RYAN TSE

Electrical Engineering and Math Student

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Electrical engineering and math student interested in novel applications of "pure" math to engineering problems, particularly in control theory, machine learning, and digital signal processing. Planning to complete a combined B.S./M.S. by Spring 2023 and to pursue a PhD. Previously worked on radar digital signal processing at Nuro, a self-driving delivery vehicle startup. Currently inventing a robust, geometry-inspired reinforcement learning alternative tailored to multi-agent control problems.

WORK EXPERIENCE

Nuro

Intern (Radar)

📅 June 2020 – August 2021   📍 Mountain View, CA

Developed, simulated, and implemented digital signal processing algorithms for radars on self-driving delivery vehicles.

Intelligent Automation Incorporated

Intern (Communications, Localization)

📅 June 2019 – August 2019   📍 Rockville, MD

Assisted in the hardware implementation of a bursty space-time continuous phase modulation receiver by analyzing quantization error. Assisted in developing indoor positioning system technology by modifying tracking filters to include IMU data.

Naval Research Laboratory

Intern (Communications)

📅 May 2018 – August 2018   📍 Washington, DC

Developed an efficient bursty satellite ranging protocol in GNURadio. Applied control loops to correct for channel impairments and implemented packet protocols.

Naval Research Laboratory

Intern (Localization)

📅 June 2017 – August 2017   📍 Washington, DC

Applied deep learning to vehicle trilateration.

TOOLS

Experienced:

`Python` `C` `Matlab` `Java` `Git` `LaTeX` `Linux`

Familiar:

`C++` `Verilog` `Rust` `GNURadio` `PyTorch` `Tensorflow` `Keras` `OpenCV` `OpenAI Gym`

Novice:

`Simulink` `KiCAD` `Cadence` `JAX` `ROS` `AWS+GCP` `JS/HTML/CSS` `MIPS ASM`

EDUCATION

University of Maryland

B.S. + M.S. in Electrical Engineering, B.S. in Mathematics

📅 Aug 2019 – Present

Select Completed Courses

(star indicates graduate level course)

- Linear Algebra
- Multivariable Calculus
- Differential Equations
- Probability Theory
- Advanced Calculus
- Partial Differential Equations
- Differential Forms
- Analog and Digital Electronics
- Digital Logic Design
- Computer Organization
- Systems Theory *
- Communications Systems
- Optimization for Control *
- Computational Methods

Select Current Courses:

- Optimal Control *
- Controls Lab
- Wave Propagation
- Capstone Design: Accelerator Physics

PROJECTS

Computationally Approximated Manifold Control

Independent Research

📅 March 2021 - Present   📍 College Park, MD

Inventing a robust, geometry-inspired reinforcement learning alternative tailored to multi-agent control problems. Details and paper coming soon.

Auto-Drifter

Hackathon Project

📅 April 2022 - Present   📍 College Park, MD

Designing a model-predictive control (MPC) law to autonomously drift a car in VDrift. Solved LQR on a linearized model for the short-time optimal control. Working through a numerical instability in linearization. Plan to eventually implement direct multiple shooting on the nonlinear model.

blair3sat

Team Founder, President, and RF Instrument Engineer

📅 2017 – 2019   📍 Rockville, MD

Developed a CubeSat to measure 3D ionospheric charge density profiles by receiving ground-based ionospheric sounders from space. Designed DSP algorithms for the instrument and lead the team in spacecraft engineering and fund seeking in an executive capacity. Secured $6,000 of funding and two corporate partnerships in 6 months. Co-wrote conference presentation for SmallSat 2019.