Ellie T. Xu

- Portfolio –

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Internships & Teams

Projects

Summary of Skills

Mechanical

- Inventor
- SolidWorks
- AutoCAD
- GD&T
- 3D Printing
- Revit
- Shop tools: lathe, CNC, laser cutter

Software

- Python
- JavaScript
- Java
- C++
- Unity
- C#
- HTML/CSS
- Firebase
- Git
- Bash
- Visual Studio

Electrical

- Schematic layout design
- PCB layout design
- KiCAD
- Altium
- Frizting
- AVR Microcontrollers
- Arduino
- Raspberry Pi
- Soldering
- Firmware development

CSS, HTML, JavaScript

elliexu.com

2021

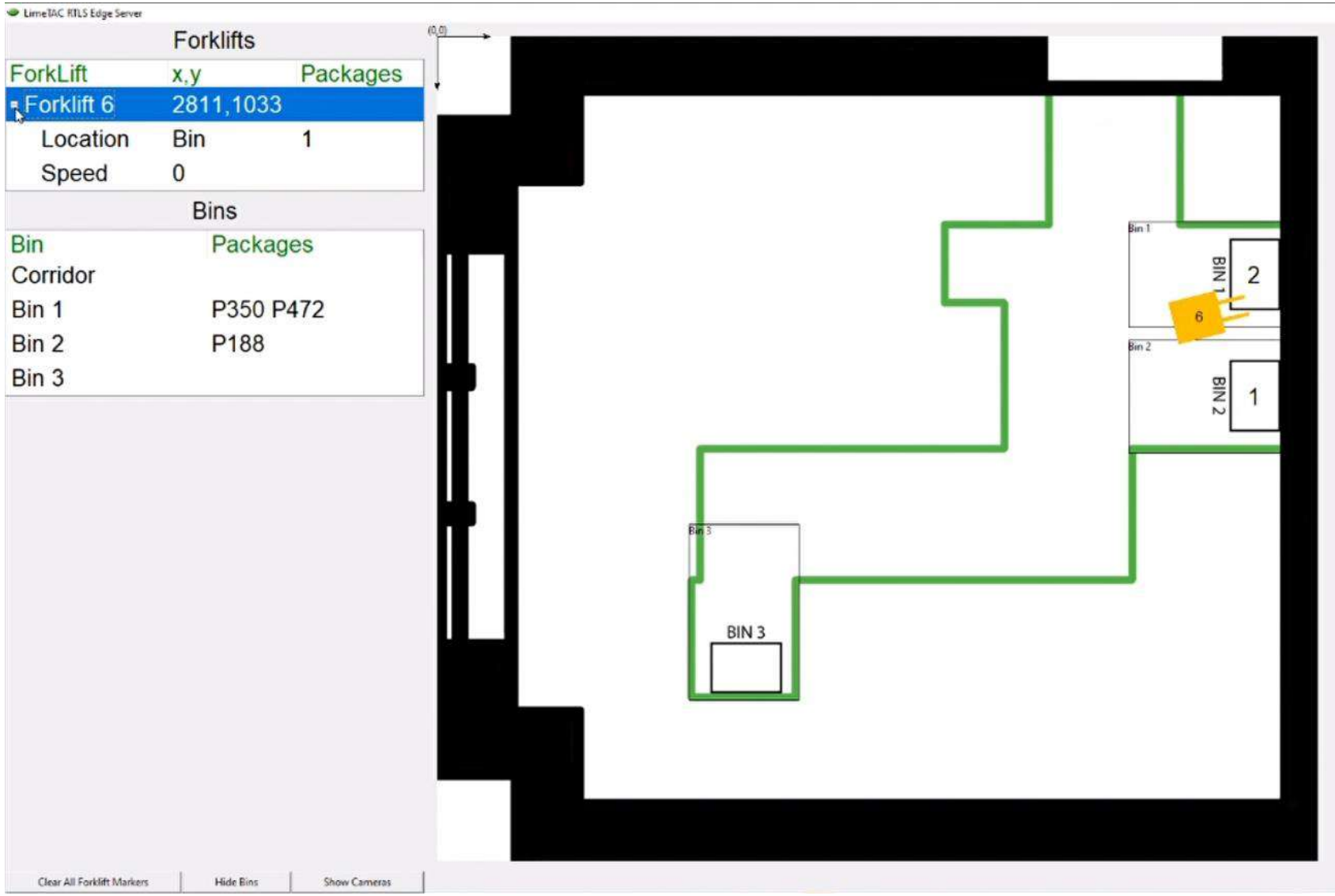
Check out my personal website created with JavaScript, HTML and CSS for an online version of my portfolio!

Raspberry Pi, Python, KiCad, Azure storage

IoT Engineer at LimeTAC

Real-time indoor vehicle tracking system

- Developed a system that could track in real-time the location and movements of indoor vehicles (i.e. forklifts in a factory).
- Designed and created the **Python back-end** code and the **frontend Tkinter GUI** shown on the image to the right.
- Researched hardware from camera lenses to **Raspberry Pi** models for this application.
- Went to a warehouse and tested out several iterations on real life forklifts.



Real-time indoor vehicle tracking system GUI

Vehicle Collision Recorder

- Worked on a vehicle collision recording system for forklift accidents that automatically uploaded incidents to the cloud on **Azure Blob Storage**. The hardware schematic was created on **KiCad** and the software was written in **Python**.
- Employed field tests and data to calibrated the vehicle collision recording system.

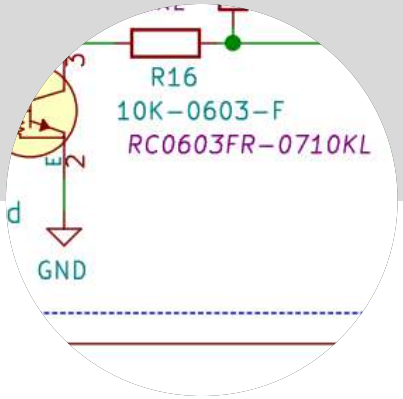
Video Player App

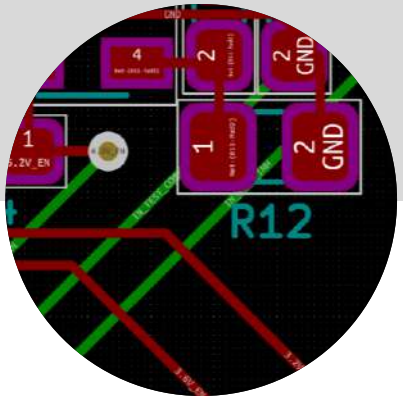
- Developed a video player app that synced **with Azure Blob Storage**. The player was coded in **Python** and the GUI was made using **TKinter**.
- This video player app retrieved and played to the viewers the incidents uploaded from the vehicle collision recording system.

