

Shiva Prakash

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Education

University of Waterloo – [BASc, Electrical and Computer Engineering](#)

Sept. 2025 - April 2030

Work Experience

Electrical Engineering Intern – [Bracket Bot Inc.](#) | San Francisco, CA

Sept. 2026 - Present

- Designed hardware for robot arm control, from schematic capture to 4-layer PCB layout and bring-up in KiCad
- Designed a dual-input power tree converting 20V and USB-C 5V inputs to a 12V motor rail and regulated 3.3V rail for STM32G071 MCU
- Performing staged board bring-up and embedded integration, verifying power rails and digital interfaces with oscilloscopes, logic analyzers, and bench supplies

Mechatronics Engineer Intern – [Titan Haptics Inc.](#) | Mississauga, ON

Jan. 2026 - April 2026

- Designed hardware for haptic reference designs, from initial architecture and schematic capture to PCB Layout and bring-up in KiCad.
- Reduced system footprint of breadboard prototypes by ~60% through high-density layout and optimized routing of ESP32 MCUs, IMUs, and dual H-bridge motor drivers.
- Debugged system latency and firmware using Serial/UART protocols, successfully synchronizing I2C sensor data with motor actuation to achieve < 10ms response times.
- Developed electromechanical assemblies in Fusion 360, utilizing rapid 3D printing to iterate on mechanical coupling methods that maximized user-perceived haptic fidelity.

Technical Projects

[Aether](#) - Dual-Processor Bluetooth-to-USB audio bridge

- Designed a USB-powered Bluetooth audio interface that converts mobile-device A2DP audio into USB Audio input for Windows PCs using a Microchip BM83 audio module and STM32-based USB interface stage.
- Developed a 4-layer PCB with USB-C power/data, controlled USB 2.0 routing, I2S digital audio interconnects, ESD protection, separated power domains, and BM83 antenna keepout/placement constraints in KiCad
- Built a custom 5V-to-3.6V buck converter power tree with rail segmentation for Bluetooth/digital loads.
- Designing for board bring-up and failure isolation with SWD access, BM83 configuration headers, reset/pairing/mute controls, RGB state indicators, and dedicated test points for USB, I2S, UART, and power rails.

[Naiad](#) - Ultra-Low Power Hydration Reminder

- Engineered an ultra-low power keychain on a 4-layer PCB in Altium Designer, leveraging STM32U0 and BMA400's low-power modes, and strategic component selection to maximize battery life for portable use (< 5µA Quiescent)
- Designed an automatic power-path switching circuit using a P-FET (SSM3J64CTC) and Schottky diode to allow seamless transitions between USB-C power and a LIR2032 coin cell.
- Engineered a Li-ion power management system featuring an MCP73831 charging controller and low-power voltage supervision (XC6135) to manage the full charge/discharge cycle of an LIR2032 cell.

[Project Hermes](#) - Raspberry Pi Game Streaming Handheld

- Designed a handheld gaming system integrating Raspberry Pi 4, a custom RP2040 controller PCB, and 7" LCD display
- Engineered a custom USB HID controller PCB using RP2040-Zero and GP2040-CE firmware
- Overcame power constraints by implementing a 5000mAh UPS system with USB-C passthrough, extending runtime to 3 hours under load
- Prevented thermal throttling by integrating active cooling and 3D-printed housing, sustaining stable 1080p streaming

