Engineering Portfolio

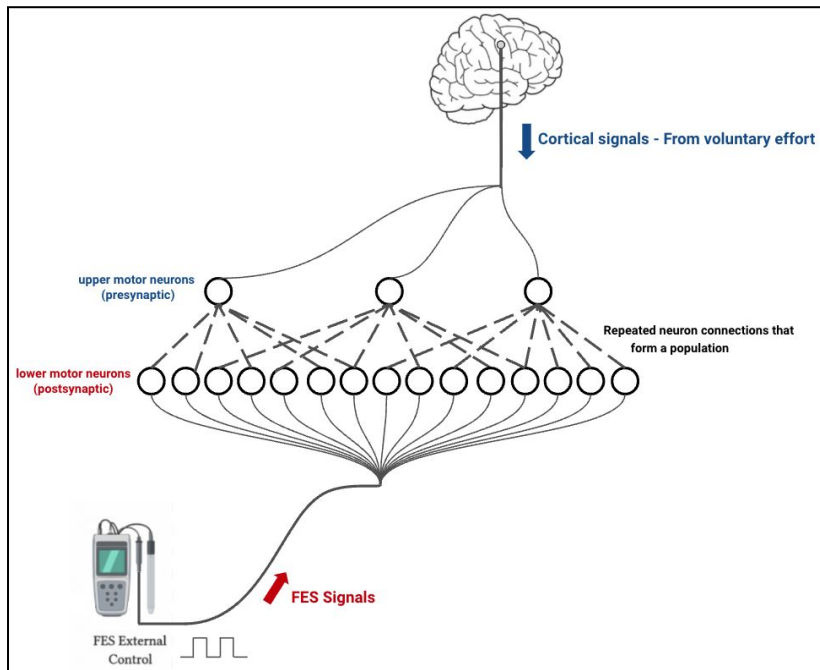Summary of Projects
By: Eren Cimentepe

Part 1. Programming Experience

Computational Neuroscience Research

This figure shows a summary of the model architecture that was implemented to simulate how the spinal cord neurons interact.

- Developed a computational model in Python that uses neural networks to simulate the interaction between upper and lower motor neurons in the spinal cord

  - Access to preliminary code can be found on GitHub

- Effectively managed given time to work under strict deadlines in order to produce results to be submitted for grant application

- Communicated produced results from the simulation and completed the first draft of a research paper that will be submitted to a scientific journal

- Developed programming skills and practiced applying them to biologically accurate scenarios

Pokémon Type Classification Using CNNs

- Gained experience working in a team to successfully complete a complex programming project

- Developed Python code that utilizes Convolutional Neural Networks (CNNs) to classify Pokémon images based on their primary and secondary types

  - Made our project accessible on GitHub for reference

- Enhanced time management skills to efficiently juggle key responsibilities, including coding and training machine learning algorithms, report writing, and conducting research
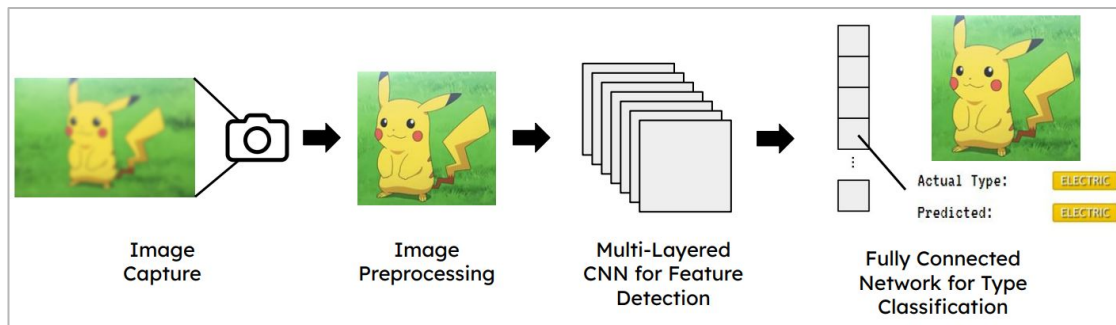
This figure shows a summary of the neural network architecture our machine learning model adopted.

