Justin Shakergayen

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Education

Purdue University West Lafayette, IN
B.S. Robotics Engineering (Mechanisms and Controls) - CS Minor — Major GPA: 3.2 *Aug 2022 – May 2027*

- Relevant Coursework: Control Systems, Robot Kinematics & Dynamics, Embedded Systems, Digital Signal Processing

Technical Skills

Languages: Python, C/C++, Rust (learning), VHDL, Verilog, Java, C#, SQL, MATLAB
Embedded & Robotics: Raspberry Pi, ESP32, Arduino, FPGA development, real-time systems, sensor fusion, telemetry
Controls & Algorithms: Kalman filtering, PID control, state estimation, signal processing
ML/AI Frameworks: PyTorch, TensorFlow, OpenCV, scikit-learn
Systems & DevOps: Linux systems programming, Git, CI/CD pipelines, Docker, Kubernetes, AWS
Simulation & Design: Simulink, SolidWorks, NX, hardware-in-the-loop testing
Frameworks/Data: Django, React, MySQL, PostgreSQL, Pandas, NumPy, Matplotlib

Experience

Token Ninja Jan 2026 – Present
Strategy + Development — Python, GraphQL *Toronto*

- Implementing SupervisorAgents for Token Optimization, metering, reallocating of compute
- Reduced Token Cost by an average of 30 percent per prompt

Boiler Quantitative Finance Group Jan 2023 – May 2025
FPGA & Embedded Systems Developer — Python, VHDL, Django, MySQL *Purdue University*

- Implemented Black-Scholes option pricing models in VHDL for FPGA, achieving 5x latency reduction vs. CPU implementation
- Developed Python-based real-time socket communication layer between FPGA boards and backend for live data streaming

Landis + Gyr May 2024 – July 2024
Firmware Test Engineer — C#, .NET, XML, JSON *Lafayette, IN*

- Refactored firmware testing API in C# and deployed major release of internal validation software used across engineering teams
- Designed and implemented automated unit testing framework for firmware API validation, reducing manual testing time by 60%
- Collaborated on development of C# applications for hardware-in-the-loop testing of smart meter firmware

The Indiana School for the Deaf and Blind Jan 2024 – May 2024
Computer Vision Developer — Python, OpenCV, AWS, Django *Indianapolis, IN*

- Applied computer vision models for American Sign Language recognition using OpenCV and AWS cloud infrastructure
- Generated synthetic training datasets with varied lighting conditions to improve model robustness and accuracy by 15%
- Integrated real-time inference pipeline with Django backend for classroom deployment and user feedback collection

Baja Racing Data Acquisition Team Jan 2022 – Jan 2023
Embedded Systems Developer — Python, Raspberry Pi, Sensor Integration *Purdue University*

- Programmed Raspberry Pi microcontroller in Python for real-time telemetry data collection from competition vehicle
- Implemented sensor fusion algorithms combining GPS, IMU, and encoder data for accurate vehicle state estimation
- Developed wireless data transmission system for live monitoring during off-road racing events

Projects

Raspberry Pi Near-Infrared Camera System | *Python, Raspberry Pi, Embedded Linux* 2026

- Built a near-infrared camera (for artistic purposes) using the NOIR camera module and a Raspberry Pi for sensor interfacing
- Used Linux drivers for real-time image manipulation
- Developed Python-based control software for image processing, and data visualization

ESP32 Generative Audio System with ML Feature Extraction | *C, ESP32, TensorFlow Lite,* 2025

- Deployed TensorFlow Lite model on ESP32 for analyzing field recordings and extracting audio features (pitch, timbre)
- Built real-time audio synthesis engine that generates new sounds based on ML-extracted characteristics from environmental recordings
- Optimized inference pipeline and DSP algorithms to run within ESP32 memory constraints while maintaining low-latency audio output

Superheterodyne FM Radio Receiver | *Analog/Digital Circuit Design, Signal Processing* 2025

- Designed, simulated, and hand-soldered complete superheterodyne receiver demonstrating RF/analog circuit expertise
- Implemented mixer, RF amplifier, local oscillator, and IF stages with proper impedance matching and filtering
- Applied signal processing theory to achieve stable FM demodulation across 88-108 MHz broadcast band

Linux FTP Server Implementation | *C, Linux Systems Programming, Network Protocols* 2022

- Built FTP server from scratch in C demonstrating low-level systems programming expertise
- Implemented socket programming and concurrent connection handling
- Deployed on Linux with proper user authentication, directory traversal security, and resource management

Concurrent Marketplace Server Architecture | *Java, Multithreading, TCP Sockets, Linux* 2024

- As part of a final project developed a client-server application with concurrent connection handling supporting 50+ simultaneous users
- Implemented robust TCP socket communication with custom protocol for transaction management and session persistence
- Applied object-oriented design patterns for scalable product catalog and distributed state management

Active Bandpass Filter | *Circuit Design, Op-Amp, Frequency Analysis* 2025

- Designed and breadboard-prototyped active bandpass filter using state-variable configuration for precise frequency selection
- Characterized frequency response using spectrum analyzer; optimized Q-factor and center frequency through component tuning
- Applied controls theory to achieve desired transfer function behavior and minimize passband ripple

CNC Machining Project | *G-code, HAAS CNC Lathe, SolidWorks* 2024

- Programmed custom G-code to perform CNC etching and part fabrication.
- Manufactured a functional hammer with an etched design using a HAAS CNC lathe, translating CAD designs into precision machining toolpaths.