OWEN MOOGK

Mechatronics Engineering Student

at the University of Waterloo

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# SKILLS

**Software Development:** Python (6 years), JavaScript/jQuery (6 years), C++ (2 years), C# (1 year), Java (1 year), and SQL (1 year).

**Frameworks / Tools:** React (4 years), MVC/ASP.NET (1 year), Django (1 year), FastAPI (1 year), Visual Studio, VS Code.

**Design & Engineering:** SolidWorks (6 years), AutoCAD (1 year), and Onshape (1 year) for 3D printing and manufacturing.

**Other:** Experience working closely with a team, using agile development techniques, including version control with Git / TFS.

# EXPERIENCE

## 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.
* Implemented web application features for part and assembly tracking, directly improving production workflow.
* 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.
* Optimized codebase structure, refactoring and enhancing existing code to enhance performance, reusability, and scalability.
* Utilized Git pipelines to improve testing and deployment of applications, ensuring quality and usability of tools.
* Implemented CRUD features in a modular manner, allowing for optimal code reuse and development ease.
* Utilized planning, project management, and communication skills to ensure adoption and integration of tools (studying workflows and designing with the user in mind).

## Research and 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), React (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 tools 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 maintained CNC tools, optimizing production speed and performance.
* Optimized hardware development workflow through an improved file storage and communication procedure.

## Software Developer (Co-op) – BusPlanner Inc. May 2023 – September 2023

* Developed and maintained web applications using the MVC ASP.NET framework, ensuring robust solutions for clients.
* Implemented and improved many web application features, directly affecting hundreds of clients across North America.
* Resolved issues on both the frontend and backend, employing debugging skills to identify and fix bugs, optimize performance, and enhance application usability with tools including C#, JavaScript/jQuery, and Bootstrap.
* Designed SQL database solutions and advanced SQL queries for efficient data retrieval and manipulation.
* Improved codebase structure, refactoring and optimizing existing code to enhance performance, reusability, and scalability.
* Utilized Azure DevOps and TFS version control to manage source code and participate in code reviews among team members.
* Conducted thorough testing of web applications to identify issues, ensuring optimal functionality and user experiences.

# 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: Circuits, Digital Logic, Thermodynamics, Statics / Dynamics, Advanced Calculus, Real-time systems.

# PROJECTS

## Chess Robot

* A picture containing indoor, automaton

  Description automatically generatedDesigned and built an **autonomous** chess robot, which performs moves against players.
* Capabilities include maneuvering chess pieces, executing moves, receiving player input, and chess clock integration.
* Designed and assembled a robotic claw, pulley systems, and precise actuation mechanisms, using **3D printed** and **laser-cut** parts.
* **Debugged** mechanical and software systems, solving integration issues.
* Programmed the robot in **C++** and **RobotC**. Built feedback loops with the use of color sensors and motor encoders.
* Project details: <https://owenmoogk.github.io/projects/chess-bot>

## A picture containing wall, indoor, pink Description automatically generatedAI-Powered Cat Feeding Robot

* Designed and programmed a **3D printed** robot to autonomously feed pets.
* Developed CAD models for 3D printing in **SolidWorks**.
* Built microcontroller circuits, integrating an **Arduino** with other simple electronic components, such as LEDs, limit switches, and servos.
* Utilized **Computer Vision** to detect a cat via an onboard webcam.
* Programmed the robot in **C++** and **Python** to detect a cat’s presence and dispense food, given specific criteria.
* Project details: <https://owenmoogk.github.io/projects/cat-feeder>

## A picture containing floor, indoor, keyboard Description automatically generatedCustom 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>

## A picture containing automaton Description automatically generated

## Vortex - FRC Robot Design Challenge

* Designed a complete FRC Robot in **SolidWorks**, with the design intended to be used in a competitive robotics match.
* Integrated object intake systems with a robot feeder and shooter, giving full control to game pieces.
* Designed an object elevator, opening additional manipulation and movement opportunity.
* Designed a swerve drive system for optimal movement and drivability.
* Project Details: <https://owenmoogk.github.io/projects/vortex>

## These are some of my favourite and most applicable projects.

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

<https://owenmoogk.github.io/projects>