Choong Zheng Yang

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Education

Nanyang Technological University (NTU) — August 2020 – Present
CN Yang Scholars Programme, School of Phys. and Mathematical Sciences
GPA: 4.96/5.00 (to date)

Hwa Chong Institution (College) — 2016 - 2017
88.75 / 90 University Admission Points

Hwa Chong Institution (High School) — 2012 - 2015
Integrated Programme

Honours

Dean's List - School of Phys. and Mathematical Sciences, NTU	AY20/21
Princeton University Physics Challenge - Top 10 / Hon. Mention	2017
Subject Prize - H2 Knowledge & Inquiry, Hwa Chong Institution (College)	2017
DSTA JC Scholarship ($2000)	2016 - 2017
Best Science Student Award, Hwa Chong Institution (College)	2016
Singapore Chemistry Olympiad - Silver	2016
Singapore Physics Olympiad - Silver	2016
Future Thinking Challenge - 2nd Place	2016
Amazing Science X Challenge - Special Mention ($200)	2015
DSTA Young Defence Scientists Programme (YDSP) Scholarship ($1000)	2014 - 2015
UNSW ICAS Science Sole Medal Winner (1st of all participants in Singapore)	2014
Singapore Games Creation Competition (SGCC) - 3rd Place	2014

Experiences

Machine Learning and Seismology — Dec 2020 –

- With faculty from Asian School of the Environment, NTU, developed an integrated processing pipeline in Python, improving detection accuracy to at least 95%. Processed $\sim$ 100 TB of data using a super-computing cluster, detecting over 6000 micro-earthquakes over a 1.5 year period.
- Quantified the model's detection performance via a Monte Carlo method, and retrained an existing Convolutional Neural Network (CNN) model for earthquake detection for use in Aceh, Indonesia.
- Performed earthquake association and relocation of low-magnitude (M<3) earthquakes in the Aceh region, for future use in finite element modelling along with travel-time tomography. Verified robustness of locations by writing a grid search method that can account for poor station coverage due to linear station arrays.
- GitHub repo at github.com/zhengyang-c/cy1400-eqt, which includes a maintained Wiki.

Making & Tinkering — 2021

- For a summer elective, developed and built a robust cell-counting microscope, capable of resolving yeast cells with size on the order of microns, automating mechanical motion as well as focusing, allowing for 3-D motion with sub-millimetre precision.
- Implemented and refined a machine vision pipeline, attaining over 90% accuracy in synthetic and real-life tests, with run-times of under 1 second. Demonstrated improvement over conventional template-matching methods, instead relying on a more general blob detection method.
- Experimented with applying a deep CNN for image classification (hence cell-counting), along with hyperparameter tuning and synthetic validation.
- Developed a Flask web interface that interacts with a Python back-end, deployed on a Raspberry Pi with a touch-screen.

Meet the People's Sessions 2018 - 2019

- Interviewed residents, assisting the Member of Parliament in writing letters to relevant organisations/agencies regarding policy, legal, and administrative matters so as to address residents' concerns.
- Attended and supported community youth events, engaging with residents on the ground.

Conferences 2015 - 2017

- Presented at the Institute of Physics Singapore (IPS) Meeting (2015, 2016) sharing Photonics research on measuring the g(2) profile of light from a pseudo-thermal light source as a means of Ghost Imaging (2015), and designing and building a grating spectrometer with sub-nanometre precision (2016).
- Presented at SPIE (Society of Photographic Instrumentation Engineers) ETOP 2017 (Education and Training in Optics and Photonics) held in Hangzhou, China, sharing experiences and learning outcomes from Photonics research performed at a high school context.

NUS Science Research Programme 2016

- Designed and performed experimentation on a Grating Spectrometer, resolving spectra at the sub-nanometre level as a gateway to characterising the spectra produced from the flash breakdown of Avalanche Photon Detectors.
- Developed Python scripts to interact with and control proprietary devices, such as Thorlabs motorised stages and a 20 year-old oscilloscope, via USB serial and RS-232 connections with a Linux platform.
- Characterised spectra and physical properties of laser optics. Analysed and written up with gnuplot and LaTeX.

Photonics Interest Group 2015 - 2016

- Founding member of a community of passionate physics students, designing and setting up a photonics lab in Hwa Chong Institution's Science Research Centre. This student-driven initiative also installed a local network of Linux desktops, sourced and purchased equipment worth thousands of dollars, while at the high school level.
- The group built a Michelson Interferometer, Hanbury Brown and Twiss Interferometer, Mach-Zedner Inteferometer, Sagnac Interferometer.
- Handled sensitive optics and electronics, studying research and statistical techniques under Dr. Tan Peng Kian from the Centre of Quantum Technologies (CQT) at the National University of Singapore (NUS).
- Set-up a local Linux network with file sharing for cluster computing, wrote interfaces for proprietary equipment for remote control and data acquisition. Github repo at github.com/sunjerry019/photonLauncher. Write-up of the software ecosystem was submitted to the German Research Software Engineers (RSE) Society for their 2022 conference.
- 3D-printed models for optics components and accessories, allowing for customisation and saving the need to purchase more expensive equipment.
- Refurbished an unused basement classroom into a student lounge, which doubled as a space for physics demonstrations to showcase past student setups, mini-demos, and posters.

Skills

Programming Daily drives Linux. Competent in Python (scipy, numpy, matplotlib). Experience with machine learning in Tensorflow (model construction, feature engineering, hyperparameter tuning, synthetic data generation) Experience with Excel VBA scripting, web crawling, and bash scripting, gnuplot and LaTeX.
Notable Courses (at present) CY1602 (Linear Algebra and Vector Calculus), PH2103 (Thermal Physics), PH2104 (Analytical Mechanics), MH2801 (Complex Methods for the Sciences).

Interests

Musical Licentiate of the Trinity College of London with Distinction for Piano Performance
Others Reading non-fiction, hiking, writing poetry.