



*Figure: UCSC staff and students at the YCS 2023 event*

## Research highlights

# UCSC Research Discourse

The UCSC research discourse aims to share the experiences, knowledge, and ongoing research conducted by UCSC research groups with academic staff, research assistants, and postgraduate students. The first meetup of the UCSC Research Discourse took place on July 26, 2024, in the UCSC boardroom. Ms. Lojenaa Navanesan, a final-year PhD student under the supervision of Prof. Kasun de Zoysa and Dr. Asanka Sayakkara, presented a summary of part of her research work titled “Ensuring Cross-Device Portability of Electromagnetic Side-Channel Analysis for Digital Forensics.”



*Figure: UCSC staff participating in the Research Discourse program*

The presentation discusses how essential to build a generalized model for smart devices using electromagnetic side-channel analysis to investigate these devices as potential evidence in criminal cases. Digital forensics investigation involves various tools and strategies recommended by law enforcement and courts to investigate digital and computing devices. However, investigators face challenges in examining smart devices with existing digital forensics tools due to the nature of these devices. Issues such as security and privacy features, less built-in storage, customized devices, rapidly advancing technologies, and more complicate the process. Additionally, investigators often need to tamper with the smart device or manipulate data for further analysis, which is not admissible as evidence in court. To address these challenges, electromagnetic side-channel analysis was proposed a few years ago as a method for investigating smart devices.

Side-channel analysis involves detecting signals emitted by electronic devices during their internal operations, such as light, heat, sound, power, electromagnetic radiation, etc. and analyzing these side-channels using various techniques. The proposed investigation technique is based on electromagnetic side-channel analysis, which is closely tied to the specific processor types they are trained on. Therefore, there is a need to develop a generalized model for investigating various devices in forensic contexts. This extended approach is referred to as “cross-device portability of electromagnetic side-channel analysis for digital forensics.”

The cross-device portable electromagnetic side-channel analysis allows investigators to examine smart devices and extract crucial insights about criminal incidents without tampering with the devices. This non-invasive technique preserves the integrity of the evidence, providing a reliable and efficient tool for forensic analysis. In conclusion, she emphasized that their cross-device portable model offers a promising solution for the digital forensics community to investigate diverse devices in the near future. This model will be particularly beneficial for investigators examining newly arrived smart devices. Furthermore, it facilitates a non-invasive investigation approach, simplifying the forensic analysis process for investigators.



*Figure: Ms. Lojenaa Navanesan presenting her research at the UCSC Research Discourse*



*Figure: UCSC staff participating in the Research Discourse program*

# Empowering UCSC with ERPNext: A New Era of Operational Excellence

In our ongoing commitment to enhancing operational efficiency, the Director and the management team recognized the necessity for a unified system to manage all activities at the University of Colombo School of Computing (UCSC). After careful consideration, we have selected ERPNext as our Enterprise Resource Planning (ERP) solution.

**Step-by-Step Implementation:** The implementation of ERPNext is being carried out in phases, starting with the Accounts Module. Data entry for this module commenced in April 2023, with the Finance Division staff diligently entering data into both the existing system and ERPNext. This parallel operation ensures a smooth transition while safeguarding data integrity. During this phase, data for several other key modules were also integrated into the new system.

**Recent Developments:** To further streamline our processes, a mobile app was developed to support the Board of Survey process through ERPNext, and it has undergone successful testing. We are pleased to announce that this system will be utilized for the 2024 Board of Survey.

In January 2024, we held the first staff training session focused on ERPNext's functionalities, followed by an intensive three-day workshop in April. These sessions have equipped our staff with the necessary skills to begin utilizing ERPNext effectively, and several departments have started entering their records into the system.

**Looking Ahead:** Following the successful deployment of the Accounts Module, we plan to roll out additional ERPNext modules in 2025. These include the HR, Loan, Inventory, and Education Modules. Once fully implemented, UCSC will have a comprehensive and integrated ERP system, resulting in substantial cost savings and improved operational efficiency.

We are excited about the future and the positive impact these enhancements will bring to UCSC. Thank you for your continued support and cooperation as we transition to the new system.






*Figure: UCSC staff receiving training on the ERPNext system.*

## Spotlight on Innovation: Featured Research

# Software Security in the Rapid Deployment Era

### Move fast and break things?

In late 2016, an engineering team at Uber maintained an internal Github repository containing code used to manage various key aspects of Uber's operations, including infrastructure, with the team regularly pushing updates. Everything appeared to be running smoothly, but a few months later, the situation took a dire turn.

Hackers infiltrated one of Uber's internal Slack accounts, boldly announcing that they had downloaded a large amount of sensitive data. To prove they had compromised Uber's systems, the attackers provided samples of the stolen data, which included information related to millions of Uber users and drivers. Uber hastily conducted an internal investigation and traced it back to a mistake by the engineering team, who, in their rush to deploy updates, had inadvertently included Amazon Web Services (AWS) credentials in the code they pushed to the previously noted GitHub repository. Although the repository was private, these credentials were exposed and eventually discovered by the attackers.

In today's era of rapid deployment, where continuous integration and continuous delivery (CI/CD) pipelines have become the norm, incidents like these are becoming increasingly prevalent. With growing competition and users demanding more sophisticated software features, engineering teams face relentless pressure to deploy code rapidly. This pressure has fuelled the adoption of continuous practices. For instance, in continuous deployment, code from the development environment is automatically pushed to production with minimal human intervention. This need for speed has also driven the rise of software development paradigms like DevOps (Development Operations) and DevSecOps (Development, Security and Operations) (Figure 01).[1]

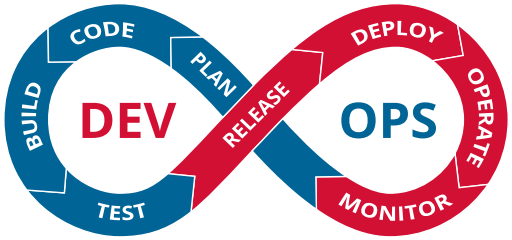



*Figure 01: Continuous workflow in The DevOps paradigm*

### Speed vs Security?

However, the increased speed of these paradigms has brought another conundrum: How to produce secure software outputs in a rapid software deployment setting without impacting its speed? In practice, software security assessment contains a multifaceted layer of tests, tools and policies that aim to identify and mitigate threats throughout the software engineering lifecycle. Vulnerabilities can emerge at any stage, from faulty code to insecure infrastructure configurations, unmanaged secrets (Uber example above) or even through third-party dependencies. Therefore, security assessment measures are time-consuming and directly go against the ethos of rapid software deployment. As a result, practitioners are under constant pressure to strike a balance—delivering software quickly while ensuring it remains secure—given the potentially severe repercussions of insecure software.

### Good Enough Security

Our research sought to address the above trade-off problem between speed and security through a series of empirical software engineering studies. Given the strong interest among practitioners in using tools and frameworks, we first conducted experiments with various configurations of CI/CD pipelines. These pipelines featured different integration patterns of Application Security Testing (AST) tools configured using GitHub Actions. The aim here was to assess the impact of various AST tool integration patterns on the delivery process from development to production. Our observations for these experiments showed that while obtaining the best of both worlds is challenging in a rapid deployment setting, there are some tool integration patterns that practitioners can adopt to achieve "*good enough security*".[2]

For example, one pattern involved setting up a parallel staging environment under simulated production conditions to run Dynamic Application Security Testing (DAST) without interrupting the delivery to production through the main pipeline.




*Figure 02: "Move fast and break things" Facebook CEO Mark Zuckerberg onstage at the F8 conference 2014 IMAGE: Mike Deerkoski (CC BY)*

Here, while the DAST tool continuously runs in the parallel staging environment, the same rapid deployment pipeline is used to deliver patches into production if critical vulnerabilities are identified from DAST.

This approach embraces the "*move fast and break things*" philosophy (once championed by Facebook- Figure 2) but with the crucial capability to rapidly/continuously detect what's broken and promptly fix it.

Another key pattern involved moving the AST to the earlier phases of the development cycle (i.e. Shift-left security). For example, implementing SAST through pre-commit hooks in the Source Code Management environment can provide immediate feedback to the developer and prevent vulnerabilities from being introduced into the repository in the first place. Selected results of this work can be accessed using the studies included in the Reference section [3,4].