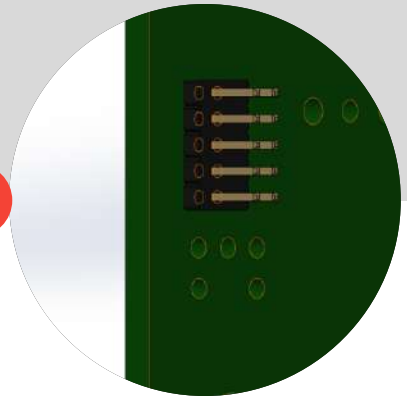
PCB & Schematic, KiCad, Python, C++, SolidWorks

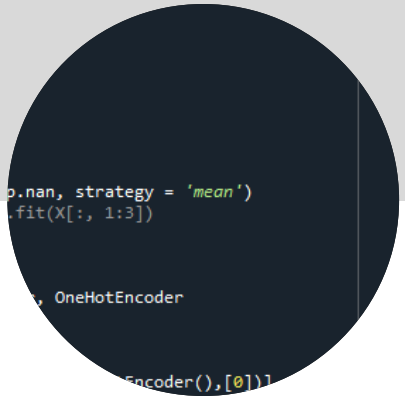
Hardware Engineer at AOMS Technologies

Jan. 2020 – Apr. 2020









LoRa GPS Mapping Device

- Wrote analysis/mapping **Python** program (e.g. Matplotlib, Rasterio, GeoPandas) for LoRaWAN-GPS mapper for product insights (e.g. gateways).
- Edited **C++** firmware and created **schematics & PCBs** in **KiCad** for LoRaWAN-GPS mapper with frequency bands for EU/USA.

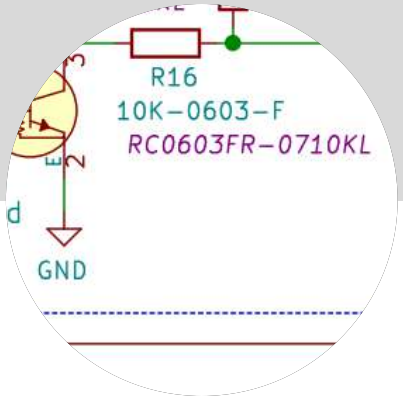
Test Jigs

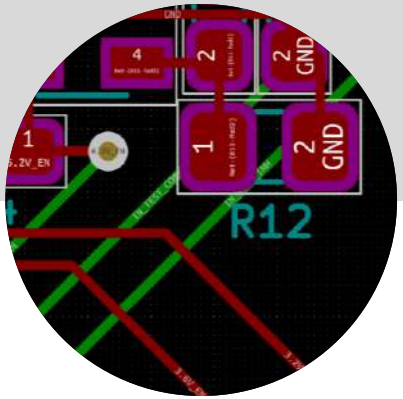
- Designed 2 test jigs: maintained **C++** firmware for their **AVR microcontrollers**, created middle-man **Python** scripts between firmware and user, **KiCad schematics/PCBs**, and **SolidWorks** models; involved the usage of UPDI, SPI, AVRDUDE, UART, ATtiny, and Atmel Ice; flashed firmware and error checked 100+ cards.

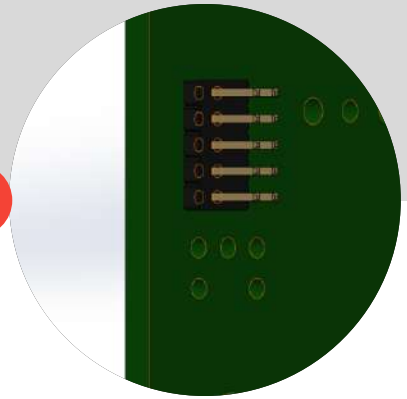
PCB & Schematic, KiCad, Python, C++, SolidWorks

Hardware Engineer at AOMS Technologies

Jan. 2020 – Apr. 2020







Lightning Sensor and a Non-intrusive current measurement sensor

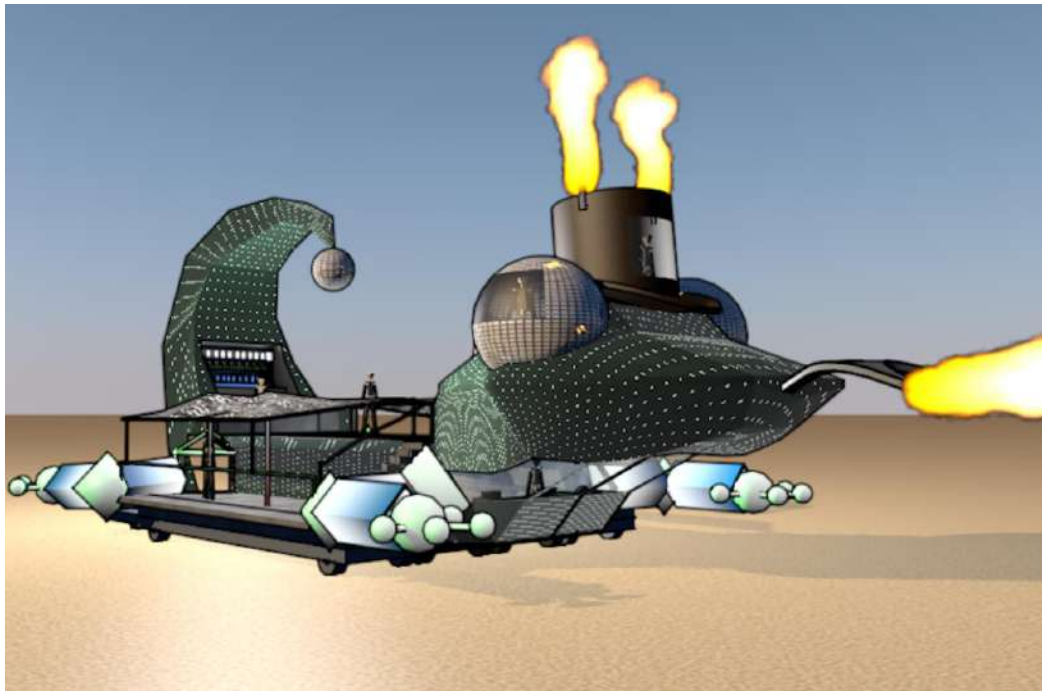
- Researched, prototyped on **Arduino**, and created **KiCad schematics & PCBs** for working CT sensor and lightning sensor.

Lab and other experiences

- Many experiences in the lab: conducted experiments on humidity sensors, worked with silicon potting, 3D printing, and product assembly.
- Used **Git** and **Agile** tools to collaborate with the team.

