

Gabriel Singaraja

Mechatronics Engineering co-op student

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[website](#)

Summary of Skills

- **Software:** SOLIDWORKS, AutoCAD, C, C++, Python, Arduino, Git, Figma, Microsoft Suite, Google Suite, Android Studio
- **Equipment:** Power Supply, DMM, Soldering Station, Breadboard, 3D Printing, Power Tools
- Machine vision, hardware integration, robotics systems, GD&T knowledge, G-class driver's license

Experience

Vision Designer – ATS Corporation – Cambridge, ON

May 2025 – August 2025

- Performed statistical analysis on blob parameters from thousands of images and developed complex machine vision code for part inspection in pharmaceutical device production line, using an algorithm that assigned weights to parameters depending on their location in the image, increasing accuracy from 90% to 99.98%
- Trained, deployed, and tested edge-learning and deep neural net tools on a production line, and summarized results, which proved the necessity of an optical redesign, and later presented to vision department about usage of AI tools within vision engineering
- Developed and tested major optical modification involving additional cameras and different lighting, leading to approval from upper management for a \$50,000 redesign that would decrease inspection error from 100 parts per million to 3 parts per million and vastly increase robustness and reliability
- Performed camera setup, calibration, and tuning on five production lines, and configured PCs to run the vision code necessary to perform image logging, laser and enzyme dispenser guidance, and automatic part inspection
- Developed, modified, and tested vision solutions for seven different camera inspections on a critical 320 parts-per-minute production line with 7 other lines depending on it, resulting in accurate inspections that met rigid customer requirements

Mechanical Project Manager – Waterloo Aerial Robotics Group – Waterloo, ON

September 2024 - Present

- Managed design of key drone components including landing gear, dual-axis camera gimbal, and electronics cases, and designed custom Li-Ion pack, electronics cases, and other components with Solidworks
- Vacuum infused carbon fibre plate for hexcopter frame, and performed wet layups for side panelling
- Manufactured aluminum frame with mill, laser cut wooden ribs, heat-wrapped wings, and assembled necessary electronics and linkages to build a fixed-wing airplane

Laborer – H2Ontario – New Hamburg, ON

July 2024 – August 2024

- Fused HDPE pipe system over 200 ft long, providing temporary bypass of plant's headworks building and aided in construction of steel piping system for flocculation tanks
- Used Leica Total Station to layout road marks, curbs, hydro, and building components, as well as estimate volumes of dirt piles, used drone for site photography

Projects

Personal Projects

- Programmed LEGO SPIKE robot with self-driving capabilities to successfully navigate crowded room
- Co-founded *Ardito*, a music-writing application which automatically generates sheet music based on audio input, using a Python backend to achieve 90% accuracy, and managed team of seven to write reports, conduct market research, and prepare pitch videos and live pitches, resulting in second place at pitching competition
- Built remote control car using Arduino Uno, infrared sensor and receiver, and H-Bridge for motor control
- Developed personal website with HTML, CSS, and JavaScript, launched with AWS toolset

Education

University of Waterloo

September 2024 - April 2029

- Candidate for BASc, Mechatronics Engineering, 94% GPA (3.96/4.0)
- Awarded President's Scholarship of Distinction

MedicArm Voice-Controlled 5-Axis Pick-and-Place Robot (Source Code) (UTRA - Devpost)

February 2025

- 3D printed and assembled robotic arm with MG966R and MG90S servo motors, controlled by Arduino Uno R3
- Implemented Google Speech Recognition API to receive input and used TTS API with Chat-GPT for intelligent replies
- Facilitated MongoDB database to add and edit customer user-defined commands to control arm movement
- Utilized serial communication between Arduino and Raspberry Pi 5 to integrate AI model with mechanical control

8x8x8 LED Cube

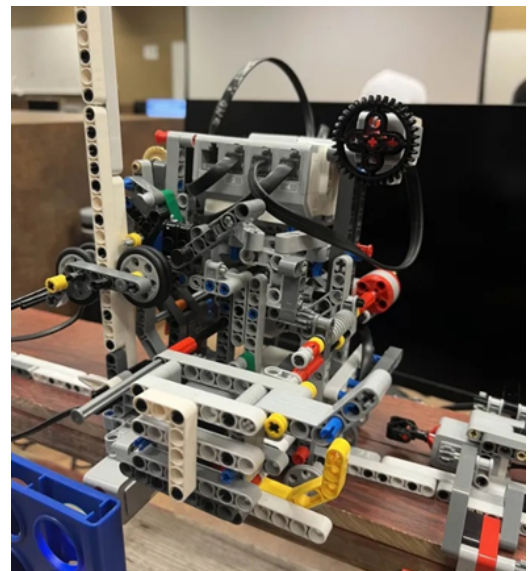
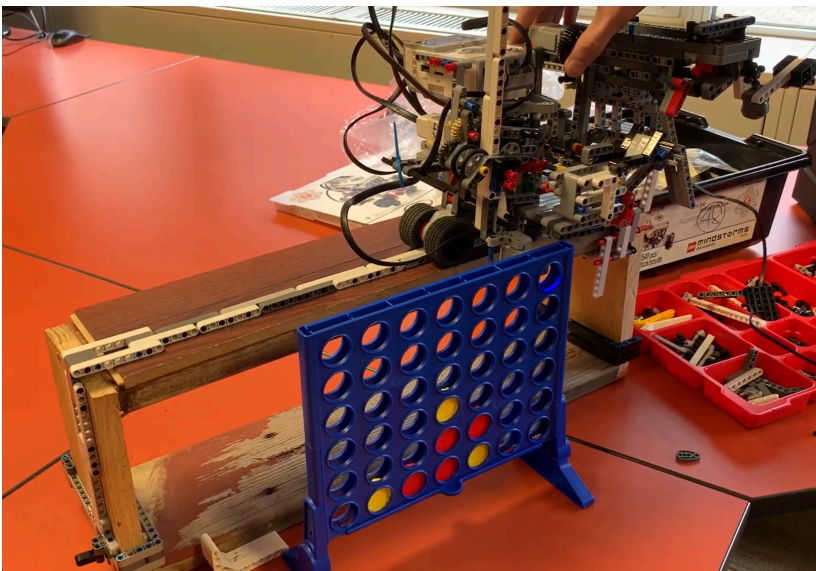
January 2025