**Socio-Technical Congruence**

A key but frequently overlooked aspect of the problem is the social dimension of the issue. Software development is inherently a social activity that involves multiple teams with different functional team members (e.g., Development-dev, Security-sec, Operations-ops teams). Numerous studies have highlighted that the way these teams coordinate their efforts can significantly impact the quality (e.g., security) of the software they produce. Here, effective coordination ensures that the disparate efforts of these functional teams align toward common software deployment goals within a coordinated pipeline/workflow. For example, the coordination between development and security teams is critical for secure software releases in a rapid software development setting. Consequently, it becomes important to quantify the effectiveness of how these teams coordinate their work, yet this has received less attention. To address this gap, we introduced the MultiClass Socio-Technical Congruence (MC-STC) metric by extending the widely researched Socio-Technical Congruence (STC) framework. STC is a well-established framework used to assess the alignment or "fit" between the required coordination effort suggested by the technical dependencies in a project and the actual coordination activities that occurred among developers. Our work expands the application of STC to capture cross functional interactions, considering the coordination data from different functional alignments or classes of project contributors (e.g., developers and security engineers). This makes MC-STC suitable for the quantitative assessment of a selected social aspect (i.e. dev-sec coordination) of the above trade-off problem to ensure that rapid deployment does not come at the expense of software security. We carried out a large-scale exploratory case study using 100 open-source projects to evaluate MC-STC (Readers can access the results and the metric here [5]).

**Take away**

While achieving a perfect balance between speed and security is challenging, it is manageable to a certain degree through strategic tool integration patterns and a shift-left approach to security in a rapid deployment setting. However, tooling or automation is only one side of this problem. Understanding and enhancing the social dynamics, such as inter-functional team coordination behaviours in these settings, is equally important for maintaining speed without sacrificing security.

[1]Rajapakse, Roshan N., et al. "Challenges and solutions when adopting DevSecOps: A systematic review." Information and software technology 141 (2022): 106700.

[2]Hurlburt, George. "Good Enough Security: The Best We'll Ever Have." Computer 49.7 (2016): 98-101.

[3]Rajapakse, Roshan N. et al "An empirical analysis of practitioners' perspectives on security tool integration into devops." Proceedings of the 15th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM). 2021.

[4]Rajapakse, Roshan N, et al.. "Collaborative application security testing for devsecops: An empirical analysis of challenges, best practices and tool support." arXiv preprint arXiv:2211.06953 (2022).

[5]Rajapakse, Roshan, and Claudia Szabo. "Towards Multi-Class Socio-Technical Congruence: Assessing Coordination in Collaborative Software Development Settings." Available at SSRN 4824803.

# UCSC Alumni Association Annual General Meeting - 2024

The UCSC Alumni Association held its Annual General Meeting on May 30, 2024, marking a significant moment for alumni. This event highlighted the progress made from September 2023 to May 2024 under the interim committee.

A key highlight was the introduction of our new committee, bringing together a diverse group of passionate individuals. They are dedicated to guiding our association to even greater achievements in the coming year.

- Vice Patron: Dr. Ajantha Atukorale (Director UCSC)
- President: Mr. Anushka Mendis
- Vice President: Mr. Chamara Dhanusha Jayaweera
- Secretary: Mr. Parakrama Ratnayake
- Assistant Secretary: Mr. Udaya Shantha Herath
- Co-Treasurer: Dr. Kasun Gunawardana
- Co-Treasurer: Mr. Sameera Subasinghe
- Editor: Mr. Omila Pasan Ihalage
- Assistant-Editor: Ms. Nilakshi Shashikala Anuradhani
- Committee members:
  - Mr. Chamil Jeewantha
  - Mr. Sujeev Rajakulendran
  - Mr. Prabath Ariyarathna
  - Mr. Suraj Radampola
  - Mr. Mathot Kadar
  - Mr. Madhuke Bodhinayake
  - Mr. Ashintha Rukmal
  - Ms. Chalani Oruthotaarachchi
  - Mr. Bhanuka Rathnayake
  - Ms. Ayisha Siddeequa Jafeer
  - Ms. Janani Dissanayake

During the AGM, there were discussions about expanding alumni networks, improving career opportunities, and building a stronger sense of community among members. It was a time to celebrate past successes and set goals for the future.

With the enthusiasm of new committee and the support of our members, the association looks forward to continuing to connect, support, and celebrate UCSC alumni worldwide. The Annual General Meeting was a positive gathering that signals a promising future for our association and its impact.




*Figure: Newly appointed committee members at the UCSC Alumni Association AGM 2024.*

## Research highlights

# Utilizing Multi-sensory Cues to Enhance the Art Gallery Experience: Entertainment for the Visually Impaired

Researchers: Ruwani Welewatta, Akila Maithripala, Heshan Weerasinghe
Supervisor: Dr. Kasun Karunanayake
Co-Supervisor: Dr. Damitha Sandaruwan

### Introduction

Visual impairment refers to any kind of vision loss, whether complete or partial. Recent statistics show that around 940 million people worldwide have some degree of vision loss, with 246 million having low vision and 39 million being blind. While many technologies assist people with visual impairments in daily activities, certain visual-only tasks pose significant challenges. For instance, reading can be aided by braille or text-to-speech systems, but experiencing art like paintings or drawings is difficult.

To study the needs of the visually impaired, we visited the Centre for Disability Research, Education and Practice (CEDREP) at the University of Colombo for a user study. We aimed to create a painting that blind students could experience without visual cues. Our design included tactile features, such as an embossed river shape that felt cool to the touch due to embedded Peltier modules, and a warm bonfire area using safe porcelain wire-wound resistors. We also incorporated sound, using a webcam and program to adjust ambient sounds based on user location. For example, near the river, users heard water flowing, while near the bonfire, they heard chirping and fire sounds.
This user-centred design was developed and evaluated with constant feedback from CEDREP



*Figure: Practical experiments in the system*

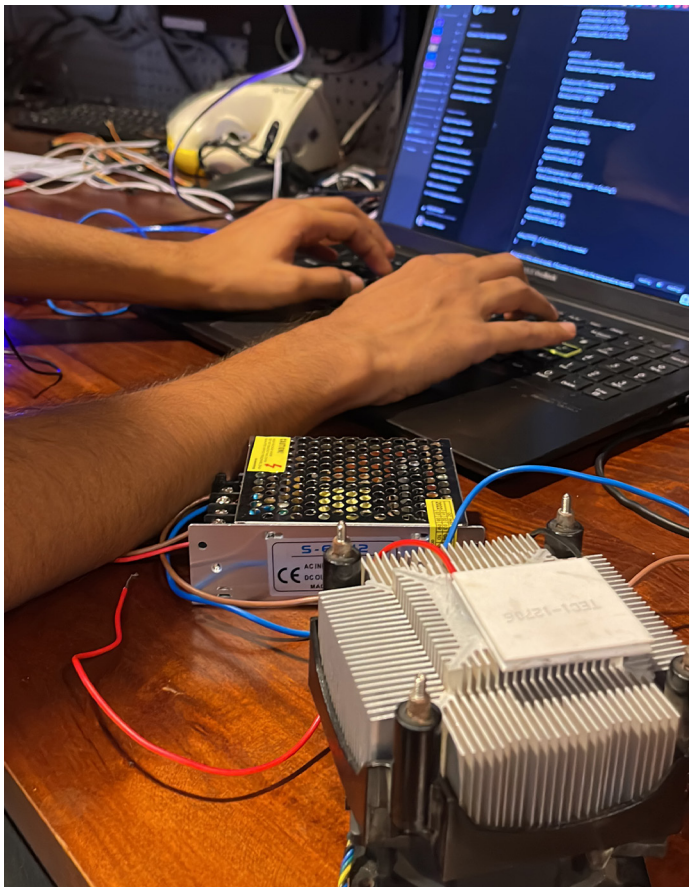


*Figure: The processing of the system*

at UOC. The following sections will discuss our design logic, evaluation methods, and results.