Schematic, Altium

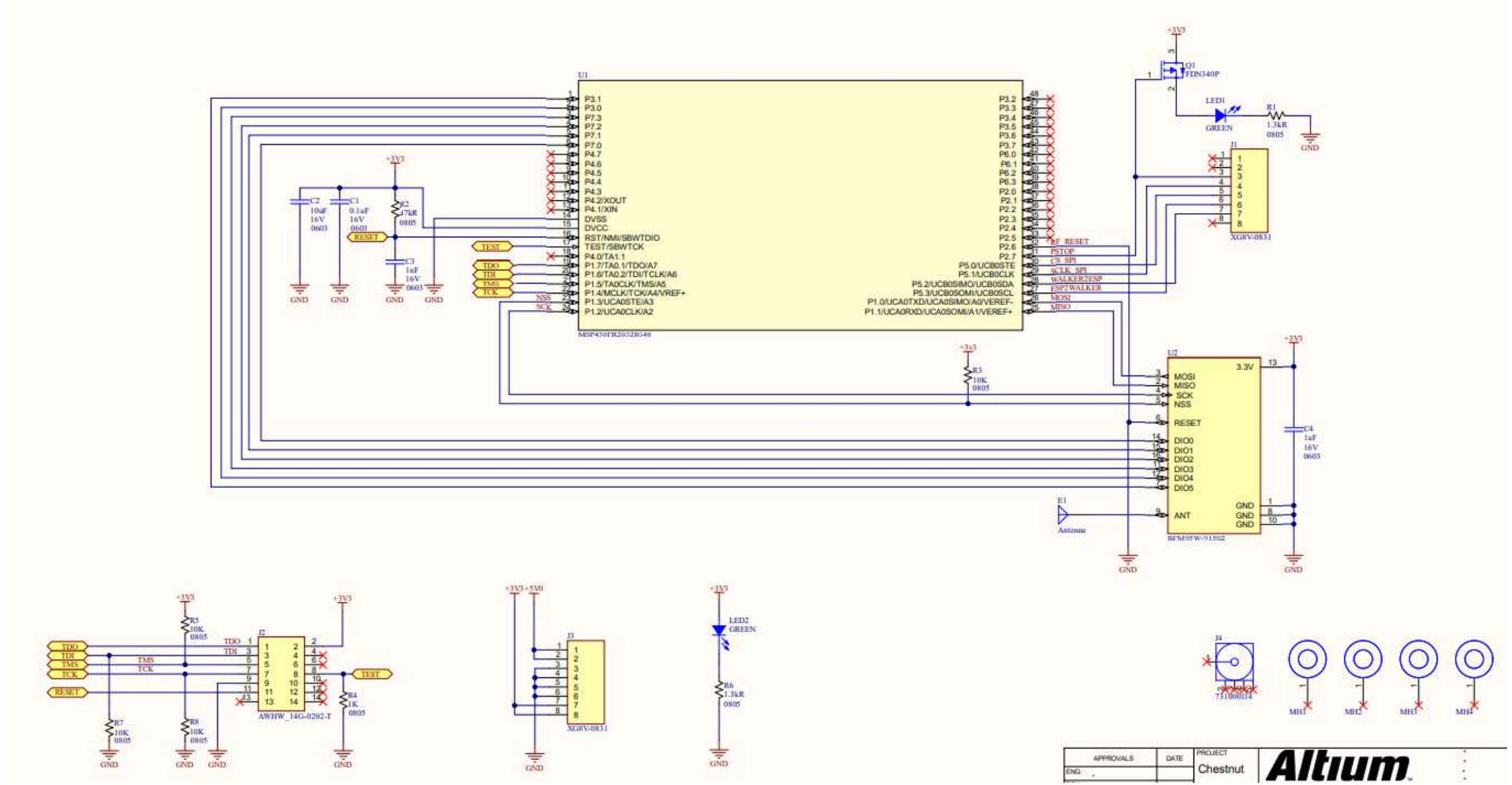
Hardware Engineer at Nuvation Garage



TechnoGecko: the Burning Man platform

- Worked with the team on the Burning Man platform project.
- Created the receiver **schematic** (shown in the next slide) on **Altium** for a remote emergency stop.
- Employed the use of **JTAG** communication, **MSP** microcontroller, and an **RF** module.

