Ellie T. Xu

- Portfolio –

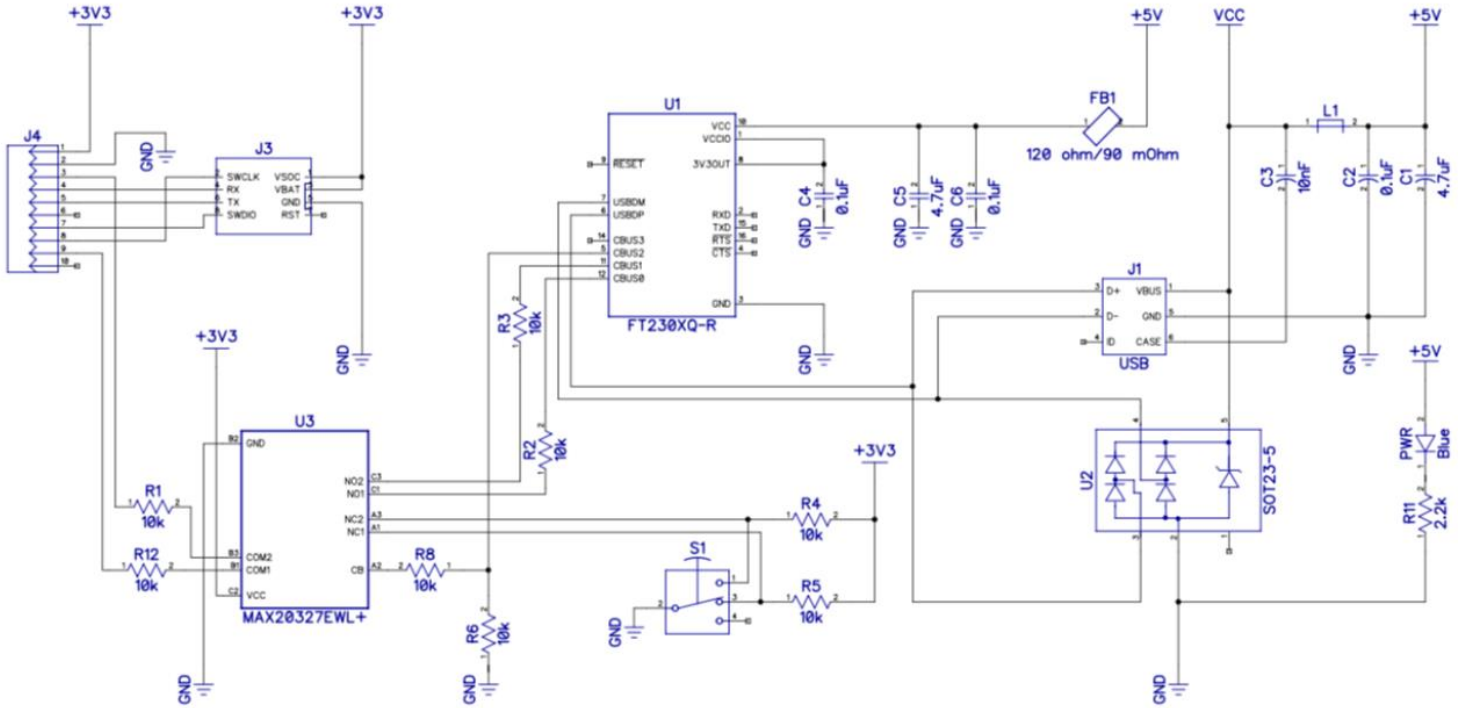
Schematic, PCB, DipTrace

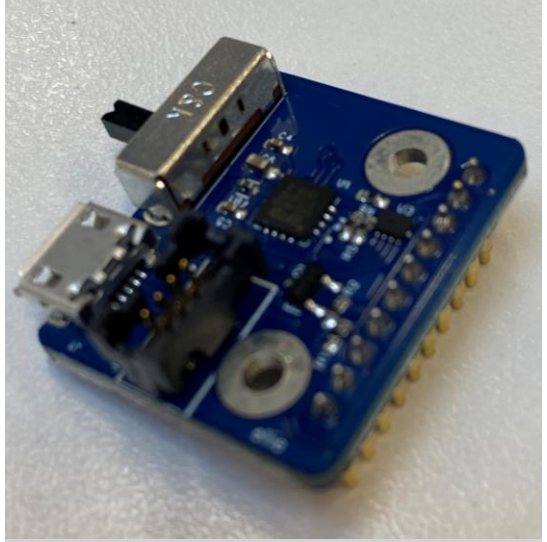
Electrical Engineer at Level Home

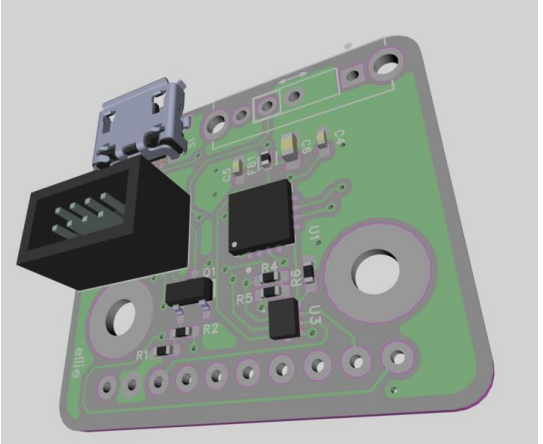
May 2023 – end of August 2023

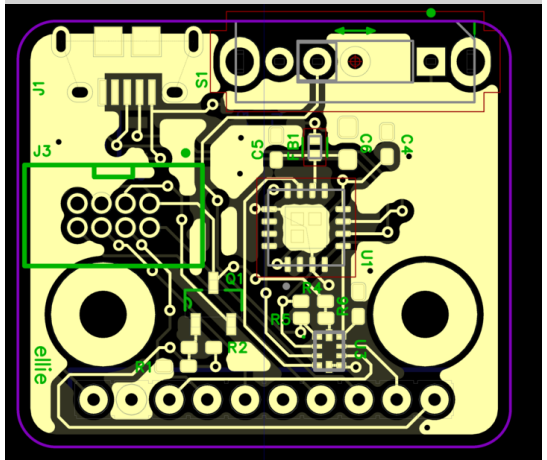
- Gathered needs and developed a PCB (block diagrams, schematics, PCB layout) that could communicate to a product's systems. This incorporated **Jlink, FTDI, analog switches, adaptive power rail systems**, etc. This has been distributed to **50+** fixtures company wide.