### Background

Recent research focuses on controlling sensory stimuli to provide users with relevant, targeted experiences rather than simply integrating different sensory inputs. Studies have shown that physical mechanisms of awareness help consumers create their own worlds, making it essential to understand these physical consumption methods in order to develop holistic experiences.

Combining different sensory stimuli in a meaningful way is appreciated by audiences and can leave a positive impression. Historically, the Phantasmagoria ghost lantern show in 18th-century France and 17th-18th-century museums allowed visitors to touch and feel exhibits. Modern

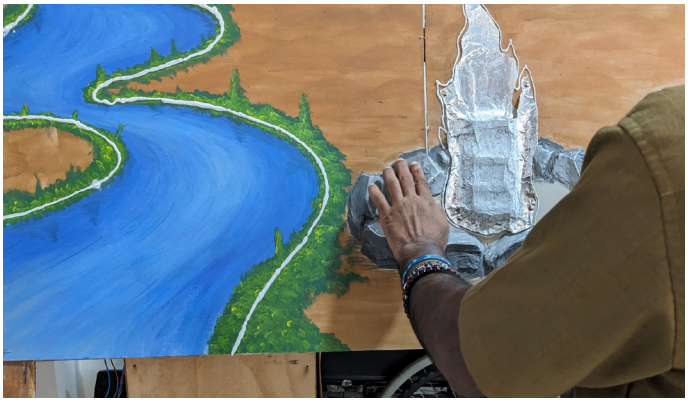


*Figure: Practical experiments in the system*

examples include Zumoko's "Feel the Art" app for Microsoft HoloLens 2, which provides a 3D art experience, and the "Neurodigital: Touching Masterpieces" study, which uses ultrasound haptic feedback with virtual reality for tactile interaction with famous artworks. The Tate Sensorium project also enhanced paintings with mixed sensory stimuli to explore multi-sensory experiences. However, many of these projects still require some visual input or are high-tech and not affordable for everyone.

Design and development of the artefact.
The design effort resulted in a prototype named SEMA: Specially Enhanced Multi-sensory Art, which stimulates tactile, auditory, and somatosensory senses in an artwork. SEMA aims to evaluate how multi-sensory integration helps users understand a painting scenario when sight is limited, focusing on conveying basic visual information through touch and sound. The painting includes three easy to understand elements: a cold river (somatosensory), a hot bonfire (somatosensory), and a tent, designed to deliver necessary stimuli clearly.

The painting was created on a 6x4 feet portable wooden frame with a 2.5mm thick board. The development involved several iterative processes:

1. Tactile Stimuli – Acrylic Relief: Acrylic Relief was used to create tactile sensory stimuli in the painting. Pre-tests were conducted with the Sri Lanka Council for the Blind to determine the optimal thickness and spatial distance of the Plaster of Paris (PoP) lines. The river, bonfire, and tent outlines were highlighted with plaster of Paris. PoP rocks were later added to the campfire element for a more realistic feel.
2. Somatosensory Stimuli - Heat Actuator: A resistor array and aluminium foil was used for even heat distribution, maintaining a temperature of 55-60°C.
3. Somatosensory Stimuli - Cold Actuator: A Peltier module and a case fan were used to create cold stimuli, maintaining temperatures between 13-16°C. The resulting humidity over the painting added to the sensory experience of water.
4. Auditory Stimuli: A Python program with a web camera was used to track the subject and play four different compositions of ambient sounds based on their position.

The user experience was assessed through a questionnaire and semi-structured interviews, providing insights into their interaction with SEMA.

**Evaluation and Results**

We assessed participant reactions to the SEMA prototype using both quantitative and qualitative methods. 22 visually impaired students (mean age 26.11, SD 7.08) from CEDREP at the University of Colombo interacted with the multi-sensory installation. They were divided into two groups: the Prototype Group (experienced SEMA) and the Control Group (received a verbal description of the painting).
The Prototype Group rated their overall experience at 4.24 (SD = 0.66), with heat sensation scoring the highest at 4.63 (SD = 0.50), followed by cold at 4.27 (SD = 0.64), texture at 4.00 (SD = 1.34), and auditory experience at 3.90 (SD = 0.94). The Prototype Group outperformed the Control Group, which had an average response of 2.71 (SD = 0.99).
Participants described this as "novel" and "realistic," and the multi-sensory experience was well-received. Some noted the need for stronger sensory stimuli and highlighted the importance of balancing inputs for a better experience. Participants acknowledged that stimulating all senses added layers and dimensions to their experience. Ensuring compatibility between the artistic message and sensory stimuli is crucial. The study emphasized the need for balancing guided exploration with individual control.
The authors believe the proposed solution can enhance the accessibility of entertainment and art galleries for the visually impaired. Despite limitations, this research advances human-computer interaction and could benefit both individuals with disabilities and the general population. The approach can be refined for more inclusive experiences in various fields. The study's findings are intended to inspire future research on multi-sensory integration in entertainment and its impact on user experiences.

# Research highlights

## University of Colombo School of Computing
## Publication List - 2024

### Conference Publications

1. Eranga Bandara, Peter Foytik, Sachin Shetty, Ravi Mukkamala, Abdul Rahman, Xueping Liang, Ng Wee Keong, Kasun De Zoysa, "SliceGPT–OpenAI GPT-3.5 LLM, Blockchain and Non-Fungible Token Enabled Intelligent 5G/6G Network Slice Broker and Marketplace", 2024 IEEE 21st Consumer Communications & Networking Conference (CCNC), Publication date: 2024/1/6, Pages: 439-445, Publisher: IEEE, Doi: https://doi.org/10.1109/CCNC51664.2024.10454701 (Foreign)
2. Sasadara Jayaweera, Piyumika Sewwandi, Dimuthi Tharaka, Pandula Pallewatta, Thilina Halloluwa, Manjusri Wickramasinghe, Kasun Karunanayaka, Samantha MatharaArachchi, "MangoDB - A TJC Mango Dataset for Deep- Learning-Based Classification and Detection in Precision Agriculture", 4th International Conference on Advanced Research in Computing (ICARC), Publication date: 2024/2, Publisher: Belihuloya, Sri Lanka, (Local)
3. Deshan Sumanathilaka, Nicholas Micallef, Ruvan Weerasinghe, "Swa-Bhasha Dataset: Romanized Sinhala to Sinhala Adhoc Transliteration Corpus", 2024 4th International Conference on Advanced Research in Computing (ICARC), Publication date of 2024/2/21, Doi: https://doi.org/10.1109/ICARC61713.2024.10499771 (Local)
4. Dilani Ranaweera, Ruwan Weerasinghe, Randima Dinalankara, "Lip Synchronization Model For Sinhala Language Using Machine Learning", 2024 4th International Conference on Advanced Research in Computing (ICARC), Publication date of 2024/2/21, Doi: https://doi.org/10.1109/ICARC61713.2024.10499753 (Local)
5. Y Rishoban, G P Seneviratne, "Session Based Recommender System: A Generative Approach', 2024 16th International Conference on Computer and Automation Engineering (ICCAE), Publication date of 2024/3/14, Doi: https://doi.org/10.1109/ICCAE59995.2024.10569614 (Foreign)
6. Sasadara Jayaweera, Piyumika Sewwandi, Dimuthi Tharaka, Pandula Pallewatta, Thilina Halloluwa, Manjusri Wickramasinghe, Kasun Karunanayaka, Samantha Mathara Arachchi, "MangoDB-A TJC Mango Dataset for Deep-Learning-Based on Classification and Detection in Precision Agriculture", 2024 4th International Conference on Advanced Research in Computing (ICARC), Publication date of 2024/2/21, Doi: https://doi.org/10.1109/ICARC61713.2024.10499698 (Local)
7. BAP Madhuwantha, ESL Silva, SMSP Samaraweera, AIU Gamage, KD Sandaruwan, "Novel Approach to 3D Simulation of Soft Tissue Changes After Orthognathic Surgery", Book: Future of Information and Communication Conference, Publication date: 2024/3/17 Doi:https://link.springer.com/chapter/10.1007/978-3-031-54053-0_11 (Foreign)
8. Sahan Dissanayaka, Manjusri Wickramasinghe, Pasindu Marasinghe, "Temporal Convolution-based Hybrid Model Approach with Representation Learning for Real-Time Acoustic Anomaly Detection", Proceedings of the 2024 16th International Conference on Machine Learning and Computing, Publication date of 2024/2/2, Doi: https://doi.org/10.1145/3651671.3651693 (Foreign)
9. AV Ann Sinthusha, EYA Charles, Ruvan Weerasinghe, "Machine Reading Comprehension with Tamil Short Story MRC Dataset", 2024 International Research Conference on Smart Computing and Systems Engineering (SCSE)", Publication date of 2024/4/4, Doi: https://doi.org/10.1109/SCSE61872.2024.10550544 (Local)
10. Nirmalie Wiratunga, Ramitha Abeyratne, Lasal Jayawardena, Kyle Martin, Stewart Massie, Ikechukwu Nkisi-Orji, A R Weerasinghe, Anne Liret, Bruno Fleisch, "CBR-RAG: case-based reasoning for retrieval augmented generation in LLMs for legal question answering", Book of International Conference on Case-Based Reasoning, Publication date of 2024/6/24, Doi: https://link.springer.com/chapter/10.1007/978-3-031-63646-2_29 (Foreign)