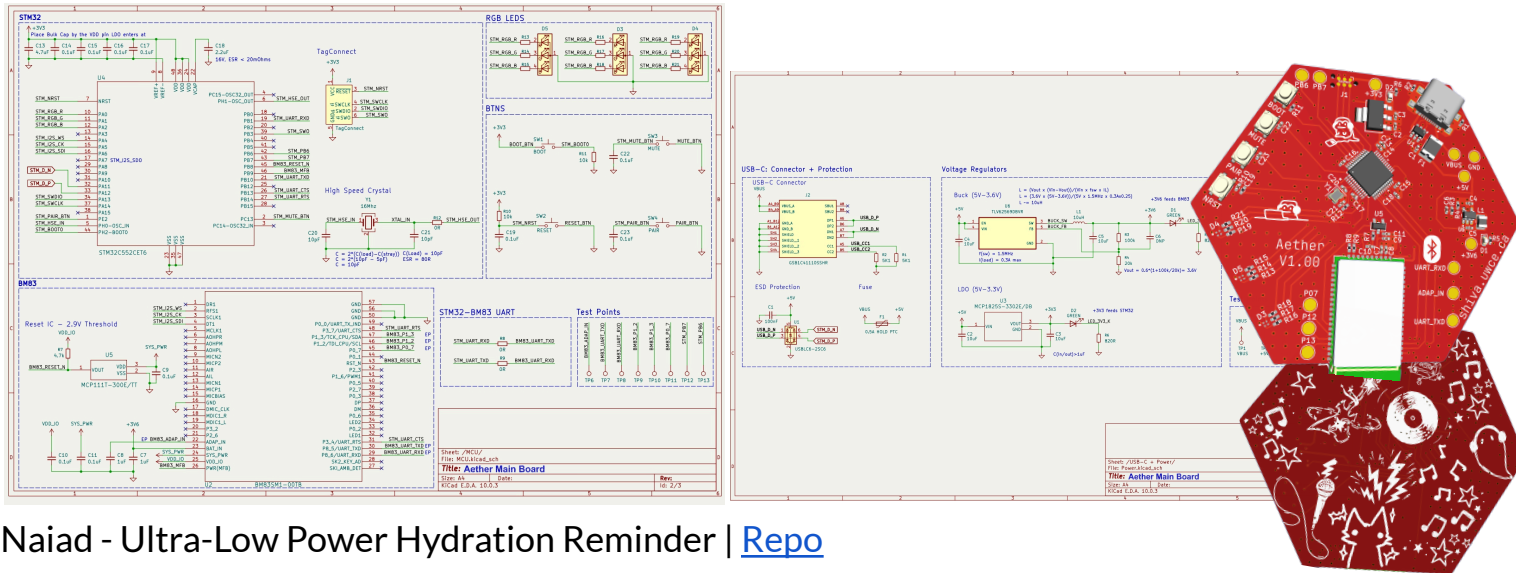
Technical Skills

- **Hardware:** 4-Layer PCB Design, Mixed-Signal Layout, Impedance Control, Circuit Debugging, DFM, PCBA
- **Tools:** Altium, KiCad, PlatformIO, Fusion 360, 3D Printing, DMM, SMD Soldering, Oscilloscope, Signal Gen
- **Programming & Protocols:** Embedded C/C++, Python, I2C, SPI, UART, I2S, PWM, OpenCV

Aether - Bluetooth-to-USB audio bridge | [Repo](#)

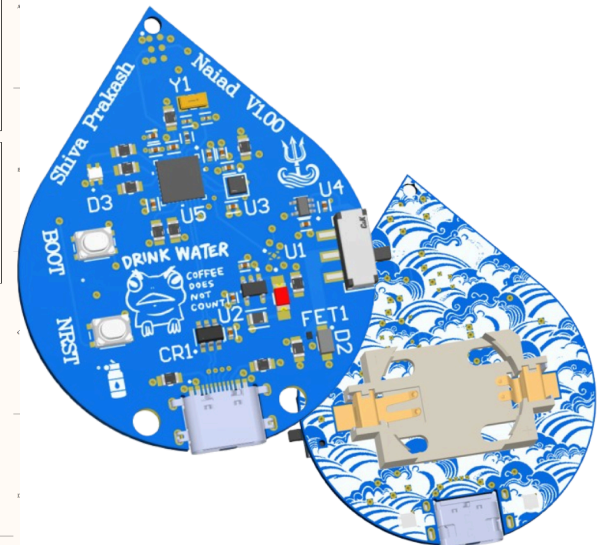
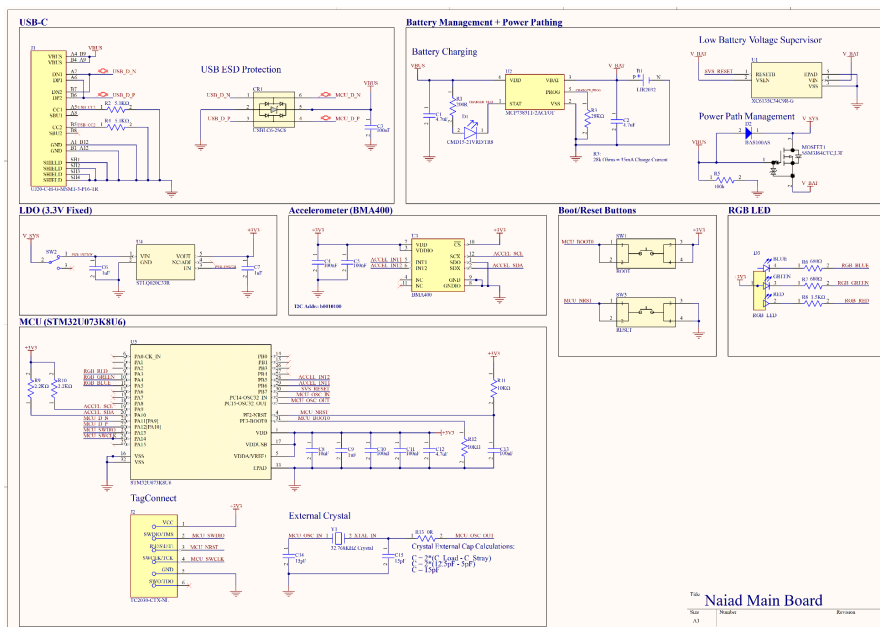
A USB-C powered Bluetooth-to-USB audio bridge that lets me connect my Phone/Console with Bluetooth and send that audio straight into my PC as a USB audio input!