Schematic of this board







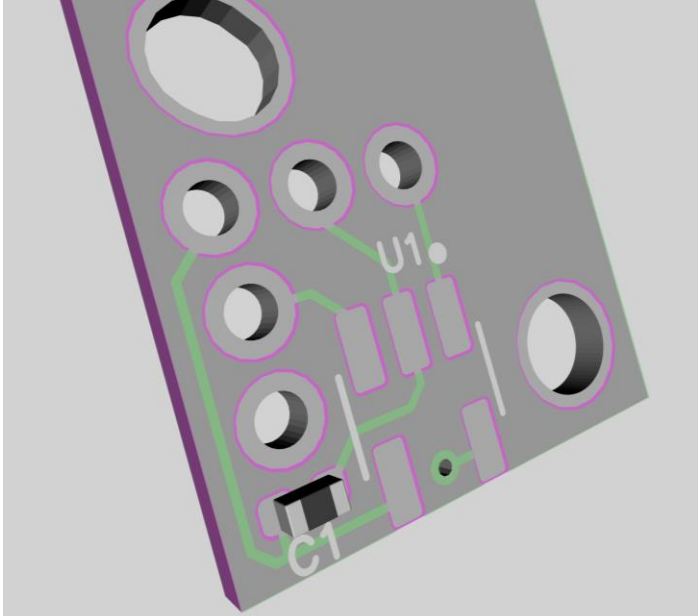


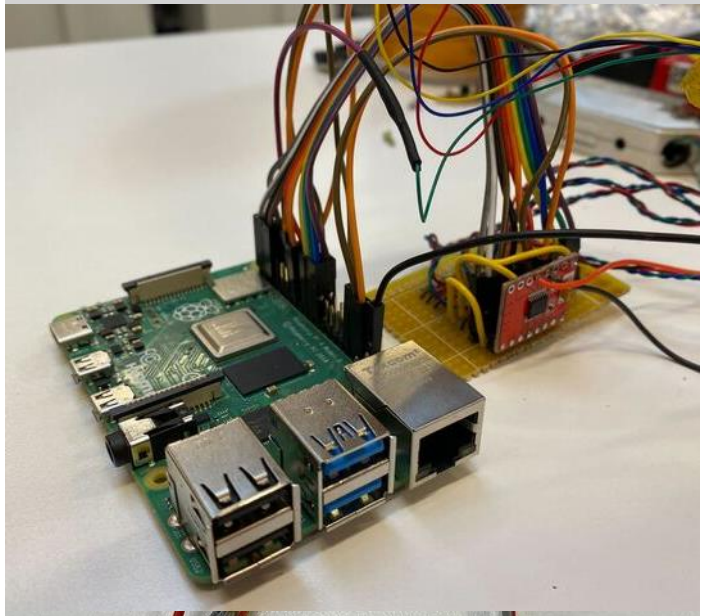
Schematic, PCB, DipTrace

Electrical Engineer at Level Home

May 2023 – end of August 2023

- Led the electrical design and collaborated with the ME team to develop a cycle test fixture . This achieved motor control and position sensing by using **Hall effect sensors, H-bridge drivers, regulators, Raspberry pi** etc.
- Prototyped R&D projects and demonstrated their functionalities to the team. This includes **e-paper, capacitive touch, haptic touch, led boards, UWB, Bluetooth,** etc.
- **Board bring ups** of product PCBs, dev board PCBs. Resolved issues from wrong trace wirings to slow SWD rise times.
- Completed **Python** and **Arduino** scripts to show firmware functionalities of projects and to automate processes. Practiced **OOP** architecture for maintainability and expandability for the future.
- Soldered components as small as 0402 packages under the microscope.



