Andrew Montgomery

amontgom@uwaterloo.ca | github.com/Skullheadx | linkedin.com/in/andrew-montgomery

Technical Skills

Programming: Python *(5+ years)*, C/C++ *(3 years)*, Bash/Unix scripting, CMake, Git, NumPy, VHDL
Technologies: Visual Studio, Linux, STM32CubeIDE, Quartus Prime, KiCAD, Shaper3D, Vim, Nix, Office, Jira
Hardware: Soldering, Multimeter, Oscilloscope, Function Generator, Bench Testing, Custom Fabrication, 3D Printing

Professional Experience

Peel Regional Police Mobile Technology Unit Jan. 2025 – Apr. 2025
Co-op Student

- Up-fitted police cruisers with emergency vehicle **lights, sirens, amps, radios, computers, and cameras**
- **Measured, designed and 3D-printed** custom brackets and mounts using ABS Resin and Carbon Fiber filament
- **Bench tested, and repaired** emergency vehicle light bars to ensure compliance with industry standards
- Diagnosed and solved 10+ electrical issues using **digital multimeter to isolate faulty components**
- Performed **unit, integration, and system-level tests** on embedded hardware to ensure electrical reliability and safety in vehicle environments
- Maintained, repaired and installed **IT equipment** for Aerial Support and Prisoner Escort Police units
- Obtained security clearance and passed background check to work with sensitive police infrastructure

Lifeguard & Aquatics Instructor Sept. 2022 – Aug. 2024
Trained in life-saving response and led instruction in high-pressure public safety environments Brampton, Ontario

Projects

STM32 Embedded System QR Code Scanner | *C++, Embedded Programming, Computer Vision* Oct. 2024

- Implemented ISO/IEC 18004:2005 QR code **generation and decoding** in **C++** on an STM32 microcontroller, optimized for limited memory and CPU resources
- Built full decoding pipeline: locating finder patterns, binarizing data, de-masking, and decoding codewords with **Reed-Solomon and Hamming Distance** error correction
- Scored and selected optimal QR mask pattern using **penalty rules** defined in the QR specification to improve symbol readability
- Used **bitwise operations, fixed-point arithmetic**, and static memory allocation to meet tight embedded constraints
- Handled all QR symbol processing; integrated into a larger system in collaboration with teammates responsible for image capture

YouTube Video Downloader CLI – ytdl | *Python, Pytube, Unix scripting, pip* Oct. 2024

- Developed a cross-platform **command-line tool** using the Pytube **API** to download YouTube videos and playlists
- Packaged and deployed CLI via `pip`, resolving **OS-specific compatibility issues** on macOS, and Windows
- Handled separate high-quality video/audio streams by **automatically merging them using FFmpeg Python**
- Fetched video metadata including **title, thumbnail, and view count**, embedding it into output file naming and tagging

Police Emergency Response Training System | *Embedded Programming* Apr. 2025

- **Designed, sourced and fabricated** a mock police light bar and siren system, satisfying client requirements
- Programmed 8 custom sounds, 5 siren tones and 7 different flash patterns using priority and grouping features to build **robust and intuitive logic**
- Performed extensive **system testing** to verify correct siren sound playback and synchronized light bar behavior under various operating modes
- **Documented code and circuit designs** to ensure ease of future maintenance and repairs

Fruit Ninja | *Python, Pygame, sdl2* Jul. 2023

- Used **GPU** to quickly render thousands of visual effects, improving frame rate up to **20x** over CPU rendering
- Developed a novel image-slicing algorithm allowing **directionally-accurate cutting of arbitrary images**
- Applied **SOLID design principles and OOP** to ensure ease of maintenance and extensibility for future features

Education & Awards

University of Waterloo [GPA:3.9] Sept. 2024 – June 2029
Candidate for Bachelor of Applied Science in Electrical Engineering Waterloo, ON

- Top 0.8% globally on Hypatia Math Contest; DECA Ontario Provincial Champion and ICDC Qualifier