OWEN MOOGK

Mechatronics Engineering Student
at the University of Waterloo

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SKILLS

CAD Software: SolidWorks (6 years), Altium (2 years), AutoCAD (1 year), and Onshape (1 year) for 3D printing and manufacturing.

Mechanical / Electrical: Proficient in 3D printing, design for manufacturing, custom circuit design, PCBs, and microcontrollers.

Other: Experience planning and developing end-to-end hardware/mechanical solutions, debugging electrical systems / PCBs.

EXPERIENCE

Electrical Engineering Student (Co-op) – Wrmth Corp. — May 2025 – August 2025

- Worked as an electrical engineering student designing printed circuit boards for mass production of heated outdoor furniture.
- Created and reviewed schematics for prototyping and mass production, ensuring performance in sub-optimal conditions.
- Designed and routed multi-layer PCBs for mass manufacturing and reliability, reducing board costs by approximately 80%.
- Created test procedures and used oscilloscope debugging techniques to validate circuit board functionality and performance.
- Designed and programmed a custom 3D printed SCARA robotic arm for additive and subtractive manufacturing and production.
- Programmed a custom G-code slicer/translator, including inverse kinematics, safety end stops, and controlled feed-rate.
- Built an IoT communication architecture for component plug-and-play reusability and rapid prototyping support.
- Improved manufacturing processes with logistical and 3D printed solutions, saving time and money in production.

R&D Development Engineering (Co-op) – Hub for Neuroengineering Solutions — January 2024 – April 2024

- Developed engineering solutions to create innovative neuroscience research devices at the University of Lethbridge.
- Built full-stack websites for serving collected data, using Django (Python), ReactJS (JavaScript), and SQL databases.
- Programmed Raspberry Pi microprocessors using Python, to process, interface, and relay recorded information to a user.
- Developed embedded systems code in Python for Linux based operating machines, optimizing speed and performance.
- Leveraged SolidWorks CAD to design mechanical components for 3D printed production, rapid iteration, and prototyping.
- Designed and built electrical circuitry with microprocessors, sensors, and actuators for ease of use and implementation.
- Designed electrical schematics and printed circuit boards (PCBs) for mass production in Altium Designer.
- Debugged electrical systems with multimeter and oscilloscope testing techniques to find and resolve development issues.
- Improved and customized CNC tools, optimizing for production speed and performance.
- Optimized hardware development workflow through an improved version control system and communication procedure.

Operational Software Developer (Co-op) – Rocket Factory Augsburg — September 2024 – December 2024

- Developed operational tools for a 300-person team building advanced rocket technology, using React and FastAPI.
- Built and deployed a web application for part and assembly tracking, directly improving production workflows.
- Designed and built a time tracking application used company-wide, reducing administrative overhead by an estimated 60-70%.
- Improved advanced database ORM architectures for scalability and speed in PostgreSQL, reducing complexity immensely.
- Utilized planning, project management, and communication skills to ensure adoption and integration of tools.

Subteam Lead – FIRST Robotics Team — August 2018 – September 2022

- Led a subteam of students using project management and teamwork skills to design and build a robotic subsystem.
- Designed flexible assemblies and robotic systems in SolidWorks for manufactured and 3D printed fabrication.
- Fabricated complex parts and assembled robotic systems, troubleshooting and optimizing mechanical systems.
- Led the team's sponsorship program, using networking and interpersonal skills to attract and retain sponsorship for the team.

EDUCATION

Mechatronics Engineering – University of Waterloo — 2022 – 2027

- Candidate for Bachelor of Applied Science studying Mechatronics Engineering, with a grade average of 95% / 4.0 GPA.
- Presidents Scholarship of Distinction, Douglas Wright Award, International Experience Award, Dean's Honors.
- Relevant courses: Deformable Solids, Sensors / Instrumentation, Statics / Dynamics, Design of Machines, Materials.

PROJECTS

Heated Chair PCB

- Designed schematics and layout for a PCB, designed to run firmware for heated outdoor furniture.
- Developed schematics and CAD in **Altium**.
- Routed microprocessor signals to components, supporting heaters, temperature sensors, and LED lighting, from an ESP-32.
- Included high current heater controls, a **watchdog safety mechanism**, and overheating + **short circuit protection**.
- Implemented power converters, managing three power levels across the board.
- Validated and tested board with **oscilloscope** and multimeter debugging techniques, ensuring a safe bring-up.

Custom Built MacroPad

- Designed, built, and programmed a complete MacroPad. Capabilities include executing complex keystroke instructions, Spotify API calls, and much more.
- Designed the custom **3D printed** housing and keycaps in **SolidWorks**.
- Designed a custom **PCB (printed circuit board)** for ease of integration.
- Built a custom mounting system that allowed integration with existing keyboards.
- Integrated hardware switches with an **Arduino Nano**, which interfaces with a PC.
- Programmed logic with **C++** and **Python**.
- Project details: https://owenmoogk.github.io/projects/macropad

Syringe Pump – Hub for Neuroengineering Solutions

- Designed and built an **autonomous** water dispensing system, for feeding lab animals after a behavioral trigger or on a timer.
- **3D printed** precision components designed in **SolidWorks** for ease of assembly.
- Implemented a threaded rod carriage for precise output volumes (to the **µL**).
- Designed and built circuitry for wired for communication with a **Raspberry Pi** microcontroller (over **SPI** and **I2C**).
- Debugged mechanical and software systems, solving integration issues.
- Programmed the device in **Python**, optimizing for precision and ease of use.
- Integrated device with standardized mice cages, for neuroscience research purposes.
- Project details: https://owenmoogk.github.io/projects/syringe-pump
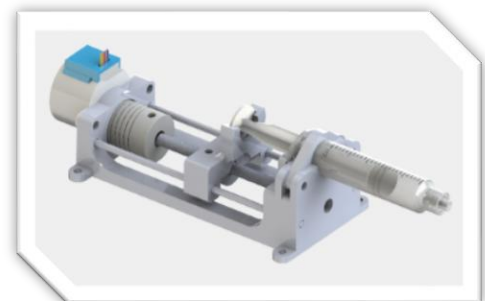
Multi-Function Feeder – Hub for Neuroengineering Solutions

- Designed a rodent cognitive testing device in **SolidWorks**, with an inbuilt logic and reward feeding system.
- **3D printed** components for rapid prototyping, assembly, and use.
- Designed a **modular accessory system**, allowing for a variety of functionality, dependant on a researcher's goals and use-case.
- Integrated **sensors** with **actuators** through system-level logic in **Python**.
- Utilized communication protocols including **I2C** and **SPI**.
- Tested device with rodent behavior, ensuring proper functionality and usability.
- Project details: https://owenmoogk.github.io/projects/multi-function-feeder
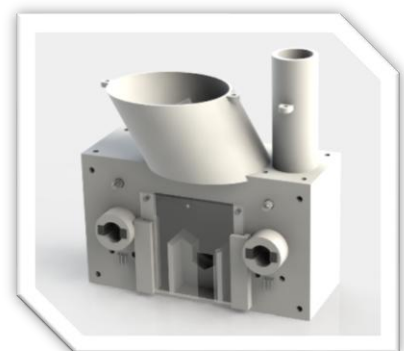
These are some of my favourite and most applicable projects.

For a complete list of projects and more details, visit my website's project page, located at:

https://owenmoogk.github.io/projects