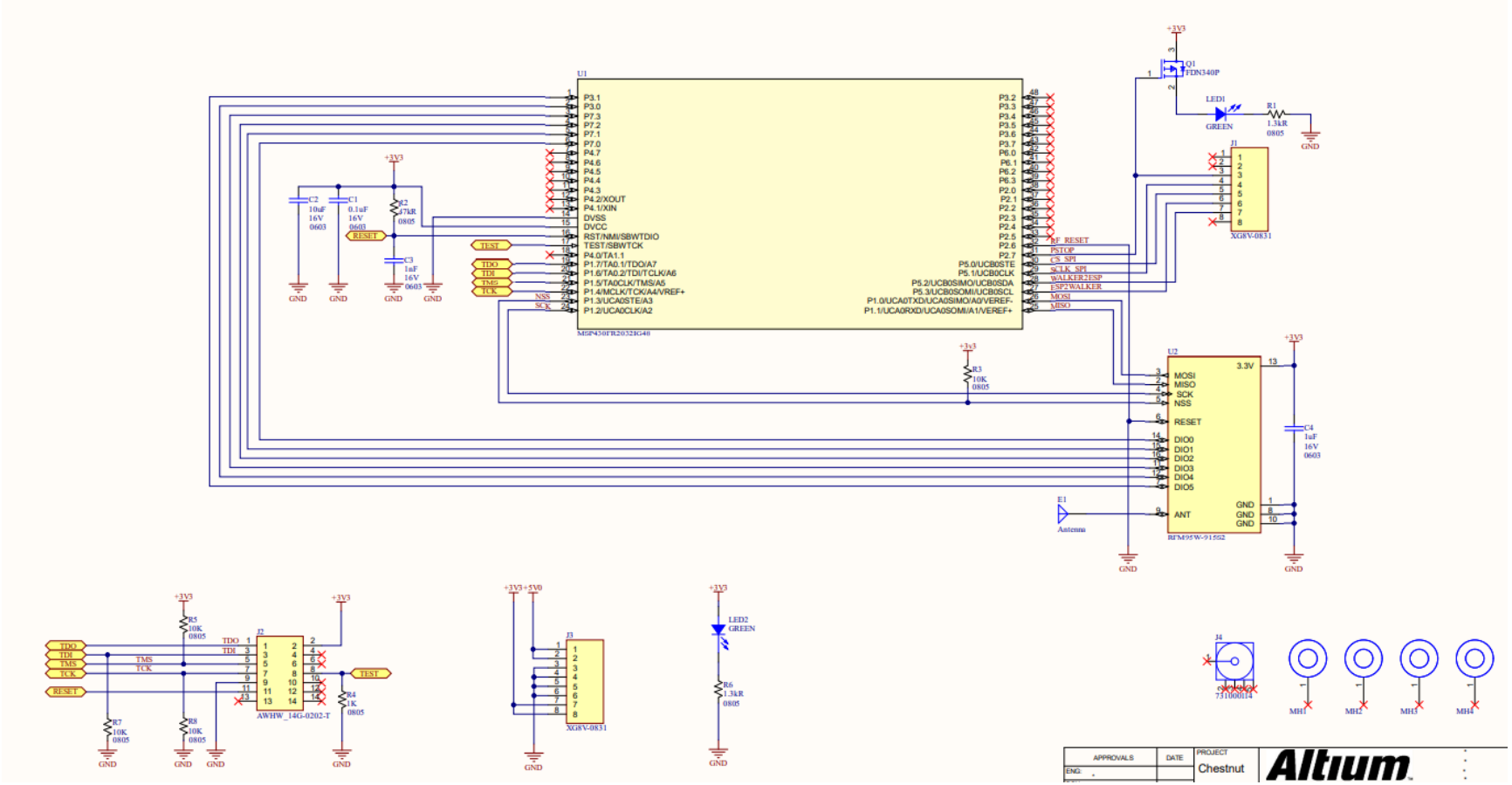


Schematic, Altium

Hardware Engineer at Nuvation Garage

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

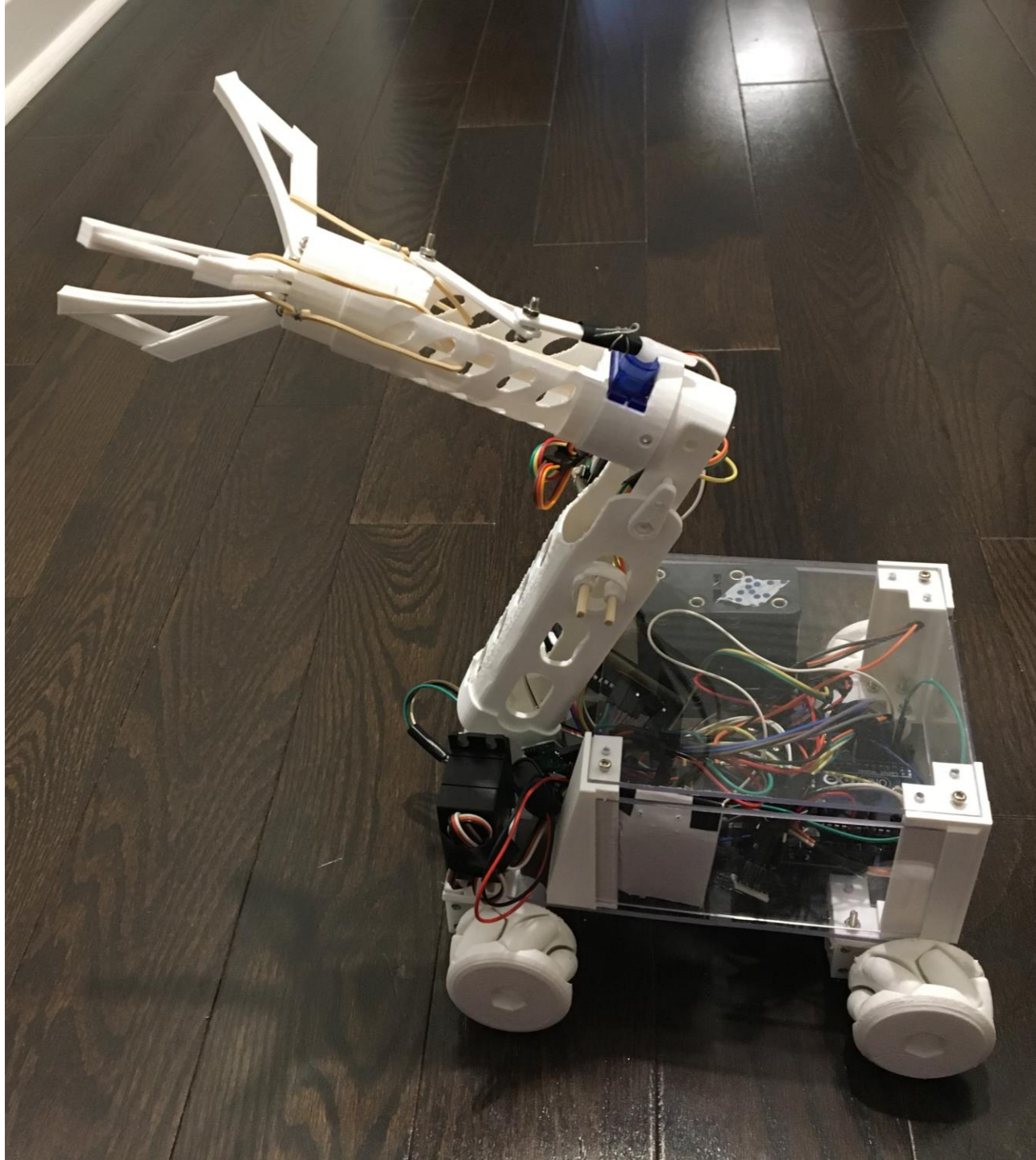
Remote emergency stop receiver schematic

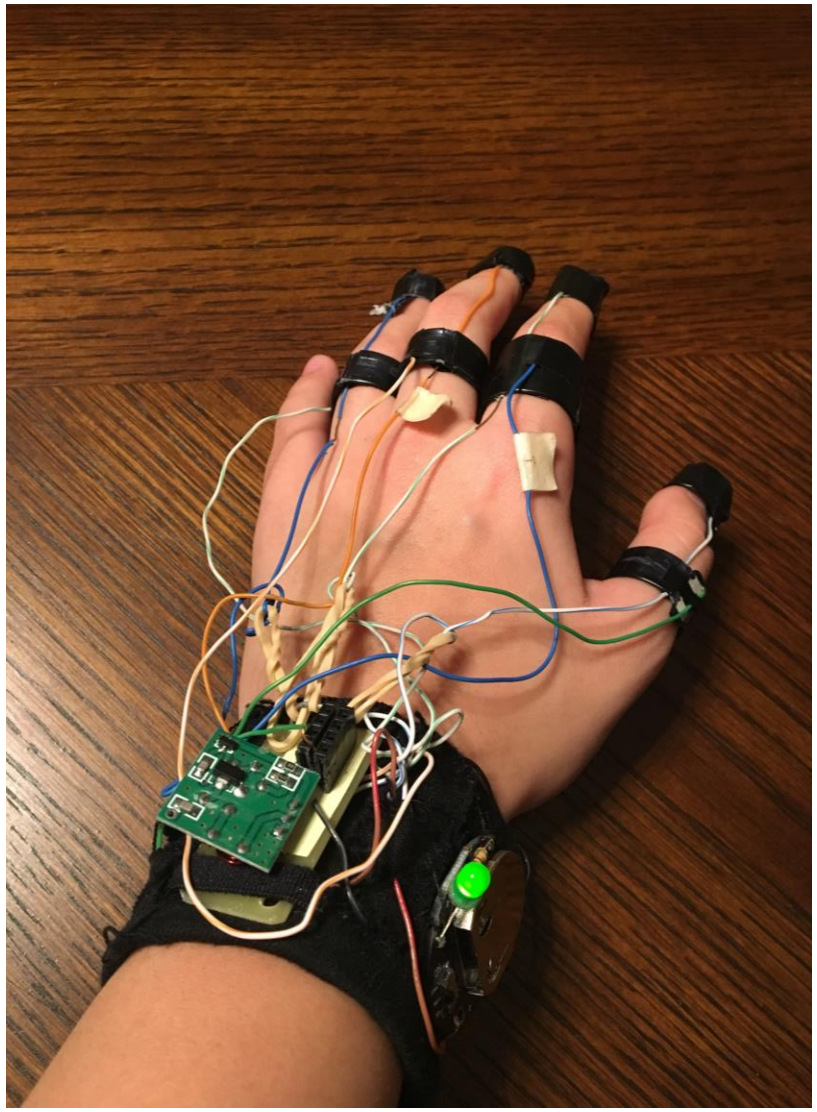


SolidWorks/Inventor, 3D printing,
Arduino, PCB & Schematic Design

CODIA

- 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)

