Vetrivel Balaji

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Education

McMaster University, Hamilton, Ontario September 2021 - April 2025

Bachelor of Engineering - Mechatronics Engineering

Highlights of Qualifications

- Proficient in **Java, C/C++, CSS, HTML, MATLAB**, and **Python (TensorFlow, Mediapipe, OpenCV, FER, Tkinter)**.
- Experienced in **Machine Learning** and **Robotic Systems** with previous work experience and projects in **Robotics**, **Computer Vision** and **Image Processing** using **Python libraries**.
- Collaborated and **communicated** with teammates around the world to **rapidly learn new complex concepts** and apply them to real-world issues by developing creative personal projects.
- Proven expertise in **implementing and optimizing fundamental data structures** (e.g., arrays, linked lists, trees, graphs) and applying various **algorithms** (e.g., sorting, searching, optimization) to solve complex programming assignments and projects, demonstrating **strong problem-solving skills and algorithmic thinking**.

Experience

Full Stack Developer, Brampton, Ontario May 2023 – Present

Pass the Pen

- Designed and developed a 501(c)3 non-profit initiative's comprehensive website, using **HTML, CSS and JavaScript**, to showcase mission and programs, ultimately increasing online presence and improving community interaction by approximately **200%**.
- Spearheaded the development of an innovative **open-access library** platform, revolutionizing access to educational resources for marginalized students and empowering them to share notes collaboratively.
- Utilized **web development** skills to create a visually appealing and user-friendly interface, incorporating intuitive navigation, secure authentication, and seamless login functionality, while integrating cloud storage and implementing robust search capabilities to ensure efficient retrieval and accessibility of educational resources.

Machine Learning Research Student, Toronto, Ontario June 2022 – August 2022

Unity Health Toronto

- Developed and implemented an **automated system** which uses **image processing** to analyze and record the poses of patients and medical practitioners in the CT scan room, while preserving privacy, in order to monitor the usage of the room and ultimately increase productivity and improve the process capacity of the CT scan room.
- Designed the **back end** and **embedded system** for the project using **Python, Linux, Bash**, **OpenCV**, **Raspberry Pi, Google Coral**, and **TensorFlow**.

Projects

Level Up | **Python, MediaPipe, OpenCV, Pygame, Git** September 2022

- Created a **computer vision and image-processing-based** application during a **three-day Hackathon** (Hack the North) that transforms exercise into a **video game** by allowing users to select between push ups, sit-ups, and squats, and accurately count reps while ensuring proper form is maintained.
- Incorporated various game modes to track progress and enhance the user experience, making exercise more enjoyable.

Recycling System | **Python, Raspberry Pi, Quanser Robotics** March 2022

- Developed an **automated process** for organizing materials in a recycling facility to improve efficiency and accuracy of the recycling process by **60%** using **color sensors**, **proximity sensors**, and **infrared LED sensors** to identify, pick up, transfer, and deposit containers into the correct recycling bins using a **robotic arm** and **bot**.

M-U-SIC | **FER, OpenCV, Time, Pygame, Tkinter, TensorFlow** January 2022

- Created an application during a **48-hour** Hackathon that utilizes cutting-edge facial expression recognition technology to detect user emotions in real-time, enabling personalized music playback with intuitive controls for pause/play, track navigation, and dynamic emotion reanalysis. Continuously improved the application post-event to optimize performance and enhance user satisfaction, showcasing **exceptional problem-solving skills** and a commitment to delivering a polished and impactful product.