Shivam Kataria

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Education

University of British Columbia May 2026

Bachelor of Applied Science - Mechanical Engineering, Mechatronics Specialization, Dean's Honour List

Relevant Courses: Real-Time Embedded Systems (RTOS), Microelectronics, Power Electronics, State-Space Control, Digital Control, Classical Control, Computer Architecture, Robot modelling & Control, Autonomous Vehicle Technology

Skills

Firmware & Hardware: C, C++, STM32, ARM Cortex-M MCUs, RTOS, FreeRTOS, serial protocols (I2C, SPI, CAN, UART), hardware debugging (oscilloscope, logic analyzer, DMM, SWD), LTspice, Altium Designer, KiCad, board bring-up & validation, soldering
Software: Python (Numpy, Pandas, CircuitPython, etc.), Matlab, Simulink, Docker, Git & Github, Linux CLI, ROS2
ICs : STM32G4 & STM32C0 series, power monitor (TI INA), IMUs (Bosch BMA), ToF (STM), inductive sensing (TI LDC), FETs (TI LMG)

Experience

Bosch Sep 2024 – Aug 2025

Embedded Systems Engineering Intern *Renningen, Germany*

- Designed and implemented a **real-time I2C** driver for power monitoring in **C** using **STM32** and **RTOS**, with high-speed **400 kHz I2C** and **DMA** in a time-critical biomedical system for Bosch Vivalytic, platform backed by **€150M+** in investment
- Debugged **mixed-signal PCBA** and FreeRTOS embedded firmware using tools such as **logic analyzer**, **oscilloscope**, **DMM**, and **SWD** to identify and resolve issues across digital, analog, and power domains
- Implemented and tuned **PID** and sliding mode control (SMC) algorithms in a real-time embedded system on STM32, using **ADC**-based temperature feedback to achieve **2x** faster thermal cycling and minimizing tracking error
- Automated fast thermal cycling experiments with Peltier modules using **Python** and source measure unit (SMU) via the VISA protocol to capture precise thermal data using thermocouples, increasing experimentation speeds by **50%**
- Analyzed experimental data using Python, **Pandas** and, Matplotlib to extract thermal performance insights, enabling **data-driven design optimizations** for enhanced cycling efficiency and speed to meet design criteria

Cibotica Sep 2023 – Dec 2023

Embedded Software Engineer Intern *Vancouver, Canada*

- Developed software contributing to the **successful first launch** of the early food tech startup in a **fast-paced, agile** and **product-focused** environment using **Raspberry Pi** and Pico **MCUs**, improving product's speed by a factor of **1.5x**
- Built and debugged state machine structured firmware for 16 components using CircuitPython consisting of several motors, sensors and peripherals such as ADC, I2C, SPI, GPIO, etc. for precision dispensing control
- Integrated ToF sensors and current sensors for edge case detection into machine logic for system robustness and reliability

Defence Research and Development Canada (DRDC) Jan 2023 – Aug 2023

Robotics Research & Development Intern *Canadian Forces Base Suffield, Canada*

- Developed and improved drone tracking algorithms using deep reinforcement learning (RL) and PID controller to track and identify target drone in real-time using YOLO object detection algorithms and RL library StableBaselines3
- Increased tracking speed with RL in Unreal Engine simulations by **3x** through hyperparameters and reward function tuning
- Tuned PID tracking controller to minimize overshoot and instability, increasing tracking speed by **5x** in real-flight operations

Engineering Projects

Position Feedback System - Capstone - ARTMS Sep 2025 – Apr 2026

Embedded Systems Lead *Burnaby, Canada*

- Led the design of a distributed embedded sensor checkpoint system to provide real-time feedback for passing capsules
- Owned development of **mixed-signal** sensor PCB in **Altium** from concept to fabrication, integrating STM32 based control, inductive sensing, IMU and ToF sensors, sensor interfaces (**SPI, I2C, GPIO**), and **CAN** bus communication between nodes
- Conducted board bring-up, schematic design, component selection, layout considerations, and manufacturer coordination

PPG Heart-Rate Sensor Jan 2026 – Mar 2026

Electrical Lead *Kelowna, Canada*

- Prototyped an optical heart-rate sensing circuit using IR emitter and photodiode, implementing a transimpedance amplifier, bandpass filtering, and gain stages for PPG signal conditioning, followed by a Schmitt trigger to generate digital pulse
- Modelled and designed the analog signal chain in **LTspice**, analyzing transfer functions and Bode plots to validate gain, small-signal response, and bandwidth of the entire circuit

Software Team Lead Jan 2022 – May 2024

UBCO Aerospace *Kelowna, Canada*

- Led the software development in 2022 to place **2nd** with the **Innovation Award** in a national UAS competition