Remote emergency stop receiver schematic

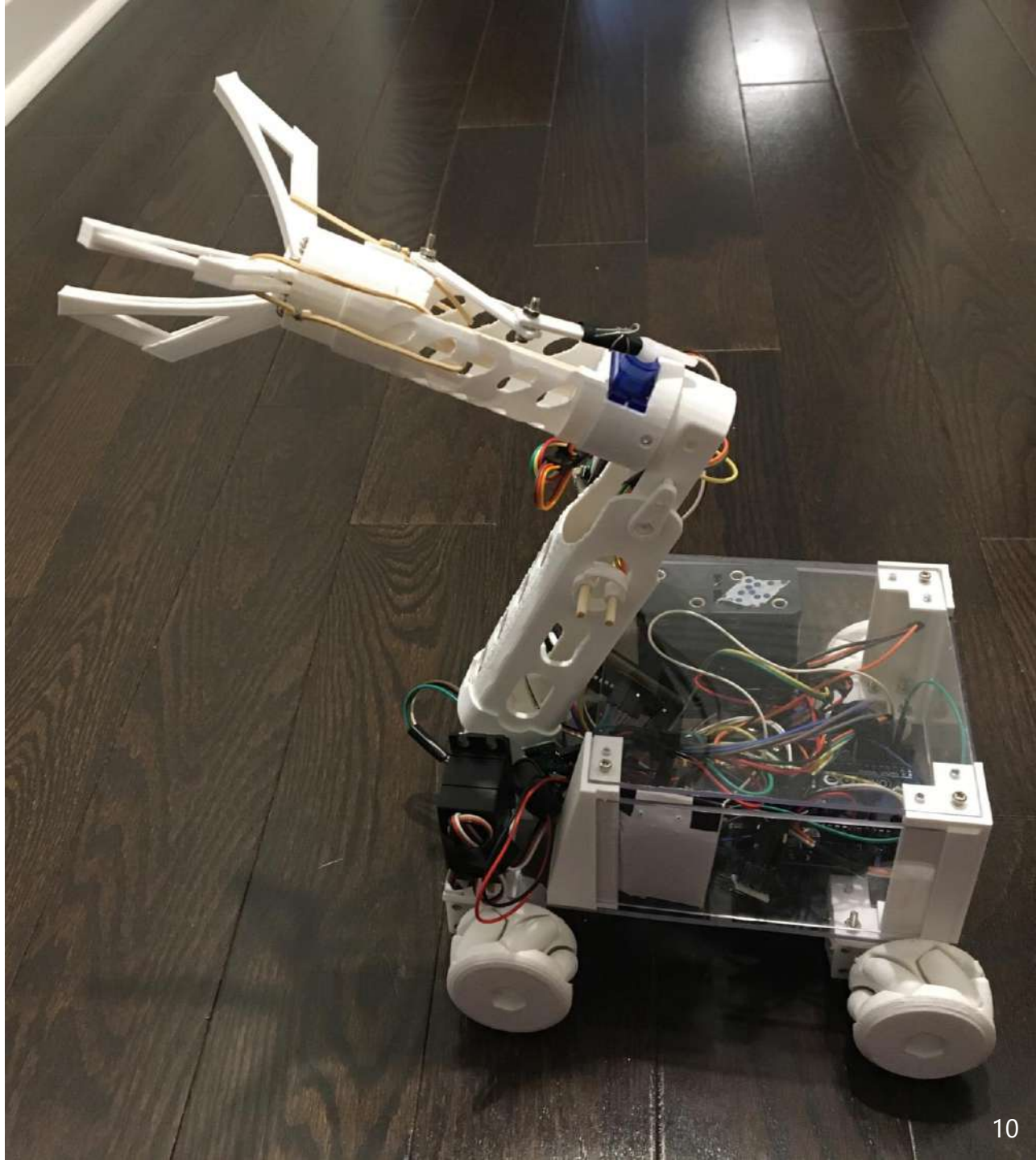


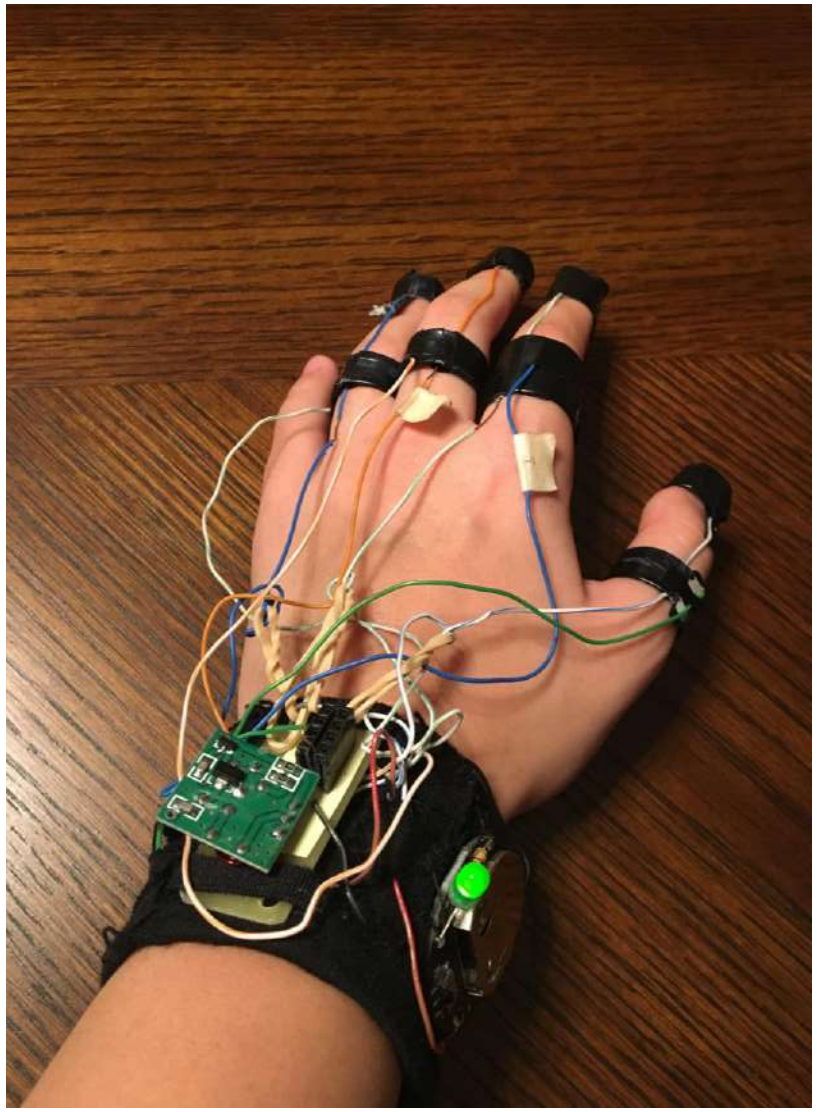
SolidWorks/Inventor, 3D printing,
Arduino, PCB & Schematic Design

CODIA

2019

- Personal project, all work and results belong to myself.
- Built an **Arduino** based modulated robot with an alterable configuration designed to adapt to perform various tasks.
- User interface through an original and low-cost wireless hand-gesture controller.
- Designed to act as an artificial assistant.





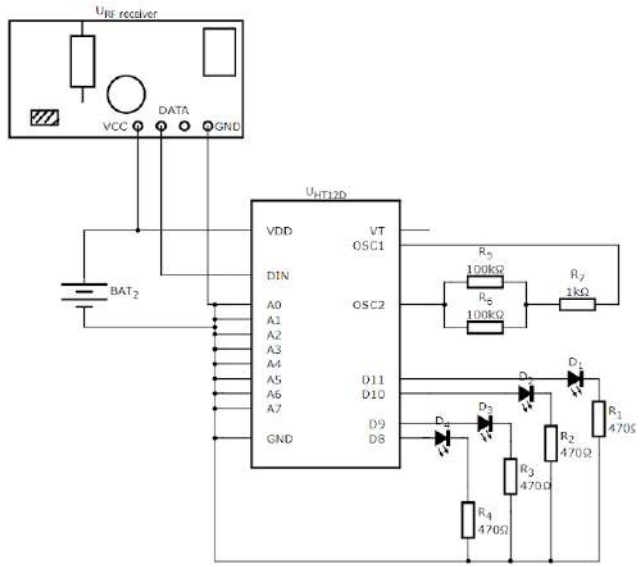
CODIA

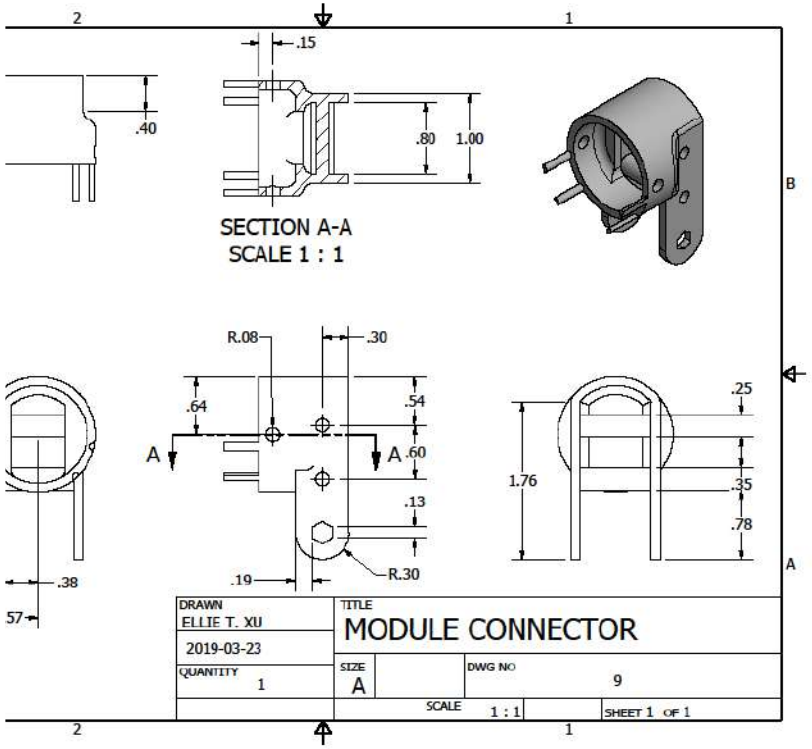
(continued)

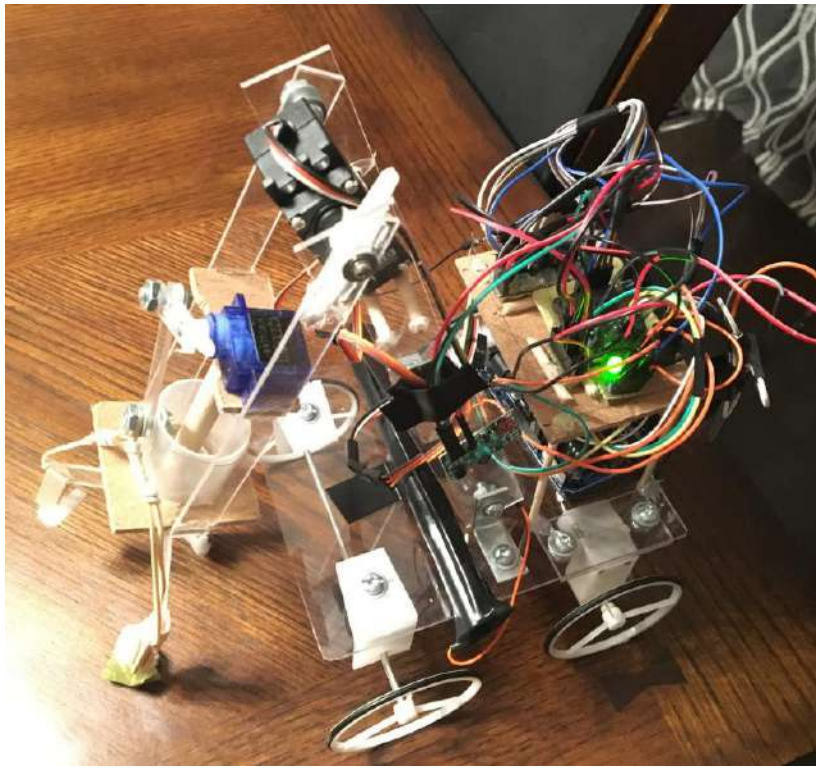
Developed an original low cost wireless hand-gesture controlled communication system using radio frequency.