Designing a Geographic Information System

- Utilized C++ and JavaScript to develop both the frontend and backend of interactive map software

- Attempted to solve the "Travelling Salesman" problem and analyzed various tools, including Dijkstra's algorithm, A*, multi-threading, etc.

- Conducted market research and performed an engineering analysis to identify gaps and design a solution that would address the need

- Developed the ability to collaborate in a team to tackle complex, multi-layered programming challenges

- Effectively communicated results through presentations to both peers and supervisors
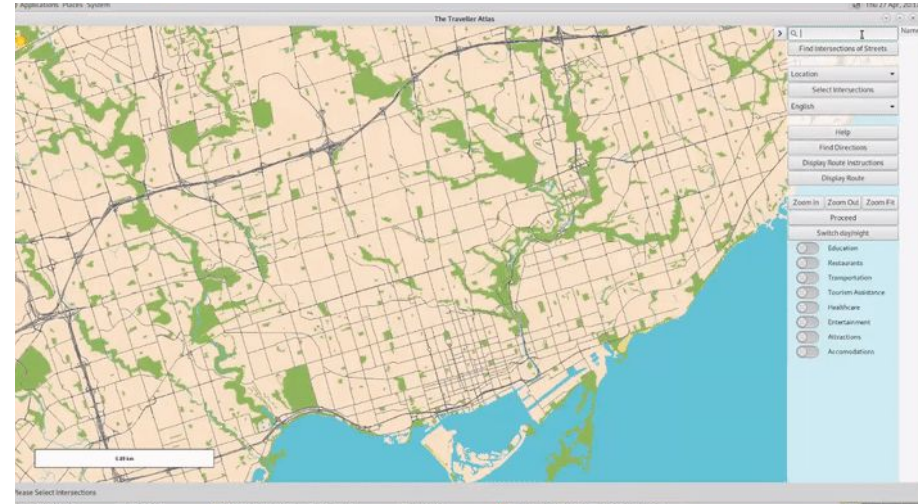
This figure shows a sample snippet of the designed GIS software by our team and some of the different functionality implemented.

Collins Aerospace - Web Development

- Utilized HTML, JavaScript, and Microsoft Tools to completely redesign and implement a new website from scratch, providing the engineering team with a collaborative platform

- Analyzed the specific needs of each sub-team of engineers and made necessary adjustments to the web pages.

- Organized and chaired meetings with other managers to gather feedback on their requirements for improved task performance, and then implemented the requested changes

- Collaborated with the IT team to ensure a seamless migration of tools from older versions of the website to the newer version, meticulously checking for any bugs or issues

- Effectively communicated the results of the newly developed web pages through regular presentations to the supervising team

Part 2. Other Team Projects

University of Toronto Aerospace (UTAT) - Part 1

- Worked in a design team to create a CubeSat destined for space. The mission's objective is to create a crop residue map by capturing images of crop fields in Toronto and transmitting this data back to Earth for analysis

- Developed computer-aided design (CAD) skills while working on the payload mounting system responsible for capturing the images

- Applied iterative design principles by soliciting feedback on mounting designs from industry professionals and incorporating their suggestions