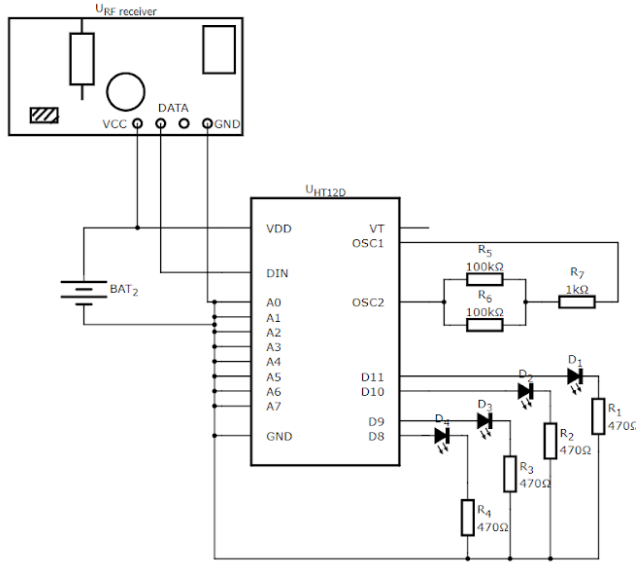
Developed an original low-cost wireless hand-gesture controlled communication system using radio frequency.

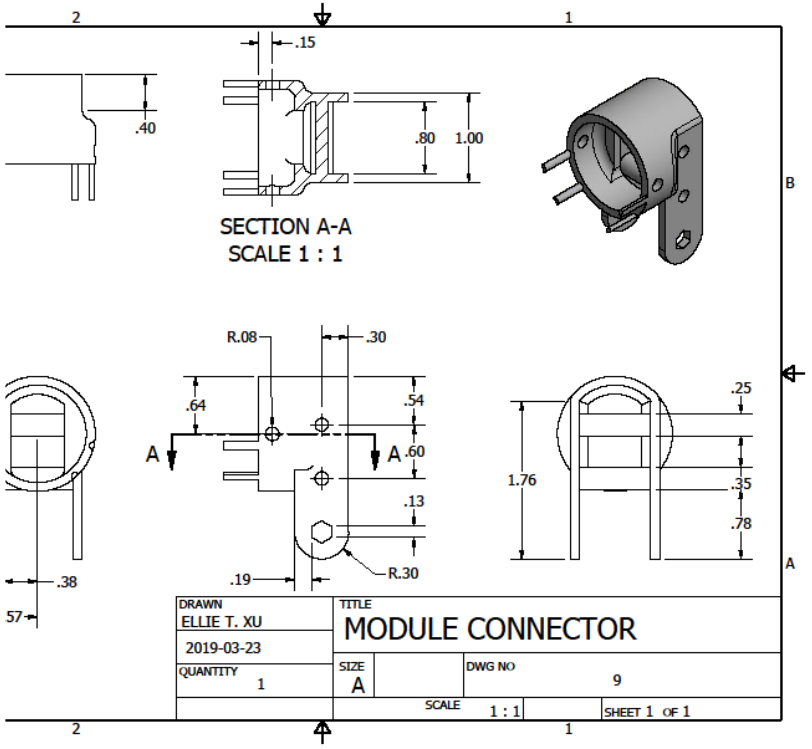
Designed, prototyped, and made all **schematics and PCBs** from drivers to automatic configuration recognition and soldered them.

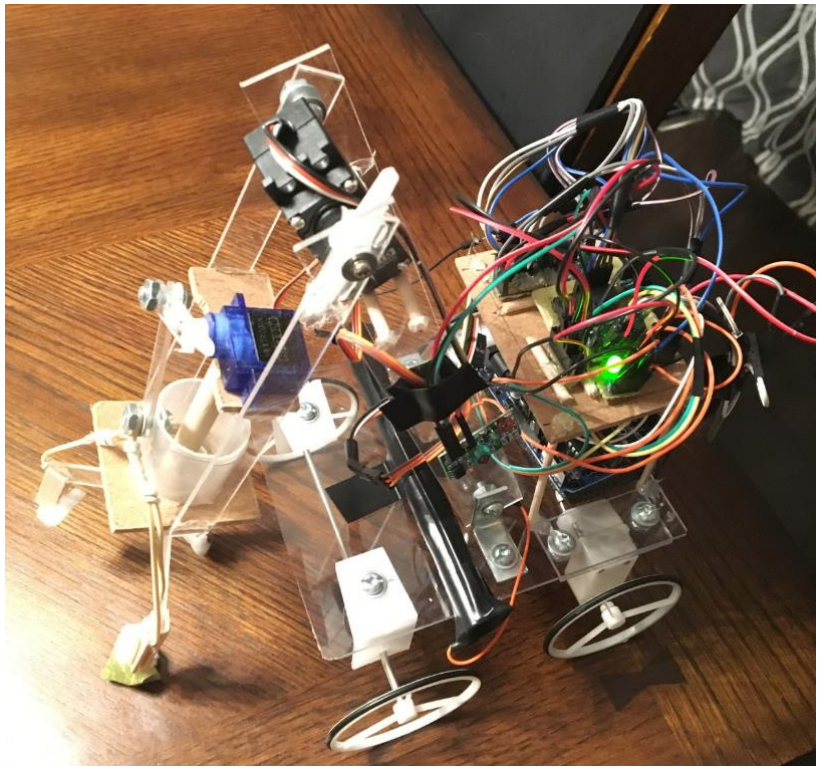
- Prototyped them on breadboards first, then moved to PCB and soldered them.

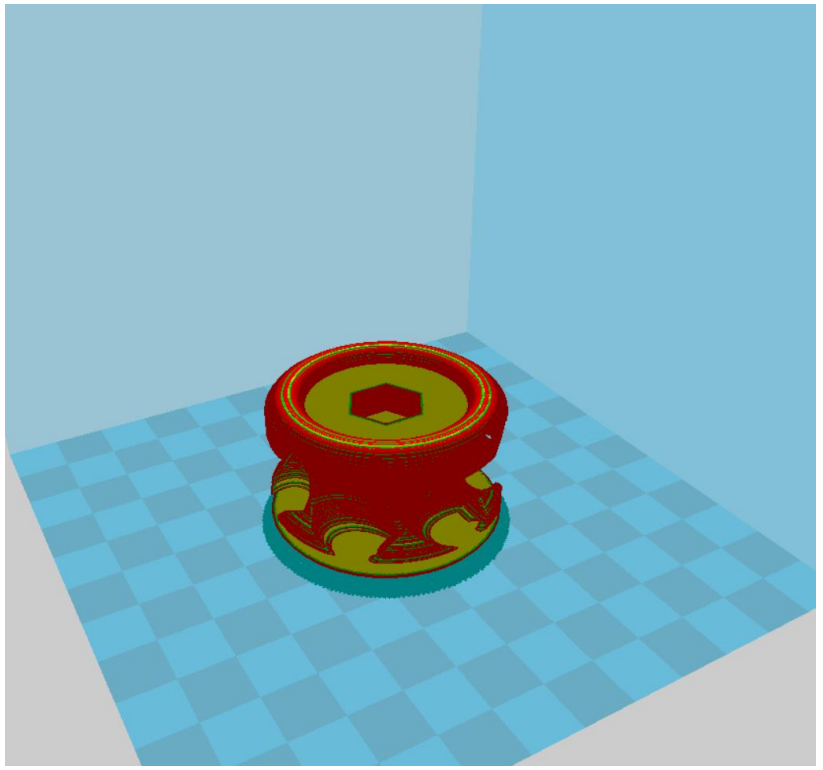
Won several prizes in the Bay Area science and engineering fair.

