

Leow Cong Sheng

RESEARCH ENGINEER, INSTITUTE OF MICROELECTRONICS (IME), AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (A*STAR)

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Research Interest

My research interest lies in **energy-efficient** computing through **hardware-software co-design** and **neuromorphic engineering**. I hope to explore new sustainable computing paradigms to extend or even go beyond Moore's law by co-designing hardware with algorithms and drawing inspiration from the biological brain.

Education

Nanyang Technological University (NTU)

Singapore

Bachelor of Engineering (Electrical and Electronic Engineering) (EEE)

Aug 2018 - Jun 2022

- **Nanyang Scholarship** (With CN Yang Scholars Program)
- **Honours (Highest Distinction)** with CGPA: 4.76 / 5.00
- **Dean's List** (Top 5% of the cohort) for Academic Year (AY) 2020/2021 and AY 2021/2022
- **Key Courses:** Mixed Signal IC Design, VLSI Systems, Advanced Analog Circuits, RF Circuits, Embedded System, Signals and Systems, Data Structures and Algorithms, Introduction to Data Science and Artificial Intelligence

Research

Voice Detection with Spiking Convolutional Neural Network for Smart Sensor Applications

NTU-IME, A*STAR

Supervised by Associate Professor Goh Wang Ling & Dr. Gao Yuan

Jul 2021 - Dec 2021

- Studied and proposed spiking convolutional neural network with high accuracy even after weight-quantization.
- Examined hyperparameter optimization for accuracy and relationship with sparsity.
- C. S. Leow, W. L. Goh, and Y. Gao, "Title omitted due to ongoing blind review; available on request." in 2023 *IEEE Int. Symp. Circuits Syst. (ISCAS)*, Submitted in 2022.

FSK Circuit and System for Low-Power Dual-Band MEMS

NTU

Supervised by Associate Professor Zheng Yuanjin

Dec 2019 - May 2020

- Modelled and simulated Phase-locked loop (PLL) demodulator for frequency-shift keying (FSK) modulated signal.
- Analysed performance of PLL-FSK demodulator at different parameters and in the presence of noise.
- Derived a set of design principles for the PLL-FSK demodulation system which can be used in MEMS (micro-electromechanical system).

Audio Segmentation for Audio-based Respiratory Anomaly Detection

NTU

Supervised by Professor Arindam Basu

Dec 2018 - May 2019

- Audio processing of breathing sound for anomaly detection.
- Explored 9 different feature extraction techniques for audio signals.
- Determined suitability of features for breathing-cycle segmentation.

Achievements

May 2022 **National Science (Ph.D.) Scholarship**, Agency for Science, Technology, and Research (A*STAR), Singapore

Sep 2021 **Winner**, Design, and Innovation Project Competition, NTU EEE

Oct 2020 **Winner**, MLDA Deep Learning Week Hackathon, MLDA@EEE

Jul 2020 **Winner**, AI VS COVID-19 Ideation Challenge, AI Singapore

Mar 2020 **Winner**, Amazon-ing Land Transport Challenge, Garage@EEE & MLDA@EEE

Jul 2019 **CY1400 Research Award**, CN Yang Scholars Program, NTU

Aug 2018 **Nanyang Scholarship**, (With CN Yang Scholars Program), NTU

Aug 2017 **Best Soldier of the Month**, National Service, Singapore Armed Forces

Teaching and Mentoring

CN Yang Scholars Programme (NTU)

Teaching Mentor

Aug 2021 - Dec 2021

- Content: CY1500 Introduction to Research
- Discussed and planned lessons together with the other year 4 and Ph.D. mentors.
- Introduced CN Yang Scholars Programme freshmen to research ideology and fundamentals.

Serangoon Garden Secondary School

Academic Mentor

Aug 2021 - Oct 2021

- Content: GCE O-Level and N-Level Physics and Mathematics
- Volunteered to provide mentorships for graduating students in secondary school.
- Help students to prepare for national examinations and regain confidence during disruptions from the pandemic.