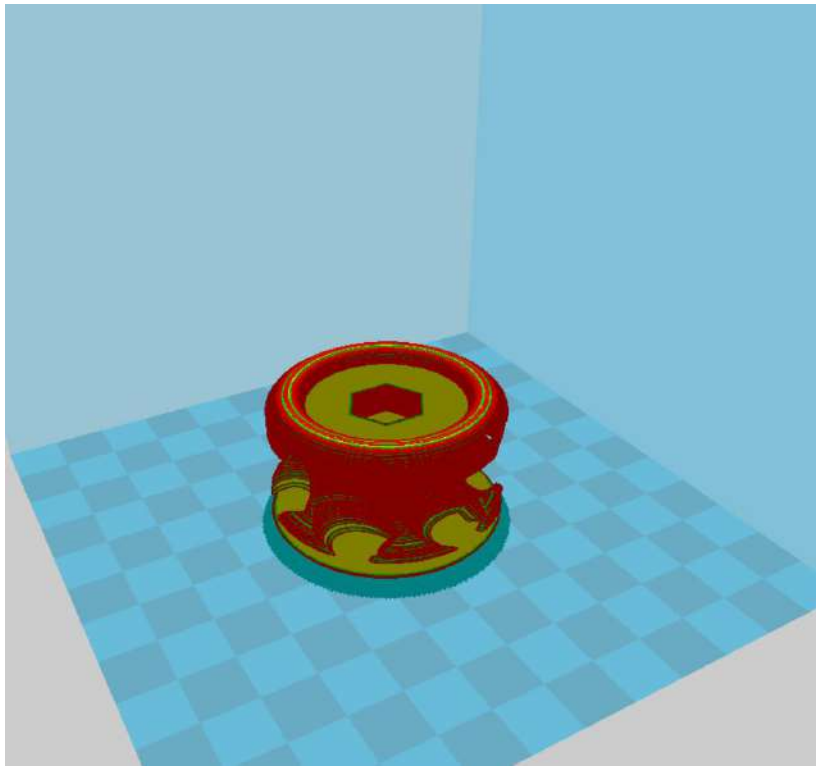
Designed, prototyped, and made all **schematics and PCBs** from drivers to automatic configuration recognition and soldered them.

- Prototyped them on breadboards first, then moved to PCB and soldered them.









Mechanical Design

Solidworks/Inventor

- Researched and 3D modelled mechanisms such as the chassis, electro-mechanical interfaces, and mecanum wheels on **Inventor**.
- Developed drawings to help the manufacturing process.

Prototype

Shop Tools

- Prototyped designs with wood and acrylic models before 3D printing the final.

3D Printing

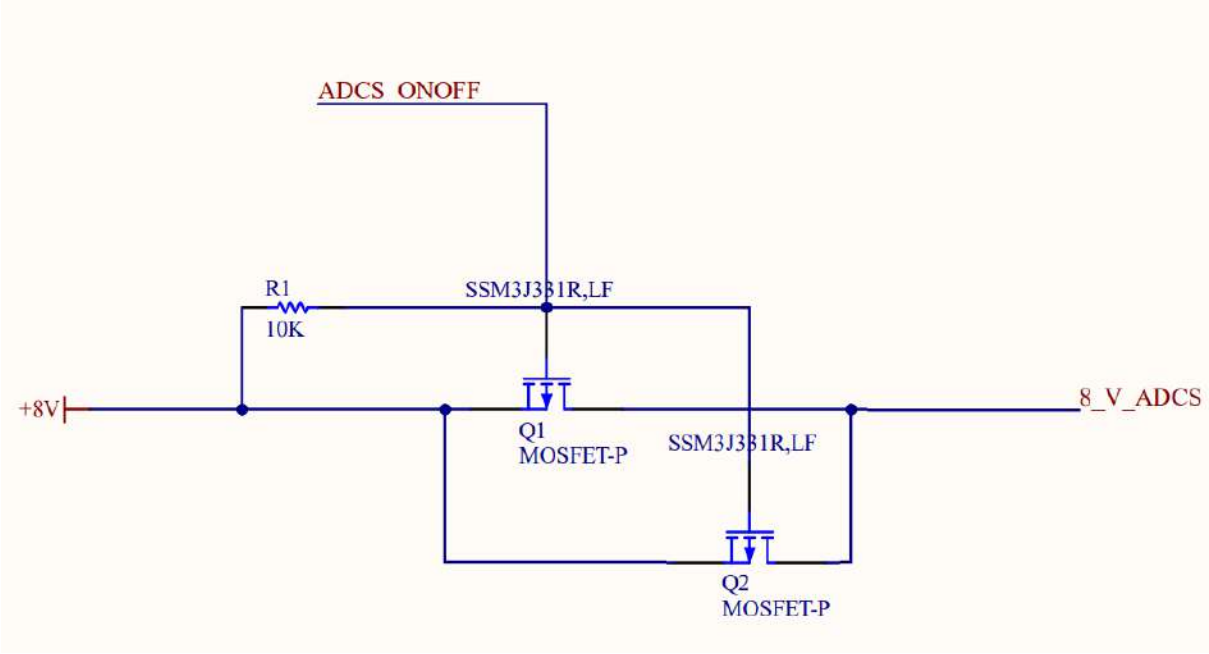
3D Printing.

