Vetrivel Balaji

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EXPERIENCE

Robotics/AI Engineering Intern
January 2025 – April 2025
Bornea Dynamics Limited
St. Catherines, Ontario
- Contributed to CubeSat development by conducting hardware qualification testing, integrating software and hardware components, running validation tests, and advancing AI initiatives using Raspberry Pi and Nvidia Jetson

Software Engineering Intern
September 2024 – December 2024
Canadian Space Agency (CSA)
Longueuil, Quebec
- Led the development of a CI/CD pipeline for mission-critical web applications supporting Canadarm2 and DEXTRE operations on the ISS, automating a manual testing process to achieve a 90% efficiency improvement while ensuring data integrity, and overseeing contractors in test case development to enhance quality assurance.

Software Engineer Intern/Co-op
May 2024 – August 2024
TD Bank Group
Toronto, Ontario
- Designed multiple advanced AI solutions with the potential to improve anti-money laundering efforts by 250% and operational efficiency by 200%, and presented these innovations to stakeholders for enterprise-wide adoption.
- Developed three integrated high-quality web applications using Java and React.js, improving referral and service efficiency by 50% and ensuring seamless software deployment using Git, JIRA, and Bitbucket.

🔗 Research Student
September 2023 – December 2023
McMaster University Telerobotics, Haptics and Computational Vision Laboratory
Hamilton, Ontario
- Developed an embedded system for a self-driving robot using ROS and C++, achieving low-latency multi-sensor synchronization of depth camera and planar LiDAR data for precise obstacle detection and avoidance.

Machine Learning Research Student
June 2022 – August 2022
Unity Health Toronto
Toronto, Ontario
- Developed an automated system using AI and pose estimation to monitor CT scan room activity with Python, OpenCV, and TensorFlow on Raspberry Pi and Google Coral, enhancing efficiency while maintaining patient privacy.

PROJECTS

🔗 Pacemaker Device-Controller Monitor | Python, FRDM-K64F Microcontroller, pySerial
December 2023
- Designed a Device Controller-Monitor (DCM) for a Pacemaker system, incorporating hardware and software for programming and delivering pacing commands, while presenting diagnostics, sensor history, and trends.

🔗 Level Up | Python, MediaPipe, OpenCV, Pygame, Git
September 2022
- Developed a computer vision application during Hack the North that gamifies exercise by allowing users to select push-ups, sit-ups, and squats, accurately counting reps and ensuring proper form through pose estimation.

🔗 Recycling System | Python, Raspberry Pi, Quanser Robotics, Depth/Proximity Sensors
March 2022
- Developed an **automated process** to improve the accuracy of the recycling process by **60%** using various sensors to identify, pick up, transfer, and deposit containers into the correct recycling bins using a **robotic arm** and **bot**.

PUBLICATIONS AND AWARDS

🔗 Co-Author | DOI: 10.17605/OSF.IO/D7NV5
August 2024
- Attitudes and Perceptions of Biomedical Journal Editors-in-Chief Towards the Use of Artificial Intelligence Chatbots in the Scholarly Publishing Process

NASA Space Apps Challenge Hamilton - Most Innovative Project
October, 2023

FBLA (Future Business Leaders of America) - Web Design National Champion
February 2020

SKILLS

- Python(TensorFlow), C/C++, ROS, Java, JavaScript, CSS, CI/CD, Verilog, HTML, MATLAB, Unix/Linux, Git, Azure
- Microcontrollers, FPGA Design, PCB Design, Sensors, Actuators, Oscilloscopes, Digital/Analog Circuitry, CAD

EDUCATION

McMaster University, Hamilton, Ontario
September 2021 - April 2026
Bachelor of Engineering - Mechatronics Engineering
GPA: 3.8/4.0
Relevant Courses: Data Structures and Algorithms, Programming for Mechatronics, Operating Systems, Software Development, Embedded Systems Design I & II, Signals and Systems, Dynamic Models and Control of Physical Systems