NTU EEE Outreach committee, MLDA@EEE, and Garage@EEE

Workshop Instructor & Mentor

Aug 2018 - Jun 2022

- Content: Machine learning, Arduino, and Electronics
- Planned, and conducted multiple workshops for university students through the various student bodies in NTU EEE.
- Mentored juniors in conducting workshops and in their projects.
 - Workshops on Arduino for Innovation Challenge 2019 under EEE Outreach, and Escendo 2018 and 2019 under Garage@EEE.
 - Workshops on Convolutional Neural Networks and Spiking Neural Networks (Recording on YouTube) under MLDA@EEE.

Work Experience

Transcelestial

Electronics Engineering (Data Science) Intern – Embedded Electronics Team

May 2021 - Aug 2021

- Engineered 11 different features based on statistical methods and signal processing algorithms for better representation of device status.
- Proposed and implemented a preliminary data aggregation algorithm on Golang to reduce logging overhead by more than 90%.
- Explored and proposed modeling capabilities, tools, and directions for greater data-driven insights.

Micron Semiconductor Asia Pte Ltd

Managed NAND Product Engineer Intern – Product Engineering Team

May 2020 - Aug 2020

- Assembled and consolidated data from 3 departments for product testing and data analysis.
- Evaluated in-house software to determine suitability for the team's usage in terms of work scope.
- Developed an automation script in Python to automate data extraction, cleaning, and analysis, thereby improving productivity and efficiency by 50%.

Experimental Power Grid Centre

Research Intern - Green building – Test Bedding & Energy Modelling Team

May 2020 - Aug 2020

- Successfully utilized Octave to develop scripts for automating data cleaning, analysis, and visualization as a computationally efficient solution.
- Optimized existing software to increase data cleaning and data analysis efficiency through vectorization.
- Designed a user-friendly graphical user interface to ease software navigation.

Defence Science Organisation National Laboratories (DSO)

Research Intern - Emerging Systems Division

Jan 2016 - Mar 2016

- Designed and tested Radio-frequency (RF) Prototypes using Computer Simulated Technology Studio Suite.
- Recommended hardware design based on mathematical model simulation on Octave.

Volunteer and Leadership

Pioneer Hall

Block Representative

Aug 2020 - Aug 2021

- Led a committee in serving the block at Pioneer hall, one of NTU's halls of residence.
- Proposed, and organized several initiatives and events to promote communal living, inclusivity, and connectedness within residents.

MLDA@EEE (Machine Learning and Data Analytics Lab)

Training and Development Subcommittee

Aug 2019 - Jun 2022

- Initiated, planned and conducted workshops for both members and students in the university on topics ranging from basic python to machine learning and artificial intelligence.
- Proposed a new feedback framework to increase feedback participation from students.

EEE Outreach

Main Committee

Aug 2018 - Jun 2022

- Led 16 technological officers in planning, and preparing technology-infused games and workshops as a chief technological officer for Innovation Challenge 2019.
- Oversaw the safety of 300 students by identification of safety hazards, providing countermeasures, and managing other safety officers as the chief safety officer for Induction Fiesta 2019.

Garage@EEE

Training & Development Student Ambassador

Aug 2018 - Jun 2022

- Designed and created an Escape Room Game for NTU technology-infused Freshmen Orientation Camp (Enitio 2019) using Arduino and Object-Oriented Programming (OOP).
- Mentored a group of students in Garage's inaugural internal Makeathon whose project gained recognition from industrial partners.

Causes for Animals (CAS)

Volunteer

Aug 2018 - Present

- Helped in daily activities (e.g. dog-walking, kennel washing, feeding, and bathing) and supported in Trap-Neuter-Release Projects.
- Cared for animals and manned the booths during adoption drives to engage the public in learning more about CAS.

References available upon request.