- Designed a USB-powered Bluetooth audio interface that converts mobile-device A2DP audio into USB Audio input for Windows PCs using a Microchip BM83 audio module and STM32-based USB interface stage.
- Developed a 4-layer PCB with USB-C power/data, controlled USB 2.0 routing, I2S digital audio interconnects, ESD protection, separated power domains, and BM83 antenna keepout/placement constraints in KiCad
- Built a custom 5V-to-3.6V buck converter power tree with rail segmentation for Bluetooth/digital loads.

Naiad - Ultra-Low Power Hydration Reminder | [Repo](#)

A USB-C rechargeable keychain (that hangs on your water bottle) that flashes to remind you to drink water if it hasn't detected a sip in X minutes.

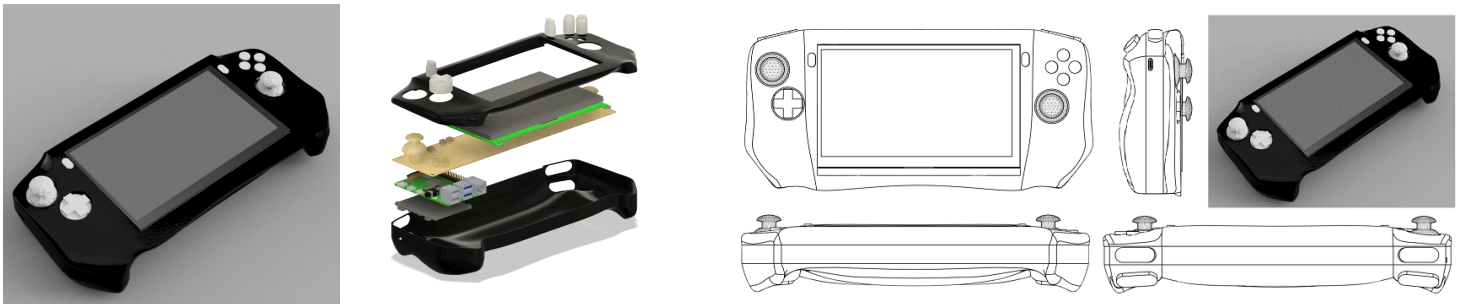
- Engineered an ultra-low power keychain on a 4-layer PCB in Altium Designer, leveraging STM32U0 and BMA400's low-power modes, and strategic component selection to maximize battery life for portable use (< 5µA Quiescent)



Project Hermes - Raspberry Pi Game Streaming Handheld | [Repo](#) | [Creation Journal](#)

A portable console that streams PC games via SteamLink, letting players access their full library anywhere without rebuying games at a more affordable price than most consoles.

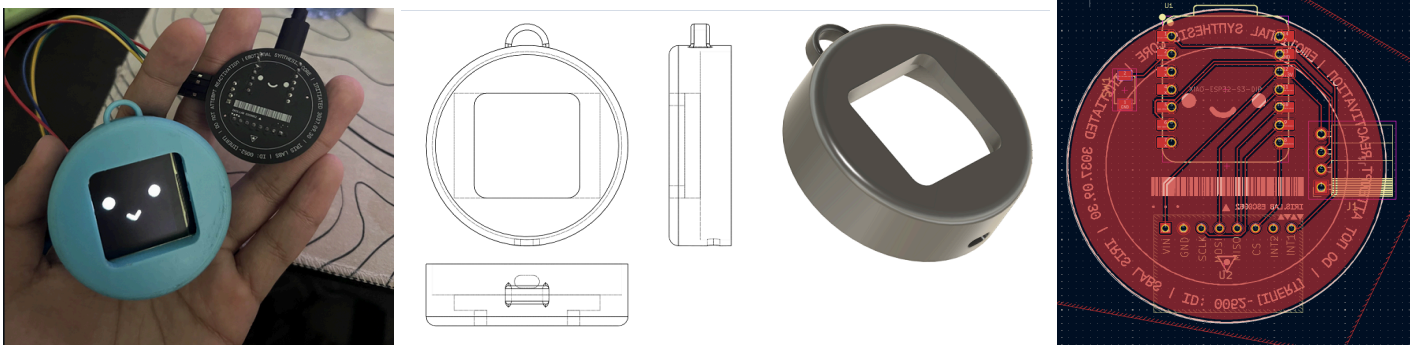
- Designed a full handheld gaming system under a strict \$200 CAD budget, integrating **Raspberry Pi 4**, 7" LCD, and custom controller **PCB**.
- Engineered a **USB HID** controller PCB using RP2040-Zero and GP2040-CE firmware, enabling plug-and-play compatibility with no custom drivers.
- Overcame handheld runtime constraints with a 5000 mAh UPS + USB-C charging system, achieving 2–3 hours of gameplay with passthrough charging.
- Designed and **3D printed custom housing** with passive cooling to prevent thermal throttling, sustaining stable 720p/60FPS streaming.
- Reflection: Taught me to balance thermal, electrical, and cost constraints in one integrated product.