Won a bronze medal of the senior category at the Canada wide science fair









Mechanical Design

Autodesk 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. Link for more drawings

Prototype

Shop Tools

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

3D Printing

3D Printing.

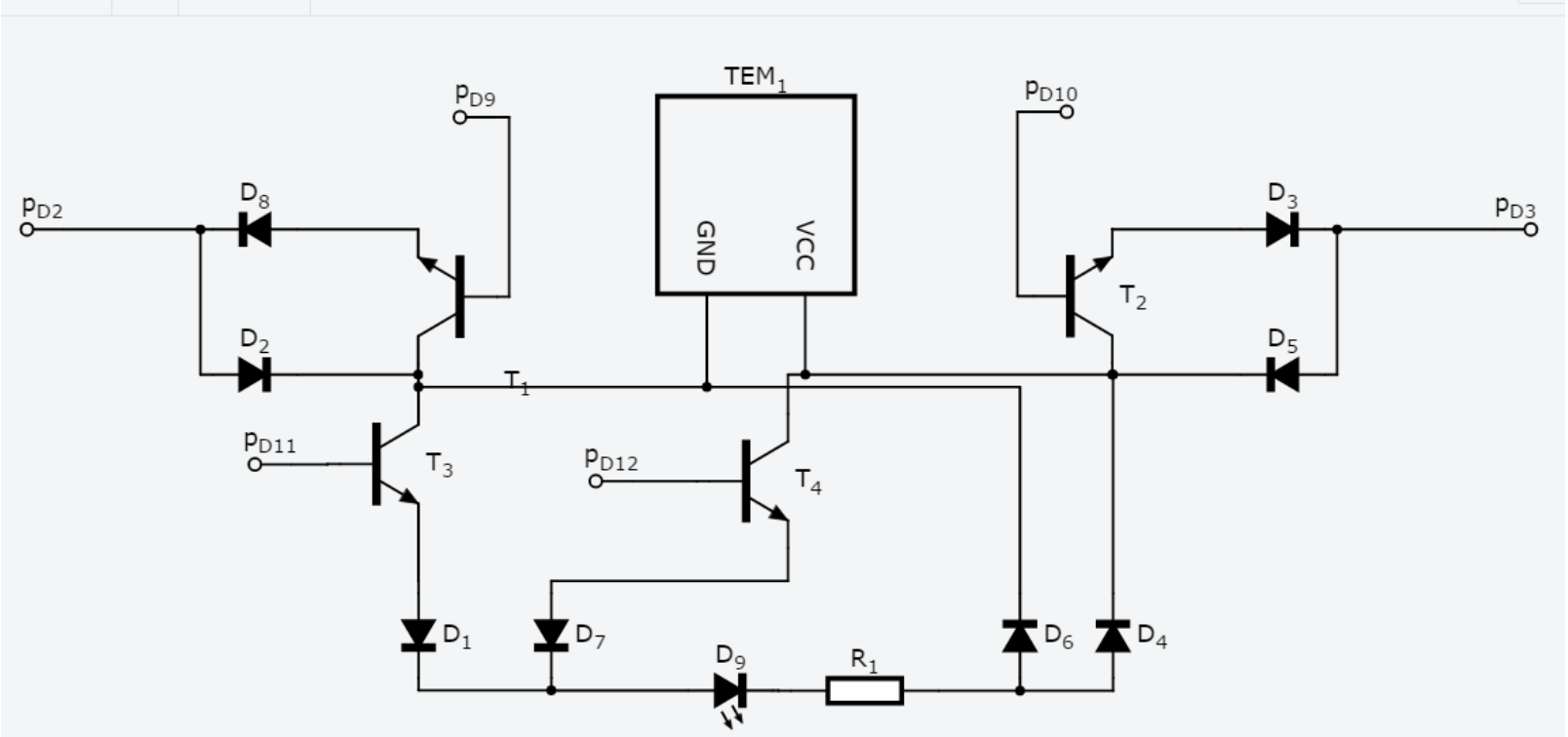
- **3D printed** complex parts with PLA plastic to increase structural integrity, precision, and functionality.

Thermoelectric 3-in-1

- A temperature regulating container that functions based on the Peltier-Seebeck effect.
- It could use the temperature difference between the container contents and the outside to act as a generator.
- It could heat or cool down the items in the container given a power source.

- Adapted an H-bridge to allow current flow in both directions while being controllable over an MCU.
- Remote control over Wifi using an ESP module and by assigning the device a static IP address.