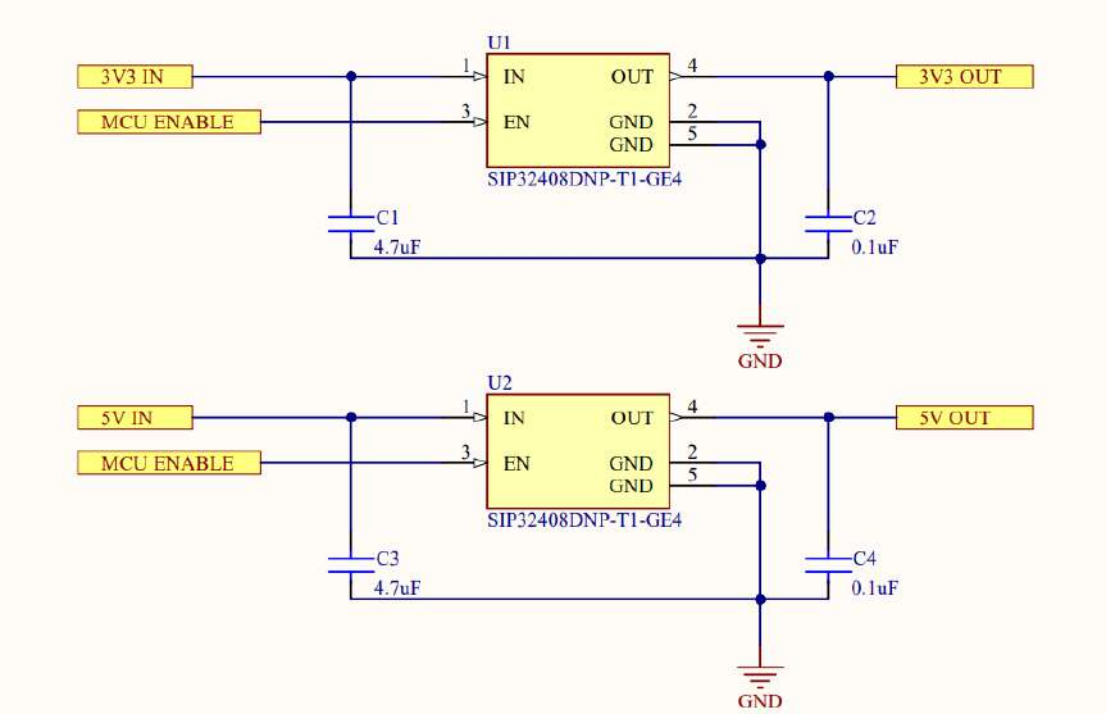
- **3D printed** complex parts with PLA plastic to increase structural integrity, precision, and functionality.

Schematic, Altium

Hardware Engineer at UW Orbital Team

- University of Waterloo Satellite Team.
- Researched load switches for the battery management system of the satellite.
- Explored many different solutions that included multi-rail ICs, single-rail ICs, MOSFETS, and combinations to minimize cost and maximize application.
- Created schematics on **Altium**.





Python, Web-scraping: Selenium

EatOut

EatOut is an app whose goal is to help you find that ideal restaurant to dine-in at tonight. Simply enter in your preferences from ratings to distance, and it will recommend to you all the restaurants that can satisfy your taste.

EatOut

How I contributed towards this project:

- I created the backend **Python** script that is responsible for collecting a food item's price at a particular restaurant and how busy that restaurant is at the current time.
- The code starts by retrieving a json file from the front end using flask. This data has the restaurants we want to know the prices of, the desired food item, among other information.
- The code then uses UberEats as a database for menu prices. It **web scrapes** the restaurant menu from UberEats using selenium and looks for the particular food item in mind.
- At the same time, it finds out how busy the resturant is using **Google Cloud API**.
- At the end it sends the price and busy information to front end as json using flask.

NETFLIX-N-CHILL

Chrome Extension, Javascript, HTML, CSS, Firestore, Python

This app finds people around you who share similar Netflix interests as you!

Using a chrome extension, the app collects the data as you watch Netflix, then with its point-based matching algorithm, it matches people based on their Netflix habits, personal preferences, and even geolocation (with permission of course). So whether you are looking for a platonic buddy to watch a movie with or perhaps a romantic partner to chill with, this app is designed for just that!

How I contributed towards this project:

- I developed the **Chrome extension** with **Javascript**, **HTML**, and **CSS**.
- Then interfaced it with the backend through **Firestore**.
- The information the extension collects is retrieved by the **Python** matching script in the backend.
- After the backend code makes the matching decision, it pushes the data to **Firestore**.

AutoCAD, Inventor, Manufacturing

Core Mechanical Engineer

FIRST Robotics team

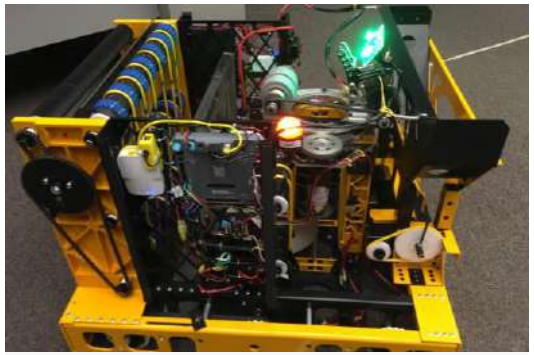
- Produced 2D, 3D, and sheet metal models on **AutoCAD & Inventor** along with drawings that applied GD&T principles.
- Performed virtual **stress simulations** on models before production using Inventor.
- Manufactured prototypes and mechanisms with the plasma cutter, CNC, lathe, and other tools.

Core Mechanical Engineer

FIRST Robotics

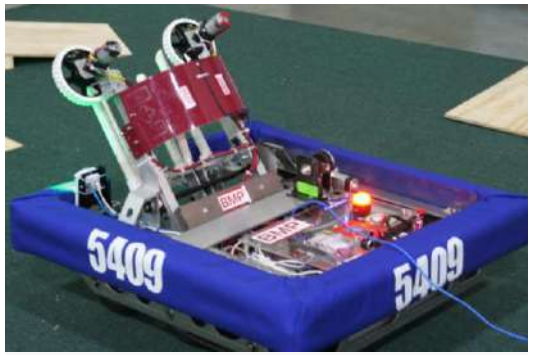
Power Up - 2018

Mechanism of focus: scissor Lift.



Steamworks - 2017

Mechanism of focus: climbing/intake mechanism.