11. Yasith Samaradivakara, Thavindu Ushan, Asela Pathirage, Prasanth Sasikumar, Kasun Karunanayaka, Chamath Keppitiyagama, Suranga Nanayakkara, “SeEar: Tailoring Real-time AR Caption Interfaces for Deaf and Hard-of-Hearing (DHH) Students in Specialized Educational Settings”, Book: Extended Abstracts of the CHI Conference on Human Factors in Computing Systems, Publication date of 2024/5/2, Doi: https://dl.acm.org/doi/abs/10.1145/3613905.3650974 (Foreign)
12. Kasun Mendis, Manjusri Wickramasinghe, Pasindu Marasinghe, “Multivariate Time Series Forecasting: A Review”, Proceedings of the 2024 2nd Asia Conference on Computer Vision, Image Processing and Pattern Recognition, Publication date of 2024/4/26, Doi: https://doi.org/10.1145/3663976.3664241 (Foreign)
13. Thisaru Dhanushika, Thushani A Weerasinghe, “Auto Identifying Key Information in Video Lectures to Generate a Navigation Structure”, 2024 International Research Conference on Smart Computing and Systems Engineering (SCSE), Publication date of 2024/4/4, Doi: https://doi.org/10.1109/SCSE61872.2024.10550668 (Local)
14. Muhammad Rusyaidi Zunaidi, Asanka Sayakkara, Mark Scanlon, “A Digital Forensic Methodology for Encryption Key Recovery from Black-Box IoT Devices”, 2024 12th International Symposium on Digital Forensics and Security (ISDFS), Publication date of 2024/4/29, Doi: https://doi.org/10.1109/ISDFS60797.2024.10527284 (Foreign)
15. B A P Madhuwantha ESL Silva, S M S P Samaraweera, A I U Gamage, K D Sandaruwan, “Check for updates Novel Approach to 3D Simulation of Soft Tissue Changes After Orthognathic Surgery”, Advances in Information and Communication: Proceedings of the 2024 Future of Information and Communication Conference (FICC), Publication date of 2024, Doi: https://books.google.com/books?hl=en&lr=&id=i2X8EAAAQBAJ&oi=fnd&pg=PA138&dq=info:oElABMj9bZ8J:scholar.google.com&ots=LOI0a5izoi&sig=bSH4kmL52iOVu2W710SmHmm4-k0 (Foreign)
16. E. Oshani Wickramasinghe, Naveen Rajan, Chathura Wanniarachchi, Kasun Karunanayaka, Prasad Wimalaratne, “Evolution of Formation Control Algorithms for Unmanned Aerial Vehicles”, ISIE 2024 - 33rd International Symposium on Industrial Electronics, UECO - Ulsan Exhibition Convention Center, Ulsan, South Korea, Publication date of 2024/6 (Foreign)
17. Chathura Wanniarachchi, Prasad Wimalaratne, Kasun Karunanayaka, “Formation Control Algorithms for Drone Swarms and The Single Point of Failure Crisis: A Review”, ISIE 2024 - 33rd International Symposium on Industrial Electronics, UECO - Ulsan Exhibition Convention Center, Ulsan, South Korea, Publication date of 2024/6 (Foreign)
18. Sandun Adhikari, Kasun Karunanayaka, Amali Perera, “AR-IoT Medi Assist: Revolutionizing Elderly Medication Management with AR and IoT”, ISIE 2024 - 33rd International Symposium on Industrial Electronics, UECO - Ulsan Exhibition Convention Center, Ulsan, South Korea, Publication date of 2024/6 (Foreign)

## Journal Publications

1. Lojenaa Navanesan, Nhien-An Le-Khac, Mark Scanlon, Kasun De Zoysa, Asanka P Sayakkara, “Ensuring cross-device portability of electromagnetic side-channel analysis for digital forensics”, Journal of Forensic Science International: Digital Investigation, Publication date: 2024/3/, Volume: 48, Pages: 301684, Publisher: Elsevier, Doi: https://doi.org/10.1016/j.fsidi.2023.301684 (Foreign)
2. Rashini Maduka, C. R. Wijesinghe, A. R. Weerasinghe, “Predicted Drug-Drug Interactions in Diabetes Mellitus with Graph Convolutional Autoencoder”, ICCBB ‘23 7th International Conference on Computational Biology and Bioinformatics, Publication date: 07th March 2024, Publisher: Association for Computing Machinery, Doi: https://doi.org/10.1145/3638569.3638576 (Foreign)
3. Pasindu Wijesena, Lakshman Jayarathne, Manjusri Wickramasinghe, Shakya Abeytunge, Pasindu Marasinghe, “Metric Learning with Sequence-to-sequence Autoencoder for Content-based Music Identification”, Journal of: ITM Web of Conferences, 09th January 2024, Doi: https://doi.org/10.1051/itmconf/20246000007 (Foreign)
4. Thisaranie Kaluarachchi, Manjusri Wickramasinghe, “WebDraw: A machine learning-driven tool for automatic website prototyping”, Journal of Science of Computer Programming, Publication date: 2024/3/1, Publisher: Elsevier, Doi: https://doi.org/10.1016/j.scico.2023.103056 (Foreign)