Modified H-bridge Design

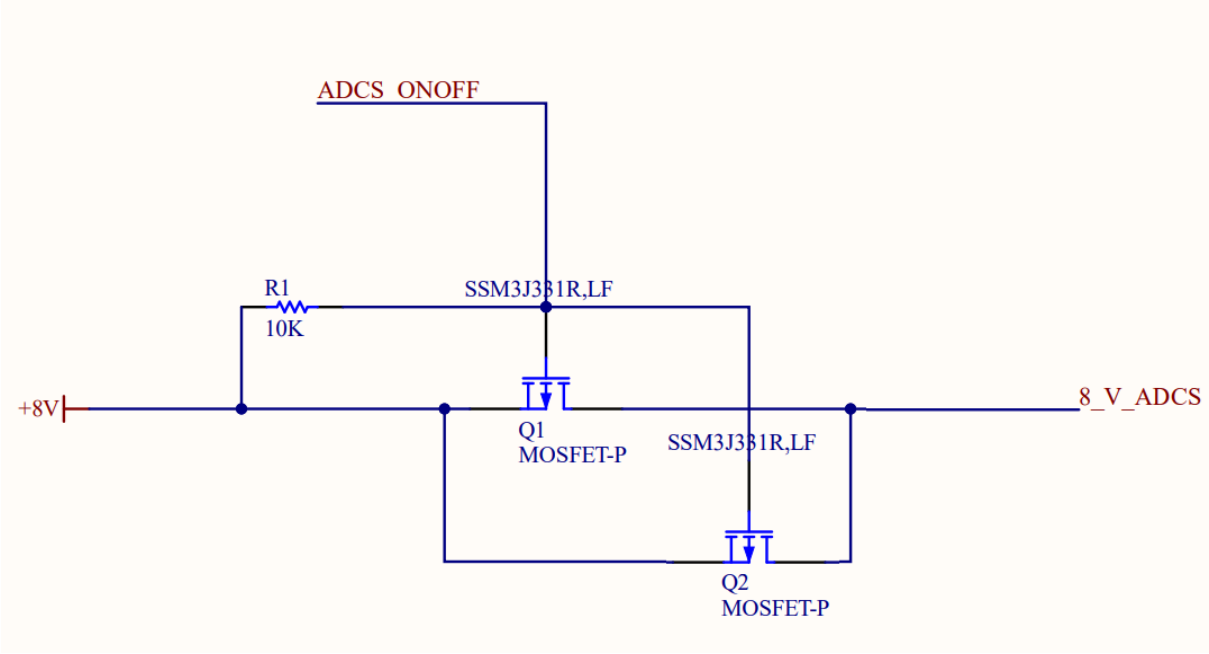


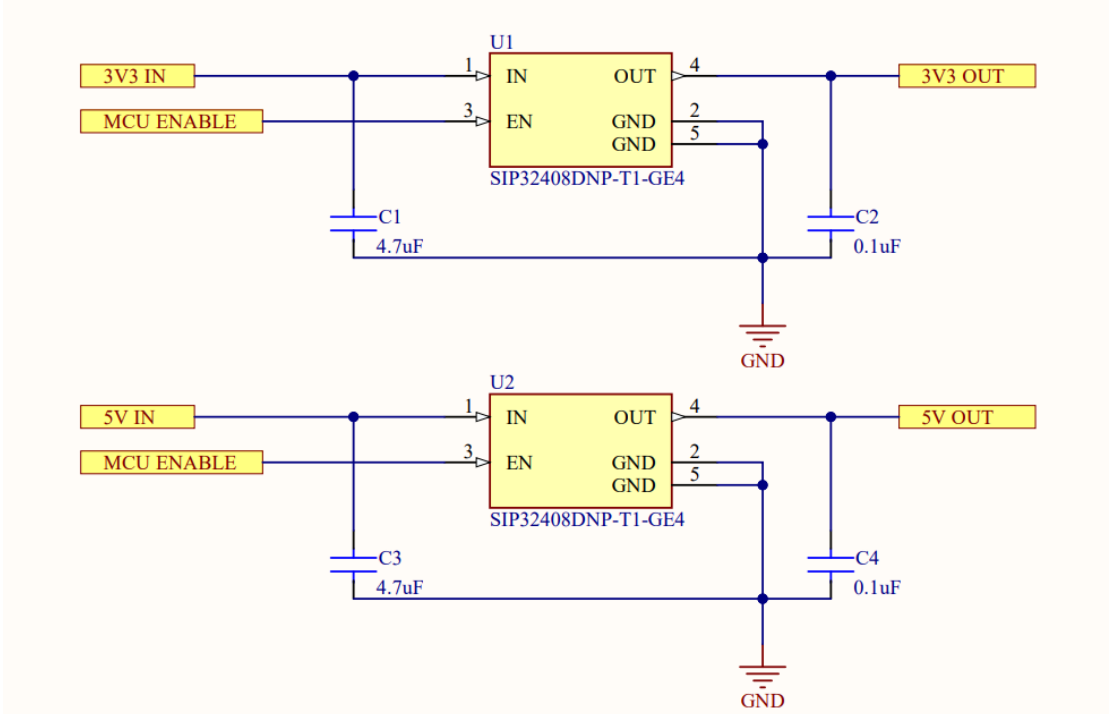
Awarded Gold metal in the Bay Area science and engineering fair.

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**.