HackCharm - Interactive OLED Keychain | [Repo](#) | [Creation Journal](#)

A keychain-sized Tamagotchi-like companion that reacts to taps and shakes with pixelated emotions on a tiny OLED display.

- Developed a miniaturized **PCB** system integrating ESP32-S3, 128×128 OLED, and ADXL362 accelerometer at \$49.66 CAD BOM cost.
- Implemented deep-sleep firmware with a 450 mAh Li-Po to achieve multi-day battery life despite continuous interaction polling.
- Built gesture-recognition firmware to process tap/shake patterns in real time, triggering expressions with <100 ms latency.
- Reflection: First project where I combined **embedded firmware, circuit design, and enclosure design** into a polished product.



NFC PCB Business Card | [Repo](#) | [Workshop Video](#)

A batteryless PCB card that lights an LED and transmits a link when tapped against a smartphone via NFC.

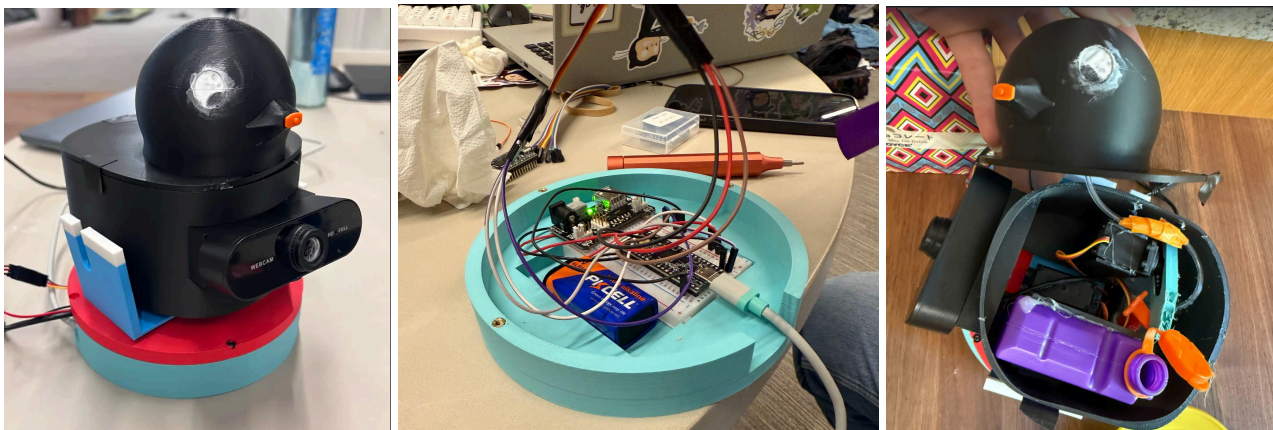
- Designed a passive **NFC circuit** with antenna, resistor, capacitor, and LED powered entirely by harvested smartphone RF energy.
- Taught to **100+ high school students** through a workshop I led on PCB design fundamentals, making electronics approachable and hands-on.



Duck Off Doomscrolling (D.O.D) - Computer Vision Water Turret | [Repo](#) | [Live Demo](#)

A hackathon project: a desk duck that tracks your face with OpenCV and squirts water at you if you open distracting apps.

- Built a real-time **computer vision** system with sub-100 ms servo response using **OpenCV** for face detection.
- Designed closed-loop servo positioning with 2 **MG996R Servos**, achieving precise targeting accuracy within 1 m.
- Integrated a commercial water gun with servo-actuated pump trigger to create a reliable mechanical actuation system.



Leadership Experience

President – MDHS Student Council

- Led a 21-member council to deliver events for 1,400+ students, managing logistics, budgeting, and promotion.

President – MDHS STEM Club

- Grew club from 15 to 190+ in one year by teaching hands-on workshops on PCB design, CAD, and programming.