# Matthew **Yu**

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## Education

**The University of Texas at Austin** *May 2021*

B.S. in Electrical and Computer Engineering

- Cumulative GPA: 3.48
- Relevant Coursework: Algorithms, Circuit Theory, Computer Architecture, Dev. of a Solar Powered Vehicle, Digital Logic Design, Digital System Design Using HDL, Intro to Embedded Systems, Linear Signals and Systems, Rocket Engineering Practicum I & II, Software Design and Implementation I & II

## Work Experience

**Qualcomm** *Plano, TX*

Software Engineering Intern *June 2020 - Present*

- Refactoring a test automation framework written in Rust and web controller written in Javascript.
  - Converted the single-threaded backend to multi-threaded to handle task execution, database polling, and logging.
  - Added new UI functionality to the web controller to pause and run scheduled tasks.
  - Reformatted the data structures used in the couchdb to increase clarity and simplify backend parsing code.
- Created an automated upgrader script that tracks updates on Github and schedules application restarts with minimal downtime.

**Cisco** *Richardson, TX*

Software Engineering Intern *June 2019 - August 2019*

- Developed CICD skills by deploying the testing environment pipeline on Jenkins for integration testing.
- Created and managed automated and manual unit tests for CX workflows and user stories.
- Refactored back-end microservices to simplify application OAUTH2 authentication.
- Optimized application build processes using prebuilt Docker images, improving setup speeds by over 50%.

## Extracurricular Activities

**Longhorn Racing - UT Solar Vehicle Team** *Fall 2018 - Present*

Solar Array Lead (2019, 2020), Dashboard & Motor Control Lead (Spring 2020)

- Develop a simulator to test, optimize, and compare MPPT algorithms for the former senior design MPPT.
- Lead a team to develop a new portable PV testing setup for single cells, modules, and subarrays.
- Led the assembly of solar cells into modules for lamination and application onto our car, BeVolt.
- Redesigned the implementation of the Motor Controller and Dashboard systems.
- Worked with Mbed OS 5 and CAN protocols to develop interfaces for driving vehicle state and the Tritium Motor Controllers.
- Work featured in a press release for Silicon Labs, a documentary for Al-Jazeera, and a video for the Girl Scouts of Central Texas.

**IEEE Robotics and Automation Society** *Fall 2017 - Present*

Historian & Webmaster (2019), R5 Electrical Lead (Spring 2020), Robotathon Co-Head (2020), Dancebot Electrical Lead (Fall 2020)

- Robotathon (Fall 2017 - Present)
  - RASArcade 2020 - Co-heading a committee to develop and implement a competition proposal for Fall 2020.
  - Lead the development of a Robotathon guide with design and interfacing tutorials.
  - Created a VM with out of the box tools and setup for students to start developing on their TM4C smoothly and quickly.
  - Lead the overall design and electrical implementation of a UT Tower of Power, the centerpiece for the RASArcade field.
- Demobots (Summer 2020 - Present)
  - Lead the electrical and software design component of our Dancebot Swarm team.
  - Repurposing the 2020 R5 robot to become a Mothership for the Dancebots.
  - Redesigned the network and software architecture for the Dancebot, enabling swarm capability.
  - Reimplemented a cleaner, asynchronous backend for Dancebot that retained front-facing functionality.

**TREL - Texas Rocket Engineering Lab** *Fall 2019 - Present*

AvGNC/Recovery Engineer

- Defined requirements for an actuation system for parachute dereefing.
- Used KiCAD to develop a relay circuit for actuating igniters and line cutters.
- Developed a system level circuit for the recovery team's drop test.
- Design requirements and a test platform to validate vibrational loads on Avionics Hardware.
- Develop UI widgets in Python3 and Kivy as part of the Mission Control System group.

**Socially Intelligent Machines (SIM) Lab** *Spring 2019 - Spring 2020*

Undergraduate Researcher

- Contributor to the Object Recognition and Perception (ORP) repository.
  - Setup a documentation project site using Sphinx autodoc generator including tutorials and setup pages.
- Deployed Ross Wightman's Posenet PyTorch port onto lab robots for pose estimation.
- Developed Publisher and Subscriber ROS nodes to collect, identify, and label pose data.
- Collaborated on a project to create and optimize a pose autoclassifier using K nearest neighbors.