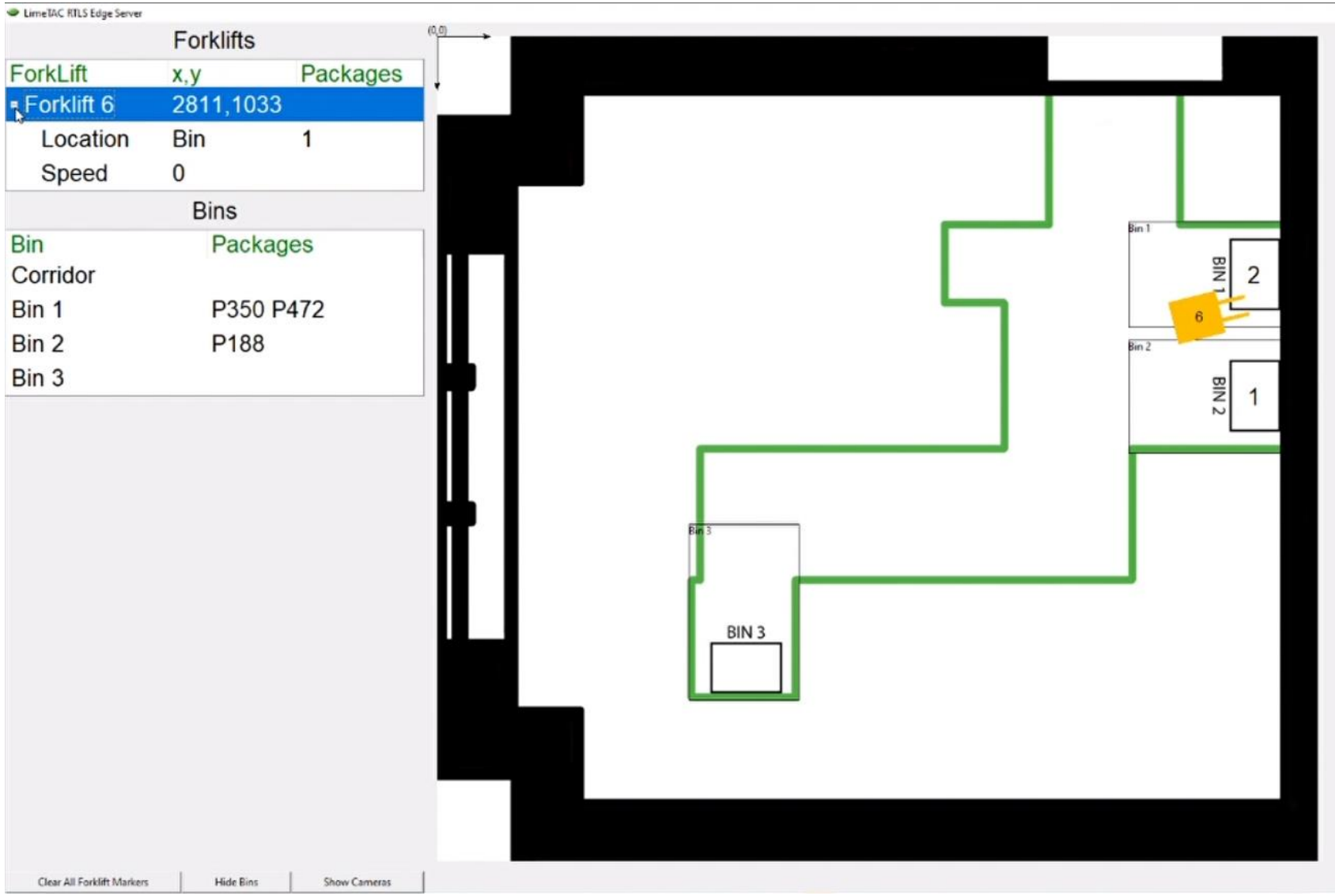


Raspberry Pi, Python, KiCad, Azure storage

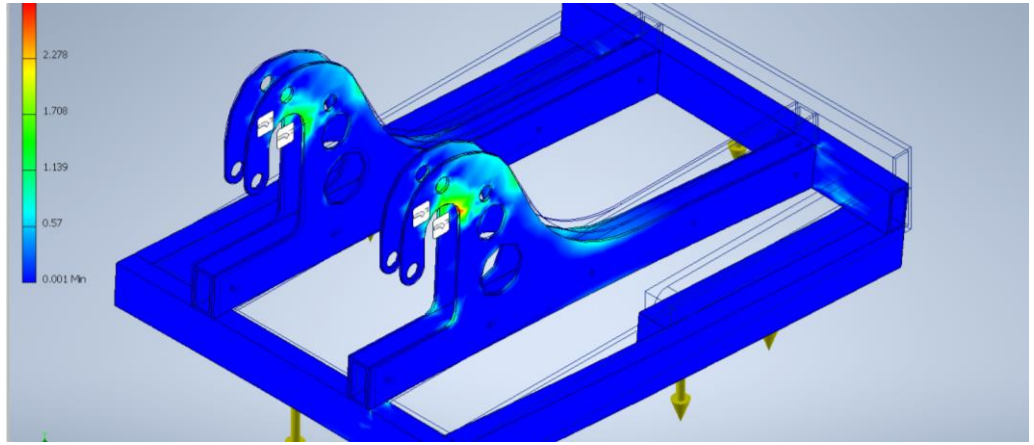
IoT Engineer at LimeTAC

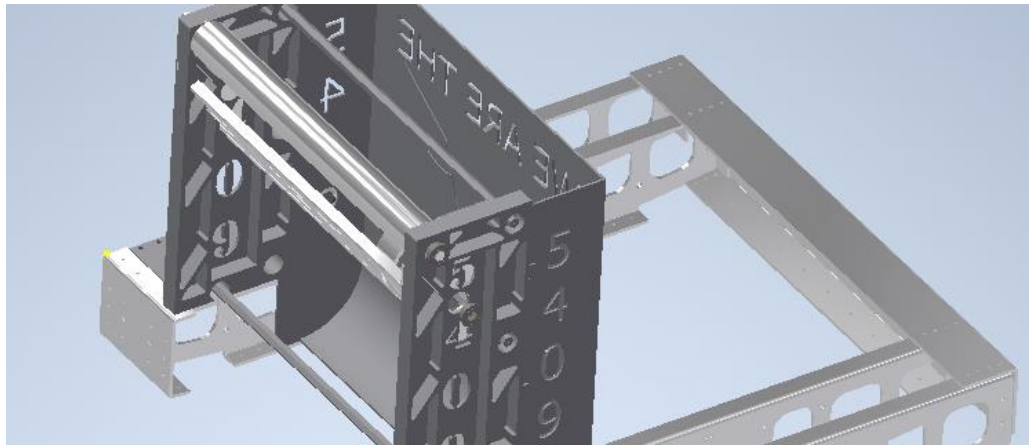
Highlight project: real-time indoor vehicle tracking system

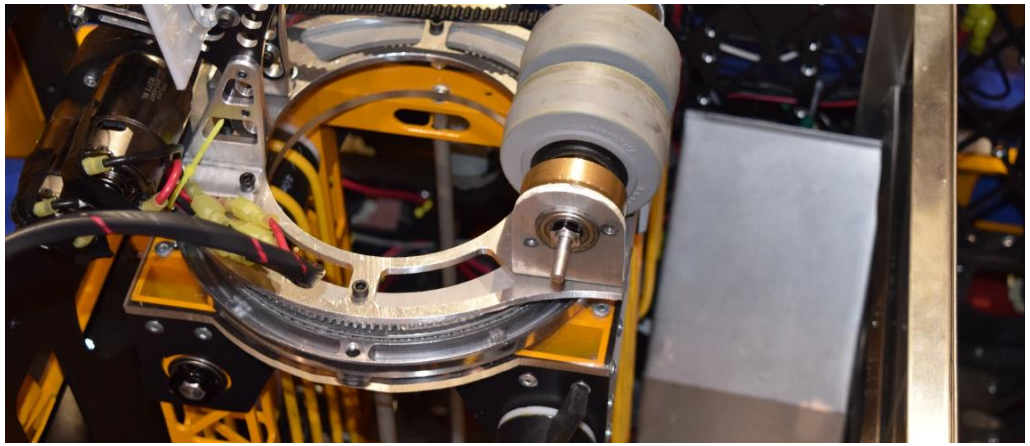
- Developed a system that could track in real-time the location and movements of indoor vehicles (i.e. forklifts in a factory).
- Spearheaded all calculations, geometry, and camera integrations.
- Designed and created the **Python back-end** code and the **Tkinter GUI** shown on the image to the right.
- Conducted research and real time tests for both hardware and software in a warehouse.



Real-time indoor vehicle tracking system GUI







AutoCAD, Inventor, Manufacturing

Core Mechanical Engineer

FIRST Robotics team

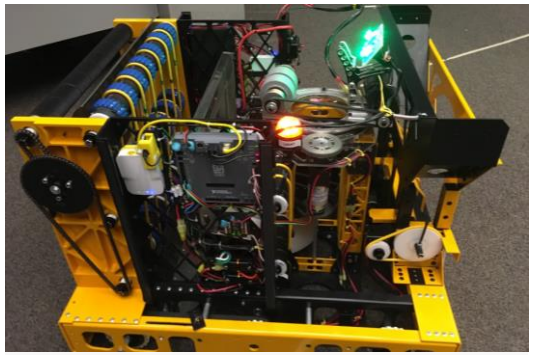
- Produced 2D, 3D, and sheet metal models on **AutoCAD & Inventor** along with drawings that applied GD&T principles.
- Performed virtual **stress simulations** on models before production using Inventor.
- Research and prototyped solutions before officializing the final design.
- Manufactured prototypes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

Core Mechanical Engineer

FIRST Robotics

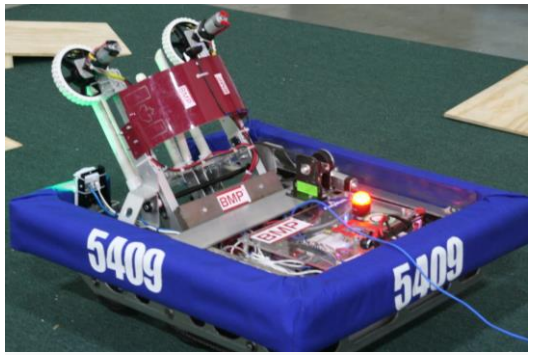
Power Up - 2018

Mechanism of focus: scissor Lift. **Prototyping and 3D modelling** the parts. Then weight reduction and **stress simulations**.



