Connor Johanson

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Summary

Passionate 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 **wearable technology**, **position tracking and control**, and **automation**. Recognized for **critical thinking**, **adaptability**, and **collaborative leadership**.

Technical Skills

Programming & Simulation: Python, C/C++, MATLAB, Simulink, Java, APIs, Git, Databases, SolidWorks, AutoCAD

Embedded & Hardware: Microcontrollers (ESP32, ARM Cortex, Arduino), Bluetooth (BLE), Sensors & Actuators, CAN, LIN, Ethernet, Motor Control, I2C, SPI

Control Systems: PID, State-Space, Kalman/UKF, Youla Parametrization, System Identification, Nonlinear & Multivariable Dynamics

Data & Signal Processing: Signal Filtering, Feature Extraction, NumPy, Pandas, TensorFlow, Keras, Scikit-learn

Experience

Antenna Positioner Design & Integration May 2024 – Aug 2024
UWaterloo EmRG Lab *Waterloo, ON*
- Developed a motorized 3-axis antenna positioner by integrating motors, drives, power electronics, and control hardware.
- Designed MATLAB-based control software achieving repeatable angular positioning within ±0.5°.
- Delivered cost-effective solution ($800) nearing performance of $15,000 commercial alternatives, now actively used in lab.

Manufacturing Product and Test System Engineering Designer Sep 2023 – Dec 2023
Ford Motor Company *Waterloo, ON*
- Devised a validation procedure to analyze ECU manufacturing test stations, reducing assessment time significantly.
- Collaborated with engineers to troubleshoot functional hardware, RF signals, and software integration issues.

Research Support and Web Development Jan 2023 – Apr 2023
UWaterloo VIP Lab *Waterloo, ON*
- Developed automated research lab website (vip.uwaterloo.ca) and performed SAR data acquisition/analysis.

Projects

Rally and Rehab - Award-Winning Capstone Project Sep 2024 – Mar 2025
Wearable Motion-Tracking System *ESP32, Bluetooth (BLE), IMUs, Python*
- Led team and developed a sleeve embedded with IMU sensors for racket sport biomechanical analysis.
- Implemented Bluetooth Low Energy communication and embedded software on ESP32-S3 for continuous data streaming.
- Applied Kalman filtering, feature extraction, and database integration to deliver real-time and historical performance dashboards.

Doppler-Based Vehicle Speed Estimation Feb 2025 – Apr 2025
Signal Processing & ML *Python, MATLAB, TensorFlow/Keras*
- Processed audio recordings of passing vehicles, generating mel spectrograms and identifying Doppler shifts.
- Trained CNN models for speed prediction with average error of 2.7 km/h.

Inverted Pendulum Ball-on-Beam Control Sep 2024 – Dec 2024
Dynamic System Modeling & Control *MATLAB, Simulink*
- Modelled nonlinear behaviour and applied discrete control techniques to create a cascaded digital control system.

Education

University of Waterloo Waterloo, ON
*BASc in Mechatronics Engineering, Co-op - **Dean's Honours*** *Sep 2020 – Apr 2025*