**American Society of Mechanical Engineers** *Fall 2017 - Present*

Member

- Rube Goldberg/Design Team (Fall 2017 - Present) - Designing multistep processes for STEM education and competition.
  - 6th Place in the Rube Goldberg National Competition (2018).
  - 3rd Place in the Purdue National Chain Reaction Competition (2019).
  - Helped design, construct, and setup a Rube Goldberg Machine for an advertising commercial by energy company Reliant.

## Projects

**NASA Payload Competition** *April - June 2020*

- Organized a team to develop an absorption spectrometer payload for the Honey, I Shrunk the NASA Payload competition.
- Identified a procedure to discover resources in the lunar regolith and troposphere.
- Developed a design methodology and implementation details for the sensor payload.
- Designed a prototype electrical system circuit and PCB design for the electronics.
- Awarded 3rd place in the Lunar Resource Potential Category.

**Computer Architecture LC3B Labs - C** *January - May 2020*

- Developed a two-pass assembler by parsing input files and using a dispatch table with function pointers to manage data flow.
- Developed a instruction level simulator and then a cycle level simulator.
- Expanded the microarchitecture and ISA to include the following functionality for the cycle level simulator:
  - Exception and Interrupt support.
  - Single level virtual address translation.

**An Inquiry into How Company Culture Influenced the Volkswagen 2015 Emissions Scandal** *February - December 2019*

- Collaborated with Ahmad Ahbab to develop a research report for Spring 2019 CHE Engineering Communications class.
- Awarded 2nd place for the Research: Lab Category in the 2019 Undergraduate Writing Flag Competition.
- Published by the Texas Scholar Works at the University of Texas Libraries.

**Hardware Neural Network - Verilog** *November 2019*

- Implemented a systolic array of MACs, able to run 8-bit signed magnitude floating point matrix calculations.
- Extended the project by developing a 1-3-1 neural network for linear interpolation on the FPGA Basys 3 Board.
- Architected neuron design and data structures, creating testbenches and debugging operation.

**Image Generation - C++** *January 2019*

- Built an application using OpenFrameworks that creates art based on Markov Chains generated from image sets.
- Developed a median cut algorithm implementation for color quantization.
- Optimized program structures and processes for efficiency improvements of over 90% in runtime.

**Generative Art - C++, Javascript, HTML, CSS** **dimembermatt.github.io/Generative_Art** *Summer 2018 - Present*

- Created a series of generative art programs using P5JS and OpenFrameworks.
- Used React to create a SPA to document work as part of an effort to better communicate code and algorithms to people.
- 1st place in the 2019 Images of Research competition with a piece based off of the Chirikov Standard Map (Chaos Theory).

**Intro to Embedded Systems Final Project - C, Python** *May 2018 - September 2018*

- Led the firmware and circuit design of an embedded system game controller using the TI TM4C microcontroller.
- Developed a game implementing the battling features of Pokémon and MusicBox, which plays pre-loaded songs.
- Designed a prototype framework using Python and OpenCV to transcribe sheet music into a file format that plays on MusicBox.

## Awards

- 3rd Place for the 2020 Honey I Shrunk the NASA Payload Challenge.
- Recipient of the 2020 UT IEEE Scholarship.
- 2nd Place for the Research: Lab Category in the 2019 Undergraduate Writing Flag Competition.
- 1st Place in the 2019 Images of Research Competition.

## Skills

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| **Programming Languages** | C/C++, Rust, Java, Python 3, JavaScript, Arm Thumb2, LC3B, Bash, Verilog |
| **Frameworks and APIs** | Mbed OS, ROS, OpenCV, OpenFrameworks, P5JS, NodeJS, Angular 6, ReactJS |
| **Technical Skills** | SMD Soldering, Milling, Lathing, Laser Cutting, 3D Printing |
| **Software** | Microsoft Office, Google Suite, KiCAD, SOLIDWORKS, Xilinx Vivado, Git, Github, Jenkins, Docker, Linux OS, Craftware |