

# Robby Nelson

Georgia Institute of Technology ECE, Atlanta GA

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robnel.com (Portfolio, Google Scholar)

## Work Experience

### Tesla Motors, BMS Embedded Firmware Intern

May 2021 – August 2021

- Decreased idle time in factories by writing C++ firmware to heat battery packs on Tesla vehicles to supercharge temperatures
- Improved heating performance of customer fleet vehicles by implementing a Binary Search Algorithm in C++ to locate the optimal discharge, regeneration, and AC charging heating temperatures
- Characterized the high voltage precharge circuit and high voltage interlock circuit on the Semi Truck and wrote a routine in C++ to ensure correct hardware functionality off the assembly line. Debugged and tested with Vector CANape and PCAN.
- Debugged isolation check errors on Chinese GB Chargers by analyzing CAN traces in Vector CANape and pinpointed code where the check was failing. Supplied custom firmware builds to China Service Engineering team to support further testing.

### Tesla Motors, Low Voltage Systems Validation Intern

May 2020 – August 2020

- Created a hardware and software setup to validate audio functionality of the Tesla Premium Audio Amplifier. Wrote Python code that utilized Fast Fourier Transforms and Unix audio utilities to send signals on car audio channels. Created a hardware configuration with Multiplexers, Transformers, and other components to select the correct audio channel.
- Worked to create key components for an outdated Python library to simulate touch commands on the Tesla Model S and Model 3 Center Displays, enabling engineers to quickly develop new Firmware and validate legally required capabilities such as the emergency call button.
- Wrote software to identify critical firmware bugs including backup camera failures and incorrect vehicle process restarts

### NCR Corporation, Software & Electrical Intern

May 2019 – August 2019

- Designed and built robotic device and 2 layer PCB using Cadence Allegro to automate EMV capable payment terminal
- Implemented remote controlled test harness using Raspberry Pi, Python, and Bottle
- Developed automated performance testing framework for payment devices using Python, threading module, and Pytest, extending and leveraging several large, pre-existing codebases

## Research and Activities

### Georgia Tech Systems Research Lab

January 2019 – April 2021

- Co-Author for a paper accepted to the 2021 American Controls Conference in New Orleans, LA (link to ieeexplore on robnel.com) about a novel Derivative-Free Multi-Agent Tracking strategy. Responsible for writing and testing MATLAB code for the Georgia Tech Robotarium robots to execute the tracking strategy using 3 agents. Wrote the experimental results section for the paper, documenting the successful conformation of the control strategy via the physical Robotarium experiment.
- Worked to implement MATLAB code for multi-agent 2D source seeking algorithms on physical GT-MAB blimps using Xbee modules and OptiTrack cameras.

### GT Solar Racing, Batteries Team

January 2019 – May 2019, August 2020 – Present

- Improved C/C++ microcontroller code to reduce time to detect communication failures in battery monitoring electronics
- Responsible for the design and layout in Autodesk EAGLE of a PCB to safely monitor current and chain together Battery Cells during testing

### Hive Makerspace Peer Instructor

May 2019 - Present

- Facilitated the creation of multidisciplinary student projects by instructing on the use of soldering, arduinos, benchtop electronics equipment, laser cutters, plasma cutters, and woodshop tools
- Suggested the use of and taught about electronics like buck/boost converters

### Microelectronics (ECE 3043) Teaching Assistant

January 2021 – Present

- Gave checkoffs and assisted students with circuit construction and design as an Open Lab TA in ECE 3043 (Microelectronics Lab) as they worked through lab procedures on filters, opamps, and transistor amplifiers
- Responsible for explaining elementary circuit concepts, benchtop equipment operation, and Microelectronics concepts such as Diodes, BJT's, MOSFET's, and their associated amplifiers

## Education

### Georgia Institute of Technology, B.S. Electrical Engineering (GPA: 3.74)

Class of 2022

- ECE/Physics Courses: DSP, Microelectronics, Computer Architecture, Quantum Mechanics, Analog Design, Electromagnetics, Feedback/State Space Controls
- CS Courses: Data Structures, AI, OOP, Engineering Computation

## Applicable Skills

**Software:** C/C++, MATLAB, Verilog, Git, UNIX Systems, MIPS Assembly, Python

**Hardware:** PCB Design (Autodesk EAGLE), SPICE Coding, STM32 HAL and Cube IDE, DSP, Analog Circuitry, Digital Design, Oscilloscopes/Benchtop Tools, Surface Mount Soldering, TI Launchpad, Raspberry Pi, Arduino, ARM Mbed, Vector CANape/PCAN