Choong Zheng Yang

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Education

Physics - Nanyang Technological University (NTU) — August 2020 – Present
CN Yang Scholars Programme, School of Phys. and Mathematical Sciences
GPA: 4.91/5.00 (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
UNSW ICAS Science Sole Medal Winner (1st of all participants in Singapore)	2014

Experiences

Quantitative Development Intern — May 2022 – Aug 2022
Astignes Capital Asia

- Developed a novel risk regime indicator tracking volatility co-movements. Experimented with methods such as Hidden Markov Models and Gaussian Mixture Models to quantify regime changes.
- Translated regime information into a trading strategy by writing and training Genetic Algorithms, quantifying strategy performance and volatility, providing heuristic value for day-to-day trading.
- Designed, maintained, and deployed an in-house dashboard in Plotly Dash for data visualisation with automatic updates, enhancing user interactivity for data exploration.

Machine Learning and Seismology — Dec 2020 – May 2022

- With faculty from Asian School of the Environment, NTU, developed an integrated processing pipeline in Python, improving detection accuracy of a pre-trained Convolutional Neural Network (CNN) to at least 95%. Processed $\sim$ 100 TB of data using a super-computing cluster, detecting over 6000 robust micro-earthquake candidates over a 1.5 year period.
- Quantified model detection performance using Monte Carlo methods, retrained existing CNN model for earthquake detection 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. Validating event locations by implementing a novel gridsearch method robust to poor station coverage resulting from linear station distribution.
- GitHub repo at github.com/zhengyang-c/cy1400-eqt, which includes a wiki.

Making & Tinkering May 2021 – Aug 2021

- For a summer elective, developed and built a remote cell-counting optical microscope, capable of resolving yeast cells with size on the order of microns, automating mechanical motion and 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 less than 1 second runtime. Demonstrated improvement over conventional template-matching methods.
- 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.

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 at the single photon level.
- 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. The group built a Michelson Interferometer, Hanbury Brown and Twiss Interferometer, Mach-Zedner Inteferometer, Sagnac Interferometer.
- Set-up a local Linux network with file sharing for cluster computing, wrote custom 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 optics components and accessories, allowing for customisation, 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 (e.g. pandas, numpy, matplotlib). Experience with machine learning in Tensorflow (model construction, feature engineering, hyperparameter tuning, synthetic data generation). Experience with Excel VBA scripting, web crawling, bash scripting, gnuplot and LaTeX.
Notable Courses (to date) Financial Mathematics, Classical Electrodynamics, Statistical Mechanics, Introduction to General Relativity, Cosmology, and Astrophysics, Quantum Mechanics (Dirac Formalism), Condensed Matter Physics, Introduction to Data Science and Artificial Intelligence, Linear Algebra I, Vector Calculus, Differential Equations, Thermal Physics, Analytical Mechanics, Introduction to Complex Analysis

Interests

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