Jaehah Shin

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EDUCATION

University of Toronto **Sep. 2022 – May. 2027**
Bachelor of Applied Science in Engineering Science + PEY Co-op *Toronto, Ontario, Canada*
Major: Robotics Engineering
Relevant Courses: Microprocessors and Embedded Microcontrollers, Electronics for Robotics, Data Structures and Analysis, Algorithm Design, Analysis & Complexity, Introduction to A.I., Introduction to Learning from Data, Control Systems, Introduction to Robotics, Mathematics for Robotics

SKILLS

Embedded System: Zephyr RTOS, NRF Connect SDK, UART, I2C, SPI
Hardware Design: SuperSpice, Eagle & Autodesk Fusion 360 (PCB), FPGA, Oscilloscope, Micro-soldering
Programming: C, Python, Assembly, LaTeX, MATLAB
Framework & Software: ROS, LabVIEW, Git, ModelSim

WORK EXPERIENCE

Ted Rogers Centre for Heart Research – https://franklinresearch.ca/ **May. 2023 – Present**
Undergraduate Researcher (Supervisor: Dr. Daniel Franklin) *Toronto, Ontario, Canada*
Project 1: Flexible PCB Design for Wearable Heat Regulation in Hyperemia Research

- Engineered a PID controller to maintain a precise temperature of 42°C for a defined period, effectively inducing a condition for cutaneous hyperemia.
- Developed a flexible PCB for heater integration in wearable applications.

Project 2: Optimizing System on Chip (SoC) Integration

- Analyzed and selected about 100 different SoC components through detailed datasheet evaluations, creating a Google Sheet to summarize key specifications and streamline sensor integration.
- Developed and refined device drivers within a Zephyr RTOS environment, enabling effective SPI communication and configuration with a Maxim Integrated chip and chosen microcontroller.

Project 3: Cross-Platform Wearable Biosensing Solution

- Collaborating on hardware development with another undergraduate researcher to consolidate analog front-end and microcontroller PCBs into a single compact, reusable board for a biosensing platform using the MAX86178 AFE (ECG, PPG, BioZ/GSR).
- Supporting project coordination for a cross-functional team (PhD candidates, firmware engineer, undergraduates) by managing meeting updates, slide decks, and development tracking.
- Contributing to the planning of a future ring-form wearable device, adapting the compact PCB design for ultra-miniaturized applications.

LEADERSHIP & INVOLVEMENT

aUToronto **Mar. 2025 – Present**
Simulation Team Member *Toronto, Ontario, Canada*

- Redesigning and implementing a custom vehicle dynamics model in Simulink to replace the built-in Vehicle Body 3DOF block, using a single-track (bicycle model) approach to simulate longitudinal, lateral, and yaw motion.

UofT Wearable Student Design Team **Jun. 2024 – Present**
Co-Founder, Co-President *Toronto, Ontario, Canada*

- Co-founded and led UofT Wearable student design team, focusing on innovative wearable technology.
- Managed sub teams in Embedded Electronics, Companion Software, and Form and Function.
- Led training sessions for approximately 35 students on RTOS, Bluetooth Low Energy, and microcontroller communication protocols, enhancing their technical proficiency and understanding.

Robotics Engineering at University of Toronto **Sep. 2024 – May. 2025**
Robotics Option Class Representative *Toronto, Ontario, Canada*

- Collaborate with professors and faculty to manage workload adjustments based on student feedback.
- Organized peer feedback sessions to foster a supportive academic community, showcasing strong leadership and communication skills.

PROJECT

Continuous all-day Wearable ECG Signal Acquisition Device under UofT Wearable **Sep. 2024 – Present**

- Design and optimize device drivers for MAX30001G and nRF52840 microcontroller in Zephyr RTOS for ECG data collection via electrodes, using SPI and Bluetooth Low Energy for data transmission.

Two-Wheeled Balancing Robot (Demo) **Jan. 2025 – Apr .2025**

- Designed and built an ESP32-based two-wheeled robot with MPU6050 IMU and stepper motors, achieving idle balancing via a PID loop
- Implemented dual-core firmware in C (ESP-IDF): one core for IMU filtering (median + Kalman) and PID computation, the other for precise stepper actuation.
- Optimized mechanical stability by lowering the center of mass and widening the chassis; iteratively tuned PID gains and gain-scheduling to reduce oscillations.

Turtle-bot 3 Waffle Pi robot Deliver Mail to Arbitrarily Chosen Stations **Nov. 2024 – Dec. 2024**

- Developed a ROS-based TurtleBot 3 for randomized mail delivery to three offices, using PID control and computer vision for precise line following on a circular route.
- Integrated Bayesian Localization and Extended Kalman Filter with Markov assumptions, ensuring robust state estimation despite sensor noise.