

# VETRIVEL BALAJI

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## EDUCATION

### McMaster University, Hamilton, Ontario

Sep 2021 - Apr 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.

## EXPERIENCE

### Bornea Dynamics Limited

Jan 2025 – Apr 2025

Robotics/AI Engineering Intern

St. Catharines, Ontario

- Conducted computer vision R&D for the **UK Ministry of Defence's missile targeting program** and achieved **92% post-quantization accuracy** by tuning YOLO-based models and ONNX quantization settings for ASIC deployment.
- Led a defence-oriented R&D initiative to assess AI-based personality classification using LLaMA models; built a dual-model system combining a real-time chatbot and a fine-tuned classifier trained on scraped behavioural data, and delivered a technical proposal to the CEO evaluating its feasibility for future defence-sector applications.

### Canadian Space Agency (CSA)

Sep 2024 – Dec 2024

Software Engineering Intern

Longueuil, Quebec

- Built a CI/CD pipeline with Azure DevOps, Docker, and Playwright to automate testing for web systems supporting the **International Space Station**, reducing verification time from 16–24 months to under 24 hours and enabling safer updates to Canadarm2 and DEXTRE data workflows.
- Developed and maintained comprehensive Playwright test suites and collaborated with external contractors to expand automated coverage across legacy and high-reliability systems supporting space mission data.

### TD Bank Group

May 2024 – Aug 2024

Software Engineer Intern/Co-op

Toronto, Ontario

- Developed and deployed a full-stack Unified Referral System across three integrated React.js and Java-based web applications, streamlining client-to-specialist routing at branches and improving referral efficiency by 60%; ensured reliable delivery using Git, Bitbucket, and JIRA within an agile team.
- Created two AI tools using Node.js, Azure, and OpenAI APIs to assist with anti-money laundering detection and customer service efficiency, earning executive interest for potential enterprise-wide implementation.

### 🔗 McMaster University Telerobotics, Haptics and Computational Vision Laboratory

Sep 2023 – Dec 2023

Robotics Research Student

Hamilton, Ontario

- Achieved low-latency multi-sensor synchronization between depth camera and LiDAR using ROS and C++, enabling reliable real-time obstacle detection for a self-driving robot through system-level debugging and integration.

## PROJECTS, PUBLICATIONS, AND AWARDS

### Mind-Link: Brain Computer Interface | Muse EEG, Real-Time Signal Processing, Python, React Native

Apr 2025

- Built a brain-computer interface using Muse EEG sensors to classify patterns associated with cognitive states in non-verbal stroke patients, achieving 83% cross-validated accuracy by extracting Alpha/Beta band features and training an SVM to detect signals corresponding to hunger, pain, calm, and alertness.
- Integrated the system with a React Native mobile app using Python, Lab Streaming Layer, and WebSockets to deliver real-time alerts and visual feedback based on live EEG classification.

### Gesture-Controlled Omni-directional Car | Computer Vision, Embedded Systems, Motor Control

Feb 2025

- Developed a real-time gesture-controlled omni-directional car by integrating motor drivers, PWM control, and embedded firmware on Arduino to simulate ECU-style logic for direction and movement control.

### 🔗 Co-Author | DOI: 10.17605/OSF.IO/D7NV5

Aug 2024

- Attitudes and Perceptions of Journal Editors-in-Chief Towards AI Chatbots in the Scholarly Publishing Process

### NASA Space Apps Challenge Hamilton - Most Innovative Project

Oct 2023

- Leveraged satellite data to detect forest fires and generate real-time alerts, enhancing early disaster response.

## SKILLS

- Python (OOP, OpenCV, PyTorch, ONNX), C++/C, Git, Bash, Linux/Ubuntu, Docker, Azure DevOps, Playwright
- Object Detection (YOLO), Real-Time Inference, Signal Processing, Sensor Fusion, LiDAR, Depth Cameras