5. Sahan Dissanayaka, Oshan Mudanayaka, Thilina Halloluwa, Chameera De Silva, “ImageLab: Simplifying Image Processing Exploration for Novices and Experts Alike”, Journal: arXiv preprint arXiv:2401.03157, Publication date: 2024/1/6, https://arxiv.org/abs/2401.03157#:~:text=https%3A//doi.org/10.48550/arXiv.2401.03157 (Foreign)
6. N Krishnaram, J Ahamed, N Sathyamoorthy, K D Sandaruwan, A M K B Athapaththu, “Skeletal point analysis to determine the accuracy of forehand smash shots played by badminton players.”, Journal of the National Science Foundation of Sri Lanka, Publication date of 2024/3/1, Doi: https://account.jnsfsl.sljol.info/index.php/sljo-j-jnsfsl/article/view/12141/7384 (Local)
7. M Fernando, K D Sandaruwan, A M K B Athapaththu, “Deep Learning Evaluation of Taekwondo Poomsae movements using skeleton points”, JOURNAL OF THE NATIONAL SCIENCE FOUNDATION OF SRI LANKA, Publication date of 2024/3, Doi: http://www.nsf.ac.lk/images/nsf/jnsf/JNSF_Volume_52_No_1.pdf#page=147 (Local)
8. CLIS Fonseka, Thilina Halloluwa, KP Hewagamage, Upul Rathnayake, R M U S Bandara, “A dataset of unmanned aerial vehicle multispectral images acquired over a field to identify nitrogen requirements”, Journal of Data in Brief, Publication date: 2024/6/1, Doi: https://doi.org/10.1016/j.dib.2024.110479 (Foreign)
9. Buddhi Gamage, Randil Pushpananda, Thilini Nadungodage, Ruvan Weerasinghe, “Applicability of End-to-End Deep Neural Architecture to Sinhala Speech Recognition”, The International Journal on Advances in ICT for Emerging Regions, Publication date of 2024/5/31, Doi: https://journal.icter.org/index.php/ICTer/article/view/510 (Local)
10. Ashmari Pramodya, KTY Mahima, Randil Pushpananda, Ruvan Weerasinghe, “Enhancing Neural Machine Translation for the Sinhala-Tamil language pair with limited resources”, The International Journal on Advances in ICT for Emerging Regions, Publication date of 2024/5/31, Doi: https://journal.icter.org/index.php/ICTer/article/view/511 (Local)
11. Eranga Bandara, Xueping Liang, Peter Foytik, Sachin Shetty, Ravi Mukkamala, Abdul Rahman, Nalin Ranasinghe, Kasun De Zoysa, Wee Keong Ng, “Lightweight, geo-scalable deterministic blockchain design for 5G networks sliced applications with hierarchical CFT/BFT consensus groups, IPFS and novel hardware design”, Journal of Internet of Things, Publication date: 2024/4/1, Volume 25, Pages 101077, Publisher: Elsevier, Doi: https://doi.org/10.1016/j.iot.2024.101077 (Foreign)
12. Imashi Dissanayake, Vinuri Piyathilake, Asanka P Sayakkara, Enosha Hettiarachchi, Isurika Perera, “Eloc-Web: Uncertainty Visualization and Real-Time Detection of Wild Elephant Locations”, Journal of Geovisualization and Spatial Analysis, Publication date: 2024/6, Publisher: Springer International Publishing, Volume 8, Issue 1, Pages 7, Doi: https://link.springer.com/article/10.1007/s41651-023-00169-7 (Foreign)
13. Sugeeshwa SP Galhena, Ajantha S Atukorale, “Comparing the Performance of Machine Learning Algorithms for Emotion Classification on Tweets”, The International Journal on Advances in ICT for Emerging Regions, Publication date of 2024/5/31, Doi: https://journal.icter.org/index.php/ICTer/article/view/514 (Local)
14. Dinendra Bandara Karunarathne, Tharindu Wijethilake, Chamath Keppitiyagama, “An Evaluation of Multipath Tcp with Highly Assymmetric Subflows”, Journal of Available at SSRN 4448825, Publication date of 2024/5/31, Doi: https://scholar.google.com/scholar?cluster=16731977531558143600&hl=en&oi=scholarr (Foreign)
15. Pramoda P Gunasekara, Pawani Muthusala Perera, Chathum D Adhihetty, Dhanushi Dilshika Kollure, Nuwan Kodagoda, Amitha Caldera, “Generate Comic Strips Using AI”, Proceedings of Conference on Transdisciplinary Research in Engineering, Publication date of 2024/5/2, Doi: https://doi.org/10.31357/contre.v1i1.7387 (Local)
16. WMU Fernando, KD Sandaruwan, AMKB Athapaththu, “Evaluation of Taekwondo Poomsae movements using skeleton points”, Journal of the National Science Foundation of Sri Lanka, Publication date of 2024/4/9, Doi: https://doi.org/10.4038/jnsfsr.v52i1.11986 (Local)
17. Muhammad Rusyaidi Zunaidi, Asanka Sayakkara, Mark Scanlon, “Revealing IoT Cryptographic Settings through Electromagnetic Side-Channel Analysis”, Journal of Electronics, Publication date of 2024/4/20, Doi: https://doi.org/10.3390/electronics13081579 (Foreign)

18. Shehan Amarasooriya, Damitha Sandaruwan, “Mathematical and Machine Learning Based Methods for UAV Simulation: A Systematic Literature Review”,International Journal of Engineering and Management Research, Publication date of 2024/4/29, Doi: https://doi.org/10.5281/zenodo.11084485 (Foreign)

## Book Chapters

1. T. A. Weerasinghe, “Case 14: The Right Time to Receive a Helping Hand: A Story of Blended Learning Practices at the University of Colombo”, Book: Handbook of Educational Reform Through Blended Learning, Publication date: 2024 (Local)
2. A R Weerasinghe, S H S Jayakody, N P G Amali, H R Maduranga, Doan Huy Loi, “Assessing the Potential Rapid and Long Travelling Landslides in Sri Lanka: A Case Study of Athwelthota Landslide”,Book of Progress in Landslide Research and Technology, Volume 3 Issue 1, 2024, Publication date of 2024/6/11, Doi: https://link.springer.com/chapter/10.1007/978-3-031-55120-8_27 (Foreign)
3. D M D S Dissanayaka, A R Weerasinghe, SHS Jayakody, Shino Asano, KN Bandara, “Assessment of the Structural Geological, Hydrogeological, and Geomorphological Relationships of the Athwelthota Landslide, Sri Lanka”, Book of Progress in Landslide Research and Technology, Volume 3 Issue 1, 2024, Publication date of 2024/6/11, Doi: https://link.springer.com/chapter/10.1007/978-3-031-55120-8_21 (Foreign)
4. N P G Amali, H R Maduranga, A R Weerasinghe, “Experimental Study on Residual Shear Strength of Soil Using Undrained Ring Shear Apparatus”, Book of Progress in Landslide Research and Technology, Volume 3 Issue 1, 2024, Publication date of 2024/6/11, Doi: https://link.springer.com/chapter/10.1007/978-3-031-55120-8_28 (Foreign)
5. Athula Ginige, Lasanthi NC De Silva, Ganganee C Samaraweera, “Digital agrifood ecosystems: Digital platforms for inclusive, efficient, sustainable food systems to achieve food security”, Book: Handbook on Public Policy and Food Security, Publication date of 2024/4/19, Doi: https://doi.org/10.4337/9781839105449.00028 (Foreign)

## Research highlights

# Algorithmic Approach to Predict Electric Taste Stimuli to Simulate Organic Sour Taste Sensations

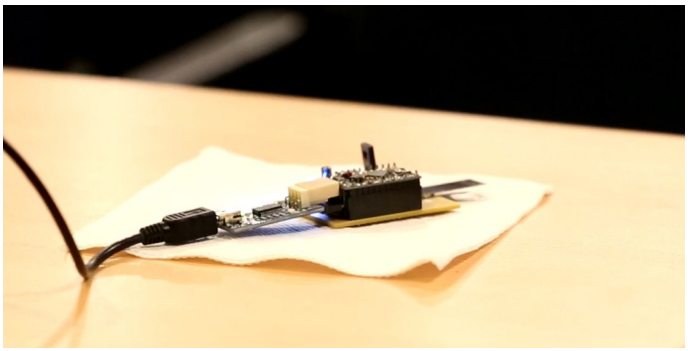
Researcher: Amali Perera
Supervisor: Dr. Kasun Karunanayaka
Co-Supervisor: Dr. MIE Wickramasinghe
Advisors: Dr. Carlos Trenado, and Prof. Adrian David Cheok

The idea of simulating taste sensations using electrical signals might sound like science fiction, but this fascinating area of research is becoming a reality. Scientists are exploring how electrical currents can be applied to the human tongue to evoke specific taste sensations without the need for food or chemicals. This innovative approach has the potential to revolutionize how we experience taste, with implications spanning virtual reality (VR), augmented reality (AR), gastronomy, and healthcare.

### The Science Behind Taste Perception

The taste system, or gustatory system, is one of the five classical senses responsible for detecting and interpreting taste. Taste perception involves complex interactions between the tongue and the brain. When we eat or drink, taste molecules (tastants) bind to receptor cells in taste buds, which send neural signals through cranial nerves to the brain's gustatory cortex. The gustatory cortex then interprets these signals as specific taste sensations such as sweet, salty, sour, bitter, and umami.

