# 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 (DSP). Graduating with a combined B.S./M.S. in Spring 2023. Previously worked on radar DSP at Nuro, a self-driving delivery vehicle startup. Currently developing a robust, geometry-inspired reinforcement learning alternative tailored to multi-agent control problems with funding from New Science.*

## 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++ | Rust | GNURadio | PyTorch | Tensorflow | OpenCV | Verilog | KiCAD | Cadence

*Novice:*

Simulink | 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)*

- Advanced Calculus
- Partial Differential Equations
- Differential Forms
- Abstract Algebra *
- Systems Theory *
- Communications Systems
- Controls Lab
- Optimal Control *
- Optimization for Control *
- Random Processes *
- Advanced Digital Signal Processing *
- Stochastic Control *

**Select Current Courses:**

- Nonlinear Control *
- Estimation and Detection Theory *

## 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. Funded by New Science. 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.