- Participated in Critical Design Analysis sessions where I presented the research and progress of projects I led to the team
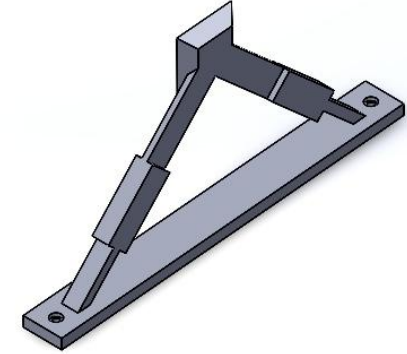
This figure shows a preliminary isostatic mount that I did the CAD model for consideration
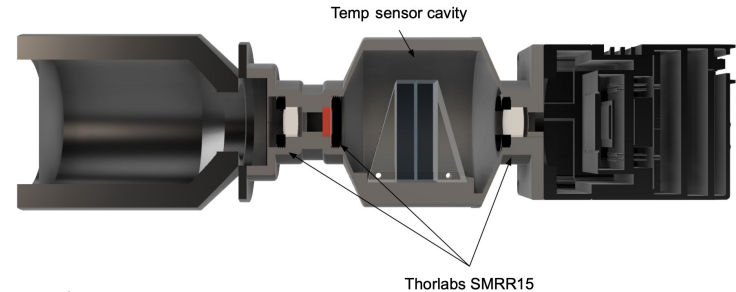
This figure is one iteration of the CAD model for our payload with its components
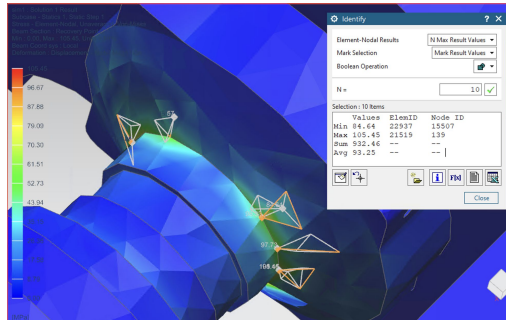
University of Toronto Aerospace (UTAT) - Part 2

This image shows the 3D printed payload components used during the first iteration of assembly tests

An example Nastran simulation ran to analyze how a particular mount performs under quasi-static loads

- Conducted research on the most effective methods for assembling optical components of satellites and drafted a report outlining the steps to follow

- 3D printed and prototyped the payload and its mounts to test the preliminary assembly plan

- Tested the satellite's performance under different loads (static, thermal, vibrational, etc.) using Nastran

- Obtained an amateur radio license to facilitate communication with our satellite by passing the standardized test

- Obtained a license for operating lasers for testing purposes during the assembly process

  - Will use precision lasers (grade 3B) to check the alignment of optical components

Syme's (Ankle) Level Prosthetic Design Project

- Collaborated in a team of four engineers to develop methods for preserving the initial alignment of a Syme's Level Prosthetic

- Presented the findings of our analysis to a client who worked as a prosthetics technician at the University Health Network (UHN)

- Prototyped and 3D printed the proposed solution to assess its viability

  - Utilized CAD software to design the model before 3D printing

- Served as the project manager, delegating tasks to team members and ensuring that the team met tight deadlines
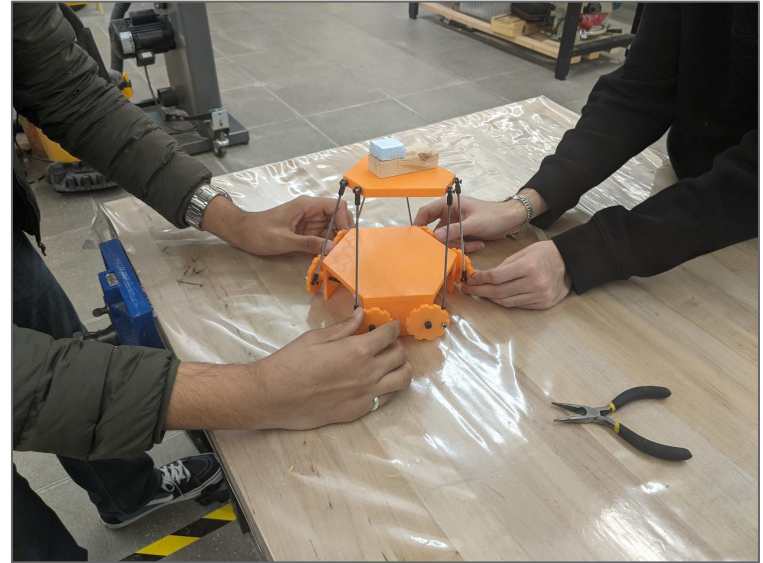
This figure is an image of the 3D printed prototype made to test the design

Thank You