However, recent breakthroughs show that taste sensations can be artificially induced using electrical signals without physical food. By applying controlled electrical pulses to the tongue, researchers can simulate specific taste experiences like sour or salty. This opens the door to a new realm of multisensory experiences in



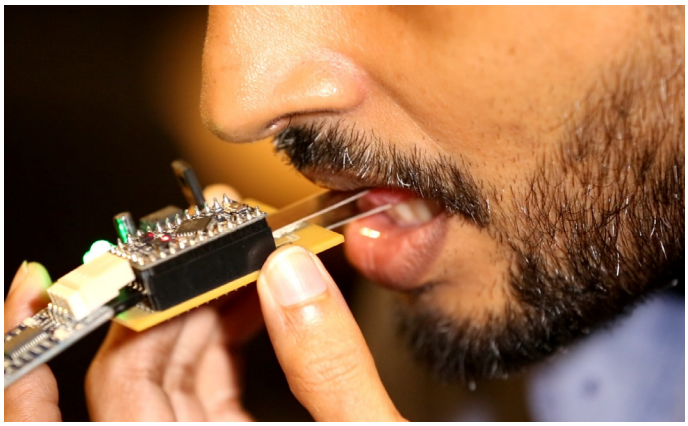


*Figure: Experiencing the Electric Taste Simulation research output, showcasing taste sensations through electrical currents.*

digital environments, where users can "taste" the virtual world in VR and AR settings.

### Electric Taste Simulation

The concept of electrically stimulating the tongue to produce taste sensations dates back to the 18th century. Sulzer reported that placing the tongue between lead and silver electrodes produced a taste similar to iron sulfate. In 1786, Alessandro Volta, a pioneer of electrical science, explored the effects of electrical stimulation on human senses. He famously reported experiencing a salty taste by placing two different metal coins on his tongue and connecting them with a wire.

Initially, electrical taste stimulation was explored in the medical field through electrogustometry, which assessed patients' taste abilities. In recent years, Human-Computer Interaction (HCI) researchers have harnessed this technology to enhance VR and AR applications.

This research focuses on fine-tuning electrical stimulation parameters to replicate the sour taste sensation. Using an electric taste device that applies controlled pulses to the tongue, researchers vary parameters such as amplitude, frequency, duty cycle, and voltage to create more precise taste simulations.

To better understand the brain's response to these stimuli, electroencephalography (EEG) is used to monitor brain activity during both natural and electrically induced taste sensations. By analyzing

EEG data, researchers can identify specific brain patterns linked to taste sensations. The neural activity triggered by electric taste stimuli can then be compared to that generated by real, organic tastes. The goal is to map the neural patterns associated with sour taste and optimize the electrical parameters to closely mimic organic sour taste experiences.

To make sense of the complex data, machine learning algorithms can be employed. These algorithms can be trained to predict the parameters of electric signals that mimic specific tastes based on EEG recordings.

**Future Applications**

The potential applications of electric taste stimulation are vast. In the culinary world, chefs could experiment with digital flavors, allowing them to alter taste without modifying the food's physical composition. This could be especially valuable for individuals with dietary restrictions, such as those managing diabetes or heart disease, enabling them to enjoy sweet or salty tastes without consuming harmful ingredients.

Beyond gastronomy, electric taste technology could significantly enhance VR and AR experiences. Imagine a virtual restaurant where users not only see and hear their surroundings but also taste the virtual dishes. This added layer of sensory immersion could transform gaming, virtual social events, and even online shopping. By making virtual environments more interactive and multisensory, electric taste could revolutionize how we experience the digital world.

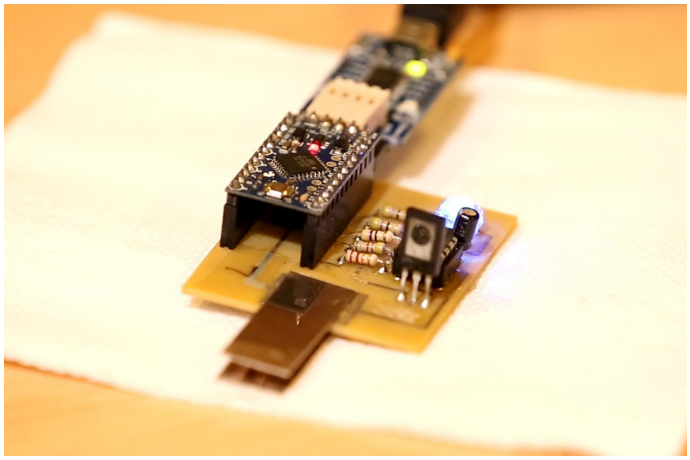
Electric taste technology could help chemotherapy patients, who often suffer from taste loss, regain sensory experiences. Additionally, individuals with taste disorders or those who have lost their sense of taste due to other medical conditions could benefit from this technology, enabling them to once again enjoy eating.

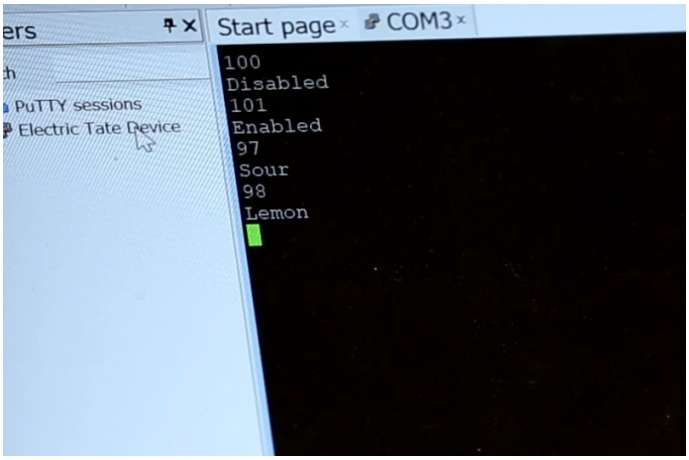
**Challenges**

While the potential for electric taste stimulation is exciting, there are still significant challenges to address. One of the main concerns is ensuring the safety and effectiveness of electrical signals for a diverse range of users. The parameters of the stimuli such as current intensity and duration, must be carefully calibrated to avoid discomfort while still delivering realistic taste sensations.
Another limitation lies with the EEG device used to monitor brain activity during taste experiences. Devices with more electrodes could provide a higher level of detail, enabling more accurate simulations of neural taste patterns.

**Conclusion**

Electric taste stimulation represents a major leap in how we think about sensory experiences. By blending computer science, electrical engineering, and neuroscience we are on the path of creating virtual taste experiences that rival the real thing. Whether enhancing the dining experience, improving patient care, or pushing the limits of virtual reality, this technology has the potential to reshape how we interact with the world, one taste at a time.





# Newly Appointed Welfare Office Bearers of the UCSC

The University of Colombo School of Computing (UCSC) has recently announced its newly appointed welfare office bearers. The team will be led by Prof. G.K.A. Dias, who has taken on the role of President. Ms. W.D.D. Sagarika will serve as the Secretary, while Ms. J.A.M.S. Wijeratna takes up the position of Treasurer. Supporting them are Dr. Shiromi Arunathilake as the Vice President, Mrs. Nalisha Gajasinghe as the Assistant Secretary, and Mr. Gihan Sirisena as the Assistant Treasurer. This new team brings together a diverse range of skills and experiences, ensuring strong leadership and support for the welfare of the UCSC community.



**Prof. G.K.A. Dias**
President



**Dr. Shiromi Arunathilake**
Vice President



**Ms. W.D.D. Sagarika**
Secretary



**Mrs. Nalisha Gajasinghe**
Assistant Secretary



**Ms. J.A.M.S. Wijeratna**
Treasurer



**Mr. Gihan Sirisena**
Assistant Treasurer

# Vaani Vizha' 23





Under the dedicated leadership of first-year students of the UCSC, the Vaani Vizha' 23 was held on 12th of January, 2024, at the New Arts Theatre of the University of Colombo. The event was a vibrant celebration of culture, tradition, and spirituality.

All participants received a warm welcome, following Tamil tradition, and were adorned with pongal pottu. A Tamil religious ceremony dedicated to worshiping the gods served as a collective ritual designed to energize the entire community. Following the ceremony, the evening began with a warm welcome for esteemed guests. They were then treated to a mesmerizing welcome dance, which





*Figure: Students performing at Vaani Vizha 2023, a Tamil cultural celebration.*

showcased the timeless artistry of Tamil dance forms, filled with grace, elegance, and vibrant energy. Vaani Vizha was elevated by the captivating performances of first-year students, each showcasing their unique talents with cultural significance. The enchanting orchestral performance and the drama that unfolded on stage brought rhythm and theatrical flair to the event. As part of the festivities, guests indulged in an array of authentic Tamil delicacies, including wade, pongal rice, and laddu.

