Connor Johanson

connorjohanson.ca | linkedin.com/in/connor-johanson | connorjohanson125@gmail.com | 587-891-9410

SUMMARY

Mechatronics engineer specializing in **sensor fusion**, **control systems**, and **embedded development**. Skilled in designing and integrating **hardware/software systems** to extract actionable insights from sensor data, with applications in **wearables**, **tracking and control**, and **automation**. Recognized for **critical thinking**, **adaptability**, and **collaborative leadership**.

TECHNICAL SKILLS

Programming & Simulation: Python, C/C++, MATLAB, Simulink, Git, Jenkins, Docker

Embedded & Hardware: Microcontrollers (ESP32, ARM Cortex, Arduino), Bluetooth (BLE), CAN, LIN, Ethernet, I2C, SPI, UART

Control & Estimation: PID, State-Space, Kalman Filtering, Estimation Theory, System Modeling, Nonlinear & Multivariable Dynamics, Sensor Fusion & Data Analysis (Signal Processing, TensorFlow)

Testing & Validation: Hardware-in-the-Loop (HIL) Testing, NI TestStand, LabVIEW, CI/CD, Agile/SAFe, Root-Cause Analysis

EXPERIENCE

Antenna Positioner Design & Integration   May 2024 – Aug 2024
UWaterloo EmRG Lab   *Waterloo, ON*
- Built a dual-axis antenna positioner for RF testing, integrating motors, pulleys, drives, control hardware, and power electronics with a MATLAB serial interface for real-time angle commands to achieve ±0.5° repeatable precision in both azimuth and elevation.
- Integrated an ARM Cortex-M3-based controller, added backlash mitigation and calibration routines, and procured components.
- Delivered an $800 system nearing $15,000 commercial performance under vibration, size, strength, and ventilation constraints.
- Collaborated with RF engineers to design a low-cost, lightweight polarization positioner with 90° repeatable rotation, motorized distance travel, and no-metal interference near the RF connection.

Manufacturing Product and Test System Engineering Designer   Sep 2023 – Dec 2023
Ford Motor Company   *Waterloo, ON*
- Devised and implemented a semi-automated validation procedure for HIL ECU test stations, rigorously verifying critical communication buses (CAN, LIN, Ethernet), RF signals (Bluetooth, Wi-Fi), and station hardware.
- Leveraged NI TestStand and LabVIEW for test execution, integrating station instrumentation (supplies, loads, signal generators, and DAQs) in procedure deployed across 50+ production stations.
- Enabled remote, supplier-side validation, eliminating engineer travel and reducing turnaround time by an estimated 75%.
- Supported engineers in diagnosing ECU failures through thermal-chamber validation and signal analysis using oscilloscopes.

Software Developer in Test   Sep 2021 – Dec 2021
Telus Health   *Cambridge, ON*
- Developed and maintained 100+ Python/Robot Framework regression tests executed via Jenkins/Docker CI/CD pipelines.
- Collaborated with Agile development teams, utilizing Jira and Confluence for issue tracking, improving deployment reliability.

PROJECTS

Rally and Rehab - Award-Winning Capstone Project   Sep 2024 – Mar 2025
Wearable Motion-Tracking System   *ESP32, Bluetooth (BLE), IMUs, Python*
- Led a five-member team in designing a compression sleeve for racket-sport biomechanical analysis, integrating three BMI270 IMUs (shoulder, elbow, wrist) via dual I2C with C++ into an ESP32-S3 for BLE real-time data streaming to a Python dashboard.
- Implemented six concurrent Kalman filters on 6-axis IMU data for 9-state motion estimation (position, velocity, acceleration) and real-time feature extraction, modeling sensor noise and architecting a data pipeline using InfluxDB.
- Delivered a $252 prototype with 3-hour battery life; won James Baleshta Special Merit Award and nominated for Best Prototype.

IR & Thermocouple Based Localization   Jan 2025 – Apr 2025
Sensor Fusion & Estimation   *MATLAB, Simulink, Python*
- Modeled IR and thermocouple sensors, characterized Gaussian noise, and fused sensor likelihood maps for position estimation.
- Designed and tuned an Extended Kalman Filter in MATLAB/Simulink for real-time tracking, achieving <5 cm position error.

Ball-on-Beam Position Control & Stabilization   Sep 2024 – Dec 2024
Dynamic System Modeling & Control   *MATLAB, Simulink, LabVIEW*
- Linearized coupled dynamics and applied optimization methods to design a cascaded digital control system in MATLAB/Simulink.
- Integrated system on NI cRIO-9076/LabVIEW, compensating for non-idealities to achieve <7 s settling time and <5 mm error.

EDUCATION

University of Waterloo - BASc in Mechatronics Engineering, Co-op   Waterloo, ON
Dean's Honours & President's Scholarship | GPA: 89.7% | Varsity Badminton Athlete   *Sep 2020 – Apr 2025*