

PROJECTS

100 Projects in 100 Days Challenge

- Built 50+ hardware and software projects across Arduino, ESP32, STM32, and Python, covering embedded systems, IoT, and automation, with complete documentation and source code published on GitHub.

Low-Power Embedded System | STM32, CubeMX, CubeIDE, C

- Implemented Run, Sleep, Stop, and Standby power modes using STM32 HAL and CubeMX.
- Reduced CPU active time from ~100% to ~1-2% by using RTC-based STOP mode wakeups every ~3 seconds.
- Verified power state transitions using LED patterns and event counters.

ESP32 WiFi Analyzer & Interference Scanner | ESP32, Arduino, Python

- Built an ESP32-based Wi-Fi scanning system that detects 10-40+ nearby networks and extracts signal strength (RSSI), channel usage, visualizing congestion patterns and interference to support network optimization and troubleshooting.
- Designed a Python desktop application to visualize, rank, and analyze networks using a custom scoring algorithm based on signal quality, channel congestion, and security metrics in real time.
- Developed a network congestion analysis metric (channel crowding) that counts up to 10+ networks per channel and applies a penalty of up to 25 points in the overall ranking score calculation.

Spotify Mini Player | ESP32, Arduino, Python, Flask, Spotify API

- Built a Wi-Fi-connected ESP32 system that displays live Spotify track, artist, and playback progress on an LCD, receiving and processing structured JSON updates every ~1-2 seconds from a Python server application reliably.
- Developed a Python Flask bridge that polls the Spotify Web API and streams real-time playback data, handling 1,000+ update cycles per session with stable and reliable network performance over extended use.
- Implemented bidirectional hardware control using 3 physical buttons to trigger play/pause, next/previous track, and 10 second seek commands through REST endpoints over a local Wi-Fi network connection.
- Designed a fault-tolerant, state-driven display and timing system with local progress tracking, debounce handling, and automatic recovery to maintain smooth real-time updates during long-running sessions.

Anti-Procrastination Study Monitor | Arduino, Ultrasonic Sensor, LCD, Embedded C/C++

- Built a proximity-based study enforcement system using an ultrasonic sensor to detect user presence within 30 cm, triggering a buzzer alert and on-screen warnings when the user leaves their desk.
- Implemented a real-time countdown study timer (~90 minutes / 5,400+ seconds) displayed on an LCD, with automatic reset logic and button-controlled restart for repeated focus sessions.
- Designed a state-driven control loop running at 1 Hz with distance filtering, debounced input handling, and continuous serial diagnostics, achieving reliable operation over 100+ continuous test cycles without crashes.

LEADERSHIP & EXTRACURRICULARS

Mechatronics Course Union (MCU) — Director of Events | Toronto Metropolitan University

- Led and delivered hands-on Arduino, Raspberry Pi, and SumoBot workshops for mechatronics students.
- Designed and delivered embedded systems workshops covering hardware integration, coding, and debugging.
- Coordinated logistics, scheduling, and materials for multi-session events with 30+ attendees per workshop.
- Collaborated with the executive team to plan the technical event calendars and manage event operations.

EDUCATION

- Toronto Metropolitan University - B.eng, Mechatronics Engineering (Expected graduation 2029)

TECHNICAL SKILLS

- Programming: Python, C, C++ (Arduino), Embedded C, MATLAB
- Embedded Systems: STM32 HAL, CubeMX, GPIO, Timers, RTC, Low-Power Modes, UART, SPI, ESP32, Arduino
- Software: OpenCV, API Integration, OAuth, Data Processing, Data Analysis
- Hardware: Circuit Design, Breadboarding, Soldering, Sensors, Actuators, Power Management
- CAD & Simulation: SolidWorks, AutoCAD, Simulink, Isaac Sim