Vaani Vizha 2024, a vibrant celebration steeped in culture, tradition, and spirituality, concluded with a heartfelt vote of thanks. This closing moment expressed gratitude to all participants, organizers, and supporters for their contributions to the success of Vaani Vizha.The day was a beautiful blend of colors and cultural richness, creating a truly memorable and meaningful experience for everyone involved.

# The IEEE WIE Student Branch Affinity Group of the UCSC hosted several events



*Figure: Participants and speakers gather for a group photo after an inspiring session.*

In the first quarter of the year, the IEEE WIE Student Branch Affinity Group of the UCSC hosted two impactful events aimed at empowering students through education and scholarship opportunities. Let's delve into the enriching sessions that took place during this period.

On February 9th, we had the privilege of hosting Dr. Jeewika Ranaweera, a versatile personality with a rich background as a Principal Hardware Engineer, speaker, author, inventor, mentor, and proud member of IEEE. Dr. Jeewika Ranaweera shared her inspiring life journey with over 20 participants, highlighting the challenges she faced in tertiary education and the valuable opportunities she seized along the way. Drawing from her own journey, Dr. Ranaweera imparted invaluable life lessons and insights into navigating the job market and choosing a fulfilling career path. Dr. Ranaweera also shed light on scholarship opportunities available for girls pursuing STEM fields, emphasizing the importance of female representation in these domains.Dr. Ranaweera's insights left a lasting impact on all who attended.

Continuing our mission to promote educational opportunities, on February 3rd, we conducted a virtual Scholarship Awareness Session. Over 150 participants from various universities joined us for an engaging discussion on scholarships in STEM. The session featured esteemed UCSC alumni speakers: Mr. Suvin Nimnaka, who elaborated on the benefits of being a GitHub Campus Expert; Ms. Sumayya Ziyad, who shared her experience with the Huawei Seeds for Future Program; and Ms. Yashithi Dharmawimala, who provided insights into scholarships such as the Grace Hopper Celebration (GHC), CMMRS, Microsoft Learn Student Ambassadors Program, and ScholarX. Each speaker generously shared their knowledge and expertise, guiding participants on how to apply for these scholarships and offering valuable tips on crafting academic CVs and navigating the application process.

Moreover, the session included a lively Q&A segment where participants had the opportunity to seek clarification and advice from the speakers. To conclude the event, we organized a quiz with STEM-based questions, fostering engagement and excitement among attendees. Additionally, we unveiled our upcoming event, Hackaholics 6.0, further fueling enthusiasm for innovation and collaboration within the STEM community.

We extend our heartfelt gratitude to Dr. Jeewika Ranaweera, Ms. Sumayya Ziyad, Ms. Yashithi Dharmawimala, and Mr. Suvin Nimnaka for their invaluable contributions to our events. Their insights and expertise have not only illuminated the journey of the participants but have also inspired countless individuals to pursue excellence in STEM fields. We look forward to continuing our efforts to empower students and create positive change in the world of technology and innovation.



*Figure: Speakers share scholarship opportunities with enthusiastic students during a lively discussion.*

# **Empowering South Asian HCI:** Highlights from the Winter School 2024 Organized by the Colombo ACM SIGCHI Chapter

The field of Human-Computer Interaction (HCI) is a critical domain that shapes the way humans interact with technology, yet it remains underrepresented in South Asia. Recognizing this gap, the Colombo ACM SIGCHI Chapter, in collaboration with the local support provided by the ACM Student Chapter of the University of Colombo School of Computing (UCSC), Sri Lanka, organized the ACM SIGCHI Winter School 2024. The event was held from 2nd of January to 4th of January 2024 at the UCSC. The three-day event aimed to foster dialogue, education, and collaboration among the HCI researchers, students, academia, and industry professionals across South Asia.

The Winter School delved into various aspects of the HCI, exceeding traditional user interface (UI) and user experience (UX) discussions. It provided a platform to explore HCI trends, research methodologies, data collection, analysis techniques, and publication strategies. Participants engaged in practical hands-on sessions, case studies, and discussions to deepen their understanding of the HCI's significance and potential.

The event boasted an impressive line up of speakers, each bringing extensive expertise to the table:

- Dr. Neha Kumar, Associate Professor, Joint with the School of Interactive Computing and Sam Nunn School of International Affairs, Georgia Tech, USA.
- Dr. Michael Bernstein, Associate Professor, Human-Computer Interaction Group, Computer Science Department, Stanford University, USA.
- Dr. Anirudha Joshi, Professor, IDC, IIT Bombay, India.
- Dr. Nova Ahmed, Professor, North South University, Bangladesh.
- Dr. Naomi Yamashita, Distinguished Researcher at the NTT Communication Science Laboratories and Visiting Professor at Kyoto University, Japan.
- Dr. Ding Wang, Senior Researcher at Google, USA.

Their collective qualifications and experiences ensured a rich learning experience for all participants, covering a wide spectrum of topics within the HCI domain.

One of the remarkable aspects of the Winter School was its diverse participant base, comprising 12 international attendees from countries such as Iran, Bangladesh, India, and the USA, alongside 13 local participants from Sri Lanka. This multicultural blend facilitated cross-cultural exchanges, broadened perspectives, and enhanced networking opportunities. Participants gained valuable knowledge and formed meaningful connections with peers and experts around the globe.

The collaborative efforts of the Colombo ACM SIGCHI Chapter, along with the local support from the ACM Student Chapter of the UCSC, led by Dr. Dilrukshi Gamage, played a crucial role in ensuring the success of the Winter School. With their dedication and commitment to advancing the HCI education and fostering community engagement were evident throughout the event. By bridging the gap between academia, industry, and aspiring practitioners, the Winter School catalyzed promoting the HCI awareness and expertise in the South Asian region.

In conclusion, the Winter School 2024 organized by the Colombo ACM SIGCHI Chapter, Sri Lanka, was a resounding success, underscoring the importance of fostering the HCI education and collaboration in South Asia. Through insightful sessions, expert speakers, and diverse participation, the event not only enriched the knowledge and skills of attendees but also strengthened the HCI community's bonds across borders. As South Asia continues to embrace the transformative potential of the HCI, initiatives like the Winter School play a pivotal role in shaping its trajectory toward innovation and inclusivity.

Written by: Samudi Perera (Program Team Member - SIGCHI Winter School 2024 organized by the Colombo ACM SIGCHI Chapter)



*Figure: Participants and speakers from around the globe gather at ACM SIGCHI Winter School 2024.*

# UCSC Career Fair 2024: Connecting Students with Industry Giants

The University of Colombo School of Computing recently hosted the Career Fair on 24th of January 2024 right within the premises of the UCSC itself. This year's event proved to be a resounding success, attracting over 25 esteemed companies and more than 300 eager students.

The UCSC Career Fair 2024 serves as a crucial platform for fostering connections between talented students and leading industry players. It offered the UCSC students a unique opportunity to engage directly with these leading companies, fostering meaningful discussions about current industry trends, potential career pathways, and invaluable networking opportunities.






*Figure: UCSC students networking with industry leaders at Career Fair 2024.*

In addition to networking opportunities, the UCSC Career Fair 2024 featured two insightful workshops with the help of the UCSC Alumni Association. The workshops held from 13th of December to 13th of January 2024, provided students with invaluable real-world insights and experiences, enhancing their readiness for the professional sphere.

The success of the UCSC Career Fair 2024 wouldn't have been possible without the dedicated efforts of the organizing committee, volunteers, sponsors, and enthusiastic participants. Their collective commitment ensured that the event was executed seamlessly, providing both students and companies with a platform for meaningful interaction and collaboration.





# Exploratio 2024
## The Welcoming Ceremony of the 20th Batch of UCSC

The 20th batch of University of Colombo School of Computing recently organised a fun-filled welcoming ceremony for the students who completed the first academic year, the 20th batch. The ceremony was held on 29th June 2024 and it turned out to be a very successful and an unforgettable day for all. This event was also victorious in relieving the academic stress of students and strengthening the bond between the senior and Junior batch.