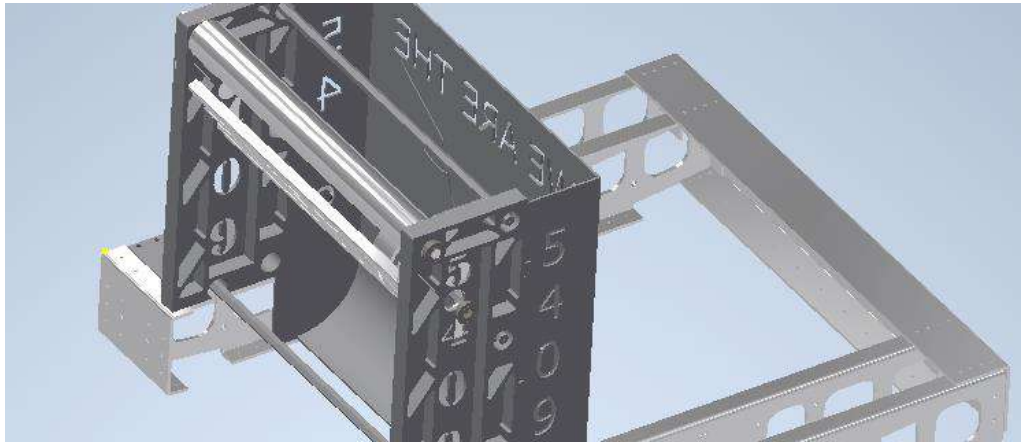


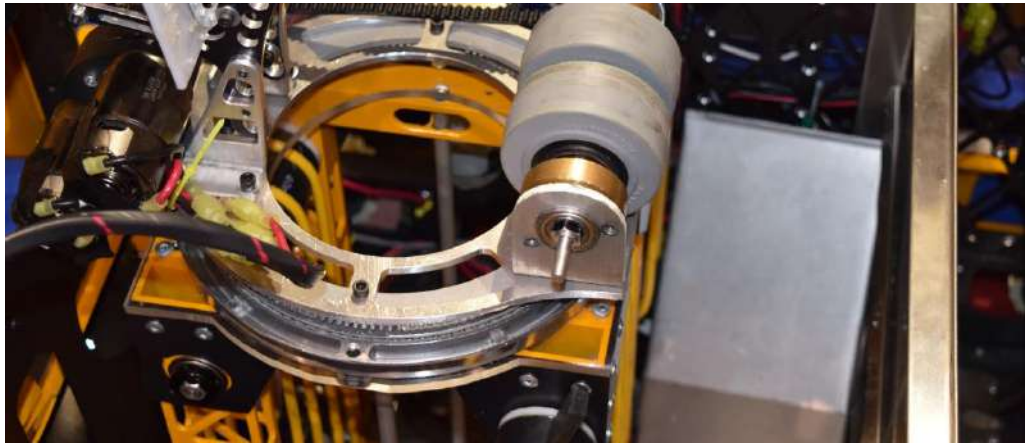
Stronghold - 2016

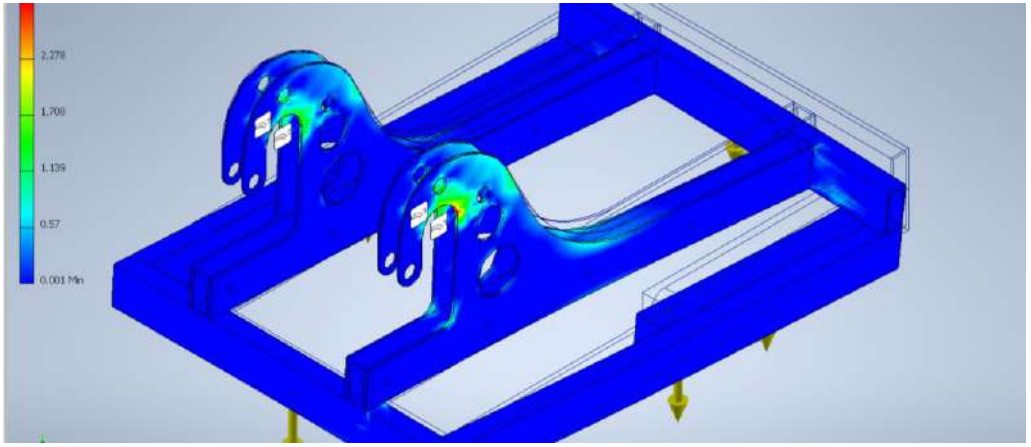
Mechanism of focus: non-electrical grappling hooks.

Core Mechanical Engineer

FIRST Robotics







Java

Software Developer at Wentworth-Halton X-ray and Ultrasound Inc.

2018

- Proposed to the team and programmed a patient booking software on **Java** as an alternative to paper bookings at my co-op placement.
- Created a **GUI** with **JFrame** (shown on the image to the left) and ensured multi-device access by creating an **XML** database.

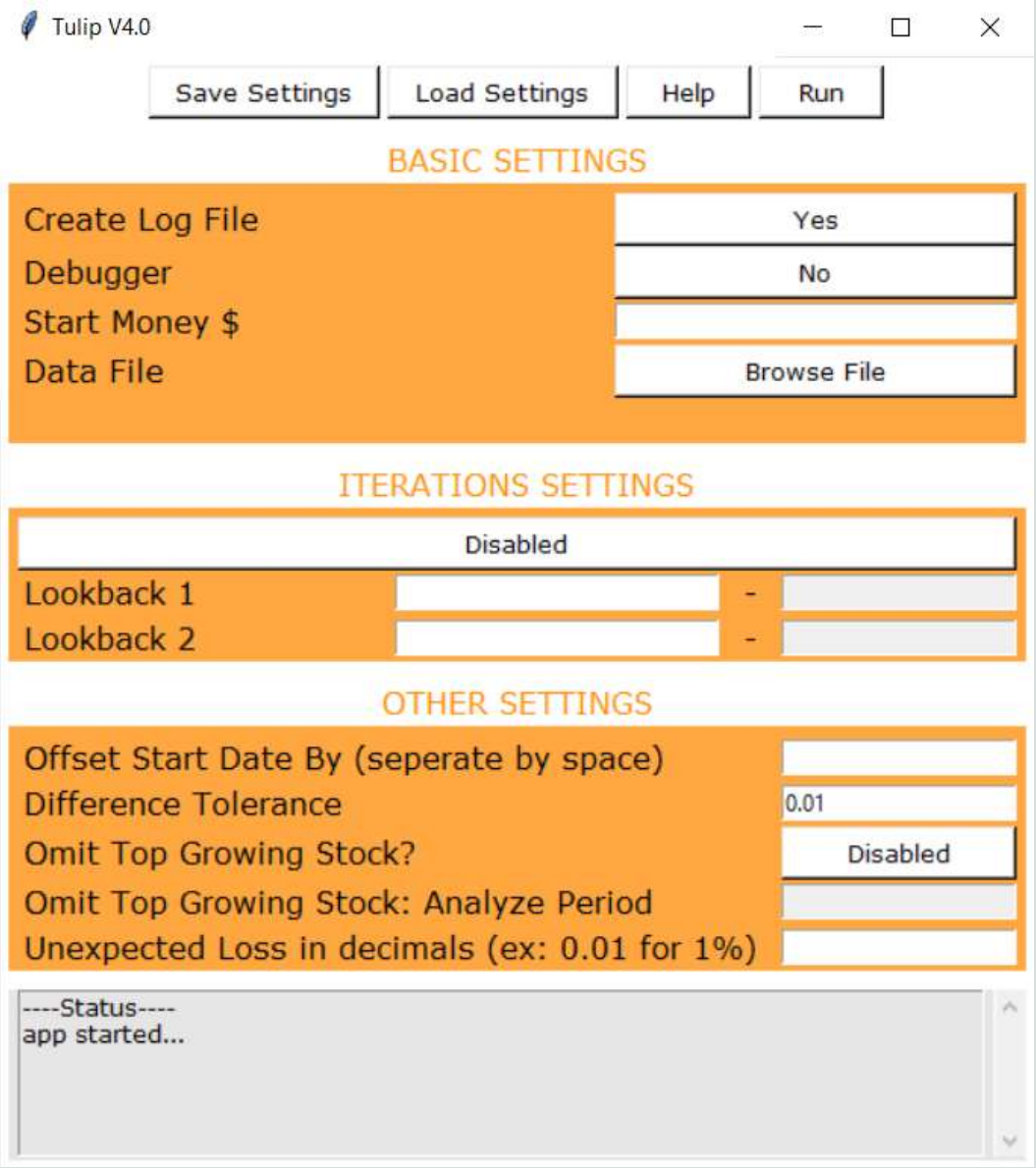
Java, C#, Unity, Git

CrowdMotions

- Smart Review Web Scraper

2019

- Created an **Android App (Unity)** that found the public's sentiment on any service by web scraping from many review sites.
- Wrote algorithms on **Java\C#** that learned sentiment values from preexisting data and used them to analyze new data.
- Used **Git** version control to collaborate with team.