Steamworks - 2017

Mechanism of focus: climbing/intake mechanism. The **physical integration** of this system into the robot.



Stronghold - 2016

Mechanism of focus: non-electrical grappling hooks. **Led the research and prototype** of several solutions from strong springs to tension cords.

Letters of Recommendations

"Ellie demonstrated exceptional creative problem-solving skills that surprised and impressed me on multiple occasions. When presented with a task, she was always able to quickly come up with a variety of solutions. She displayed this ability throughout the term on the various projects she worked on. Ellie had also demonstrated excellent persistence throughout the term. This was reflected on multiple occasions; she impressed me when she decided that unexpected issues did not mean the end of the project, even if those issues were large enough to halt it. Overall, Ellie showed an excellent ability to creatively solve any problems she was faced with and carried with her the persistence to follow through with a task despite the obstacles."

– LimeTAC CTO's comments

"Ellie Xu had exceeded significantly on all expectations. She delivered a high-quality work in a short time. She went above and beyond with all assignments. Always performed exceptionally and had significantly contributed to the organization through her works. She was able to solve complex code independently in a short period of time and even improved to a more efficient algorithms. This was reflected when she was given tasks to convert codes in VB to Python to format hundreds of Excel reports to a format we defined. She was also helping resolving defects on Python script to modify reports in Excel format to comply with AODA guidelines. She was able to perform the tasks without any helps considering the complexity of the codes. Previous students I worked with demonstrated the struggles in understanding and completing the task but Ellie managed to resolve issues we could not in the past."

– Ontario Ministry of Health Supervisor's comments

Some Additional Projects

EatOut

- Web scraped restaurant menus using Selenium, then with Google Cloud API, backend Python, and frontend communication using Flash, nearby restaurants with menus that match customer's preferences were displayed.

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.

EAT
OUT

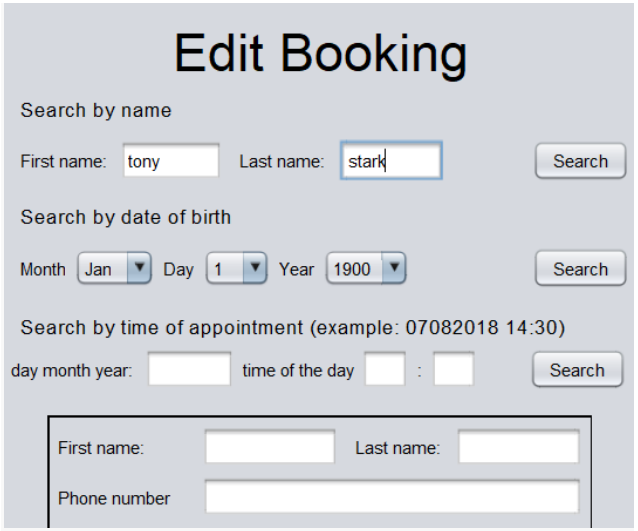
CrowdMotions

- Wrote algorithms on **Java\C#** that learned sentiment values from preexisting data and used them to analyze new data.

Some Additional Projects

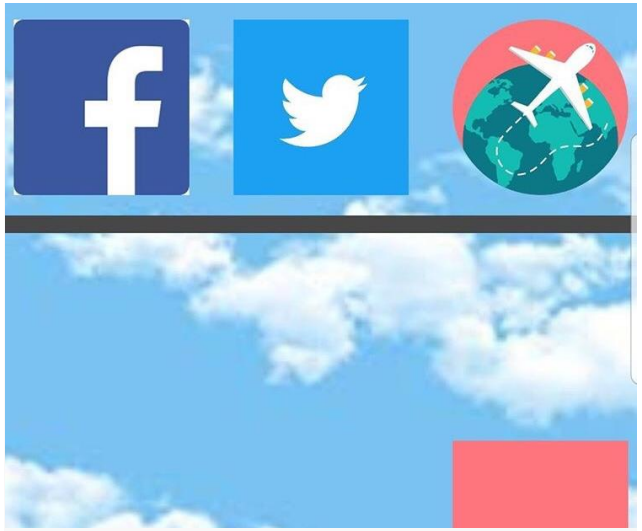
Netflix-N-Chill

- Developed the Chrome extension for the project with Javascript, HTML, and CSS. Then interfaced it with the backend through Firestore.
- Wrote python backend.



Software developer at Halton clinic

- Proposed and programmed a patient booking software on **Java** as an alternative to paper bookings at my co-op placement.



Some Additional Projects

Software Developer at UWAFT team

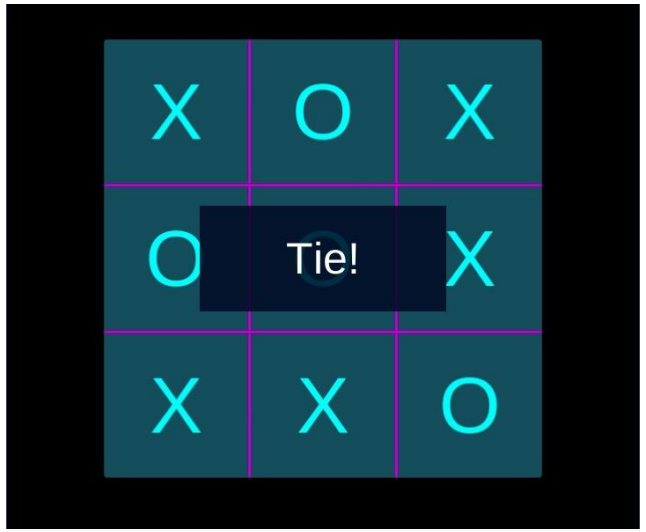
- Developed a dashboard to display sensor data using **Python** OOP (i.e. TKinter) and ROSpy.

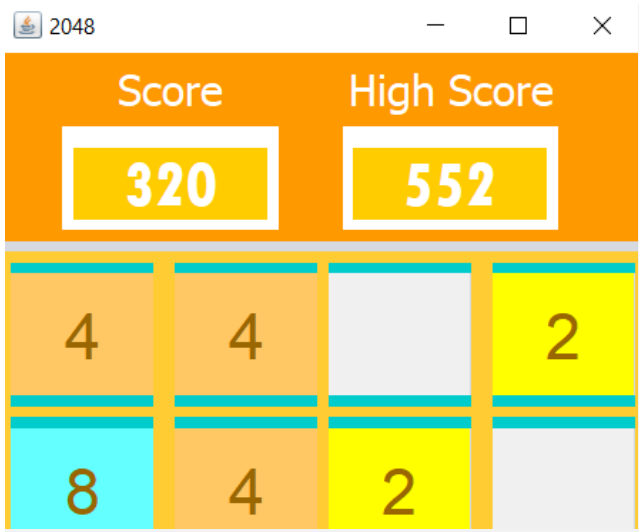
Mechanical Engineer at Watlock

- 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