*Figure: Students' performances at Exploratio 2024.*

The students were met with an amazing line-up of activities filled with laughter and joy throughout the welcoming ceremony. They were also able to keep the memory to themselves through individual photos and a group photo within the grounds of the Independence Square captured by Pahasara, the UCSC media.

The highlight of the event was the Musical programme held at the Vidya Jyothi Professor V. K Samaranayake Auditorium of UCSC. The programme had many items including singing



and dancing items and along with a hilarious drama that kept the audience entertained throughout the programme. These items were done with the collaboration of the senior and junior batch students which showcased the hidden and non hidden yet incredible talents of the UCSC students.

On behalf of the 18th batch of UCSC, the past union treasurer, Thirmira Galahitiyawa welcomed and addressed the students regarding the strength of the unity among the UCSC community. His remarks were followed by a warm welcome from the director of UCSC, Dr. Ajanatha Athukorale, who extended a cordial greeting to the assembled students in the auditorium.

The event came to a spectacular end with the rhythm of music presented by the brothers and sisters of the senior batch filling the air of the auditorium with happiness and excitement, paving the way to a memory that would last a lifetime.



# UCSC - Padura '23

Padura '23, organized by the 18th and 20th batches of the University of Colombo School of Computing held on 2nd of August 2024 at UCSC premises. Starting at 6:00 PM and continuing until midnight, it was an unforgettable night filled with music, dance, and joyous celebrations. It was graced by the presence of the chief guests, the Director of UCSC, Dr. Ajantha Athukorala, and the academic staff. The director, Dr. Ajantha Athukorala welcomed everyone at the beginning, setting a warm and inviting tone for the event.

The audience was treated to numerous entertaining plays scattered throughout the event. The talented brothers and sisters from the 18th, 19th, and 20th batches of UCSC showcased their remarkable singing and dancing abilities. The event featured a series of songs and dance performances that kept everyone engaged and entertained. Adding to the excitement, some of the lecturers and non-academic staff also joined in participating in the performances. The beautifully decorated stages added to the overall ambiance, creating a visually stunning backdrop for the night's activities. The event was themed around a mental hospital, adding an element of fun and creativity.

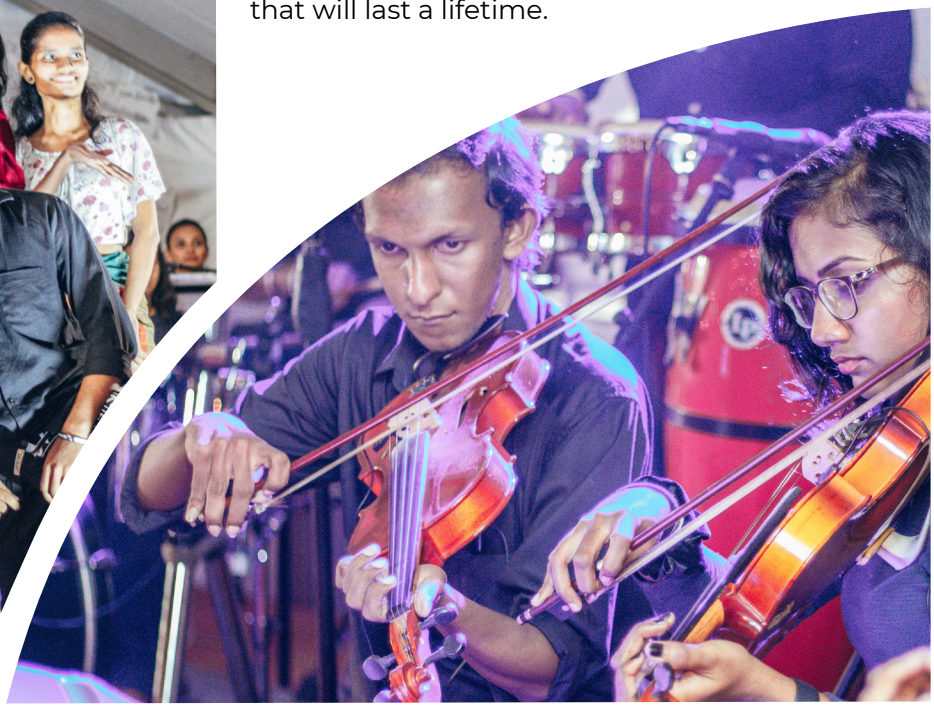


*Figure: Guests enjoying the performances at UCSC - Padura '23*

Attendees were treated with boiled manioc and belimal drinks, adding a traditional touch to the night. The former committee member of the student union, Dilan Thenuwara brother, held the vote of thanks, remarking on how they overcame every obstacle to make the event possible and expressing gratitude to all the brothers and sisters who contributed, even in the smallest ways, to the event's success.

Padura '23 successfully provided a platform for brothers and sisters to relieve their academic stress and bond with each other, making it a memorable night for everyone involved. The event concluded with a sense of fulfilment and happiness, leaving behind cherished memories that will last a lifetime.







# Short term Training Programs in UCSC

## Computer Services Centre (CSC)

- **Training Course on Data Science with Python**
  Duration - 08 Saturdays
  Course Fee - Rs. 35,000/=
  Minimum Qualifications - Some experience in Data Analytics and experience in Programming.

- **Software Quality Assurance Using Test Automation Frameworks**
  Duration - 08 Saturdays
  Course Fee - Rs. 35,000/=
  Minimum Qualifications - Better if the participants have fundamental knowledge in JAVA programming

- **Training Course on Python Fundamentals**
  Duration - 08 Sundays
  Course Fee - Rs. 35,000/=
  Minimum Qualifications - Participants with little or no programming experience

- **Training Course on MERN Stack**
  Duration - 08 Sundays
  Course Fee - Rs. 35,000/=
  Minimum Qualifications - People with basic programming knowledge

- **Training Course on AutoCAD**
  Duration - 08 Sundays
  Course Fee - Rs. 25,000/=
  Minimum Qualifications - People with basic programming knowledge

- **Mastering MS Office & Google Suits**
  Duration - 05 Sundays
  Course Fee - Rs. 22,000/=
  Minimum Qualifications - People with basic programming knowledge

## Advanced Digital Media Technology Centre (ADMTC)

- **Advanced Multimedia Web Design & Development Techniques**
  Duration - 08 Sundays
  Course Fee - Rs. 35,000/=
  Minimum Qualifications - Basic Computer Knowledge

- **Graphic Design & Creativity Development**
  Duration - 08 Saturdays
  Course Fee - Rs. 35,000/=
  Minimum Qualifications - Basic Computer Knowledge

University of Colombo
School of Computing

**For more information**
https://ucsc.cmb.ac.lk/training-programmes

## Postgraduate Degree Programs in UCSC

- **Master of Computer Science (MCS)**
  Duration - 2 years
  Next Batch Enrollment Dates - March to August 2024
- **Master of Science in Computer Science (MSc in CS)**
  Duration - 2 years
  Next Batch Enrollment Dates - March to August 2024
- **Master of Information Technology (MIT)**
  Duration - 2 years
  Next Batch Enrollment Dates - March to August 2024
- **Master of Information Security (MIS)**
  Duration - 2 years
  Next Batch Enrollment Dates - March to August 2024
- **Master of Business Analytics (MBAnalytics)**
  Duration - 2 years
  Next Batch Enrollment Dates - March to August 2024
- **Master of Cybersecurity (MC)**
  Duration - 2 years
  Next Batch Enrollment Dates - March to June 2024

## External Degree Program in UCSC

- **Bachelor of Inforation Technology (BIT)**

  UCSC took the initiative to launch the three-year External Degree programme leading towards the award of Degree of Bachelor of Information Technology (External) in the year 2000. This degree programme has been redesigned according to ACM guidelines and Policy Framework for External and Extension programme introduced by the University Grants Commission in the year 2010. BIT Programme is designed to:

  - Produce qualified IT professionals through external mode in addition to the traditional University output.
  - Set professional standards and encourage students to obtain skills in commercial IT applications and in the usage of necessary tools.
  - Enable those who could not enter into a state university to read for a degree in IT due to severe competition in obtaining such a degree from a state university.
  - Provide an opportunity to those non-graduates already working in the IT sector to obtain a formal qualification through self-study.

  The minimum duration of the BIT degree programme will be 3 academic years.



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