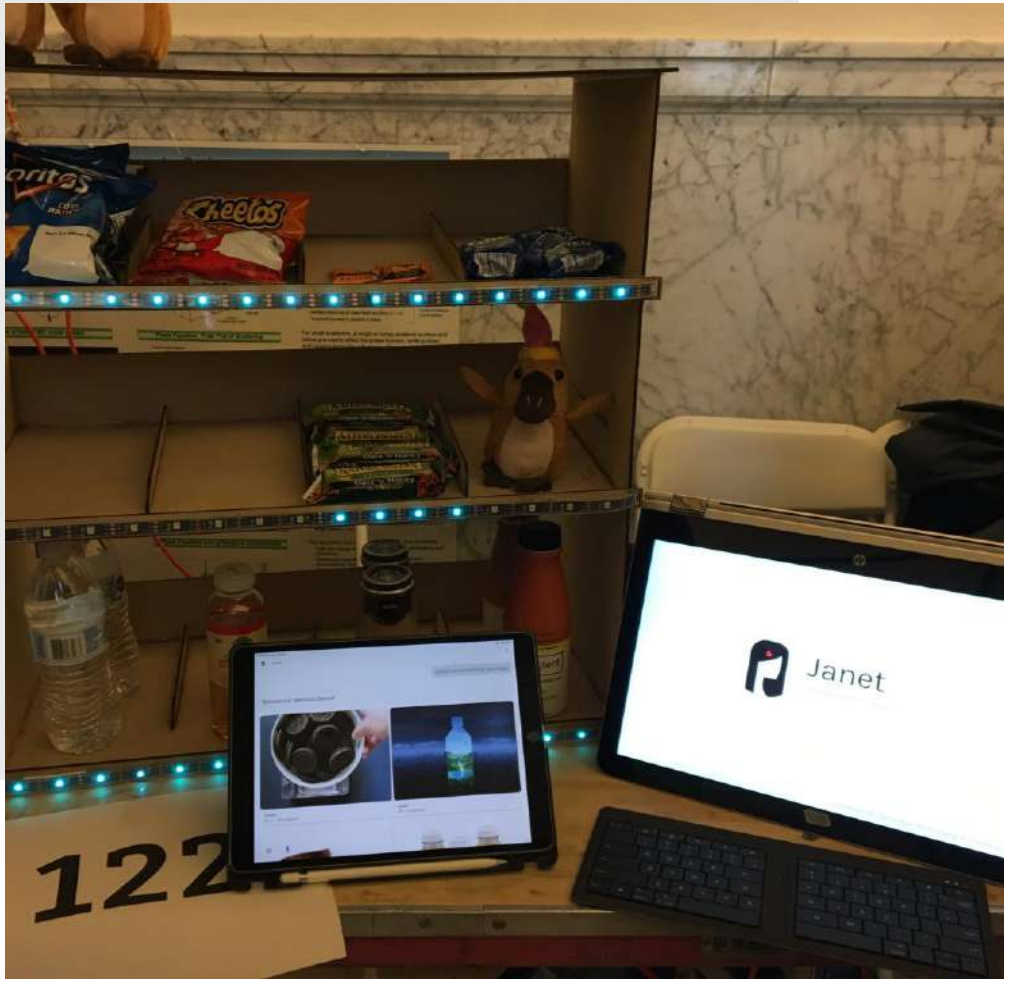


Python

Stock Analyzers

2020

- Wrote **Python** (Numpy, Pandas, etc.) programs that ran thousands of simulations under various algorithms to find the optimal approach to the stock market.
- Improved user experience by creating a **GUI** using TKinter (shown on the image to the left) and adding various shortcuts.
- Wrote another **Python** script that incorporated real time web scraped data from twitter to perform and integrate sentiment analysis.



Python, Arduino, Inventor, Laser Cutting

Virtual Personal Shopping Assistant

2019

- Janet: a **voice-controlled** shopping assistant for customers that performed tasks from locating products to providing helpful suggestions.
- Carol: the other assistant that provided companies with projected customers trends that were obtained through **machine learning**.
- **Database**: connected to a database so the shopping assistants can be accessed from different devices.
- Incorporated hardware as a user guidance with **Arduino** and **3D modelling**, and **laser cutting**.

Some Additional Projects

Thermoelectric 3-in-1

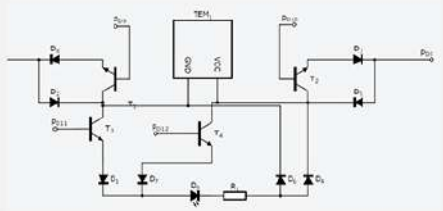
- A container that used the Peltier-Seebeck effect to act as a generator, cooler, or heater.
- Controllable over **Wi-Fi** and is **Arduino** based.

AR Navigation

- An **AR** based navigation **Android (Unity)** app that recognized key features to determine locations.
- Projected 3D navigation directions on the glasses.

Web ID

- **Arduino**, **HTML**
- Virtual wallet accessible over a web page.
- Dispenser drops items when virtual credits are spent.



Software Developer at UWAFT team

- Developed a dashboard to display sensor data using **Python** OOP (i.e. TKinter) and ROSpy.

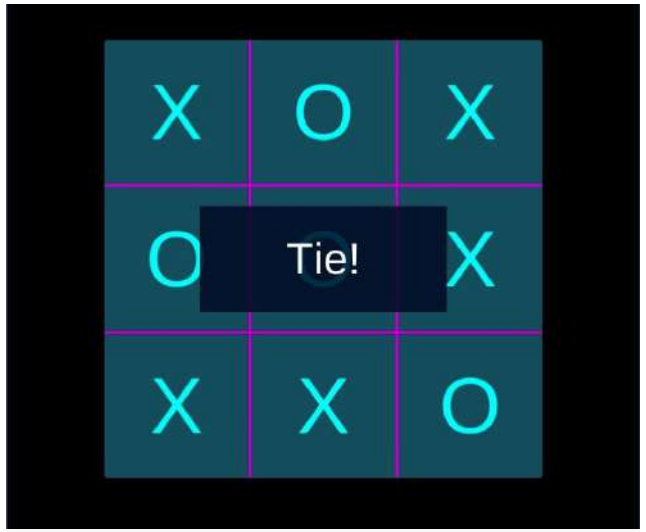
Some Additional Projects

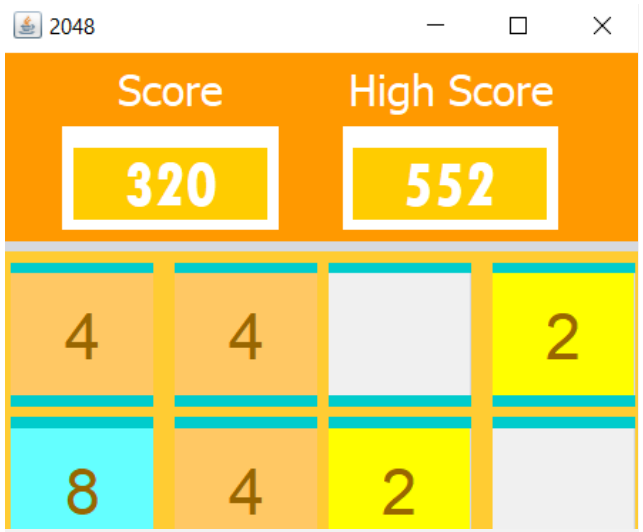
Mechanical Engineer at Watlock

- Researched, modelled, and contributed to the airlock hatch door made to withstand Mars conditions on **SolidWorks** and **GrabCAD**.

Mini Games

- Created **Android Apps (Unity & C#)** from Tic Tac Toe to custom arcade games.
- Created the classic 2048 game on **Java**.





Check out more of my projects and involvements:

elliexu.com