

AYANGA IMESHA KALUPAHANA

PERSONAL INFORMATION

UNIVERSITY: National University of Singapore
MAJOR: Computer Science
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RESEARCH INTERESTS

Wearable computing/sensing, application of privacy and security to wearable, wearable energy harvesting, wearable power and latency optimization

EDUCATION

2020-Feb 2025 Ph.D. Candidate in Computer Science
National University of Singapore
Advisor : [Prof. Peh Li-Shiuan](#)
CAP: 4.08/5
2011-2016 BSc. Eng. (Hons) specialized in Electronics and Telecommunication Engineering
University of Moratuwa (UoM), Sri Lanka
FYP Advisor: [Dr. Ajith Pasqual](#)
CGPA: 3.57/4.2 (34th of 101)

WORK EXPERIENCE

Jan 2023 - May 2023	Graduate Teaching Assistant -CS4222/CS5222 Wireless Networking @ School of Computing, NUS Module Instructor: Prof. Ambuj Varshney <ul style="list-style-type: none">Conducted tutorials and provided consultation for Final-year undergraduate and postgraduate studentsEvaluated assignments and course projects of 150 enrolled students
Aug 2019 - Dec 2019	Research Intern @ LSP Group, NUS Advisors : Prof. Peh Li-Shiuan and Prof. Xiaokui Xiao Evaluated Rastogi et al.s' Distributed Differential Privacy algorithm 's performance and limitations on off-the-shelf smartwatches
May 2016 - July 2019	Research Engineer @ Synergen Technology Labs LLC, USA (Headquarters in Dallas, Texas, USA, Innovation center in Sri Lanka) <ul style="list-style-type: none">Designed a 4-layer PCB (36mmx19mm) for a spine care wearable patch with inductive wireless charging circuitDeveloped a single IMU-based smoke detection mechanismDeveloped an algorithm for de-noising Ambulatory ECG by fusion with accelerometer data and activity detection for Synergen's now FDA-approved Scio-Cardio ambulatory ECG monitorDeveloped a respiration estimation algorithm for the PPG signal input taken from the infant's ankle-worn wearable in patented Synergen Baby monitorDeveloped a cry detection algorithm

	<ul style="list-style-type: none"> Supervised six UoM undergraduate engineering students' internships related to wearable stress monitor, smoke detection, baby monitor and hydration monitor in 2016, 2018 and 2019
Nov 2014 - March 2015	Research & Development Engineering Intern @ Integrated System Development (ISD) Ltd, UK (Headquarters in London, UK, Research & Development center in Sri Lanka) Now ISD is operated as Verox Labs Ltd Mentor: Mr. Harin De Silva , Managing/Technical Director <ul style="list-style-type: none"> Assisted in developing their next version of the "Heated Glass Stage Device", which is used to inject sperm into egg cells in-vitro fertilization process Researched, experimented, and developed algorithms to provide even heat signature to the living cell Designed a heated glass stage protection circuit

JOURNAL PUBLICATIONS

1. [SeRaNDiP - Leveraging Inherent Sensor Random Noise for Differential Privacy Preservation in Wearable Community Sensing Applications](#)
Ayanga Kalupahana, Ananta Narayanan Balaji, Xiaokui Xiao and Li-Shiuan Peh
 Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 2023 (IMWUT/Ubicomp)
 Project webpage : [SeRaNDiP: Leveraging Inherent Sensor Random Noise for Differential Privacy Preservation in Wearable Community Sensing Applications](#)

CONFERENCE PUBLICATIONS

1. [FPAF and FPGA Based Universal Sensor Node Design](#)
Ayanga Kalupahana, Nisal Hemadasa, Nipun Wijerathne, Anuranga Ranasinghe and Ajith Pasqual
 Proceedings of the 11th International Conference on Sensing Technology (ICST 2017), Sydney, Australia

PHD THESIS

Advisor: [Prof. Peh Li Shiuan](#), Dept. of Computer Science, NUS

Under my Ph.D. thesis, I am studying and solving problems, gaps, and bottlenecks in implementing privacy and security algorithms for wearable devices in both community sensing and remote monitoring.

First I have proposed [SeRaNDiP](#) which is a framework that leverages low-power wearable sensors' inherent noise for varying Differential Privacy noise requirements without hardware modification. As per our knowledge, this is the first inherent noise-based Differential Privacy providing framework applicable to existing smart watches and fitness trackers. It resulted 1.4X-1.8X computation/communication speedup and 1.2X-1.5X energy savings against state-of-the-art DP implementation.

REVIEWER

2022	ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies(IMWUT)
2023	Moratuwa Engineering Research Conference (MERCon)
2023	ACM Conference on Human Factors in Computing Systems(CHI)

AWARDS AND SCHOLARSHIPS

2020-2024	NUS Research Scholarship Award
2017	Presentation Award- 2nd Runner up (Student Category), 11th International Conference on Sensing Technology, ICST 2017, Sydney, Australia
2011	18 plus Scholarship 2010 Award For the outstanding academic performance of G.C.E. Advanced Level 2010

PROGRAMMING SKILLS

Proficient: C/C++ (Embedded software development), Python, Java, Matlab, Bluetooth Low Energy

Basic Knowledge: Differential Privacy, Verilog, Altium, Solid Works, Eagle, R language
Development Boards: Raspberry Pi, Beaglebone, Odroid, Pynq FPGA, ESP-32, Spartan 3E FPGA, AN231E04 FPAA etc.

Sensors: PPG, ECG, Temperature, Accelerometer, Barometer sensors, GSR and micro-phones

REFERENCES

1. Dr. Li-Shiuan Peh
Provost's chair professor, School of Computing, National University of Singapore.
2. Dr. Ajith Pasqual
Senior Lecturer, Department of Electronic & Telecommunication Engineering,
University of Moratuwa, Sri Lanka