- Soldered 512 LEDs into cube shape and created controller using ESP32, and 9 74HC595 shift registers to control 72 transistors, allowing an external 5V DC power supply to power each LED on or off
- Soldered components to prototype PCBs and connected to the cube with ribbon cable
- Wrote low-level firmware that uses multiplexing to achieve efficient control over each individual LED based on its coordinate position
- Programmed several cube animations with C++ and added BLE interface with Android app made in Android Studio

Connect 4 Playing Robot

November 2024

- Designed and programmed a robot using LEGO Mindstorms components and LEGO EV3 brick to hold Connect 4 tokens, read the state of a Connect 4 board, and move around to play the game
- Designed mechanisms for movement, token dropping, and color sensor operation
- Collaborated with a team of four, and distributed programming tasks to create a RobotC program that could control the robot and make smart decisions about where to play
- Used 2D arrays extensively to create an algorithm from scratch that could decide what the best move is based on the current state of the board
- Presented ideas in formal presentation, and communicated the prototype in a technical report



FPV Drone

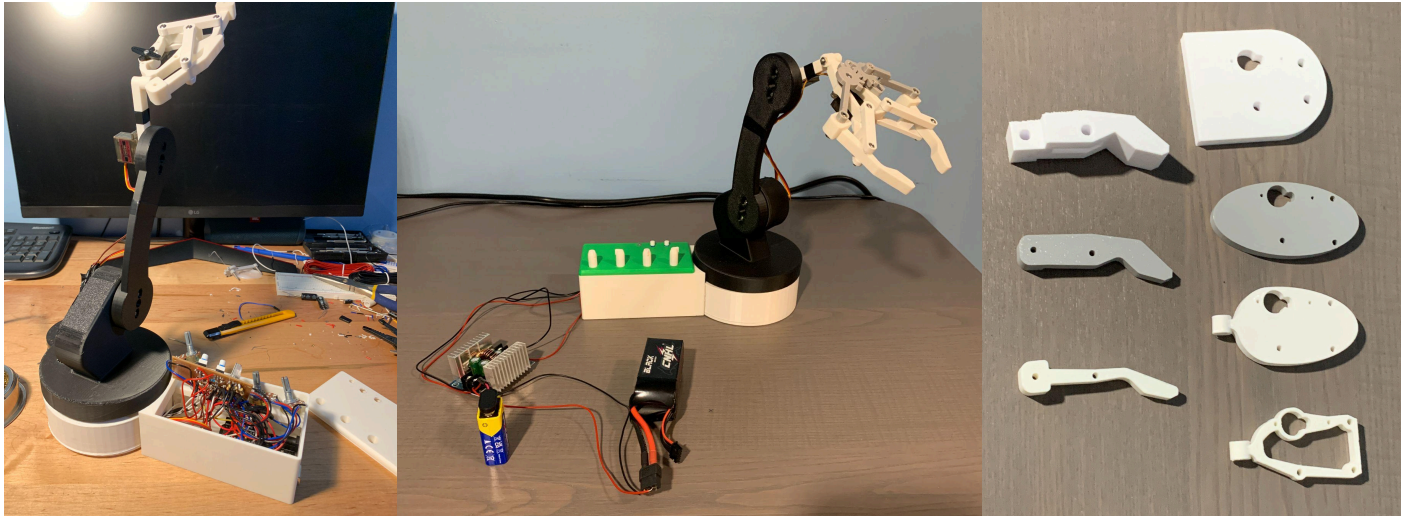
February 2025

- Soldered necessary components to flight controller and assembled body of drone
- Installed and configured firmware on flight controller using Betaflight, tuned PID's and adjusted settings to optimize flight performance
- Successfully performed RC transmitter and receiver binding, and adjusted various controller settings
- Researched principles of video transmission in order to adjust channels and power output from video transmitter

Record/Playback Custom Robot Arm

July 2025

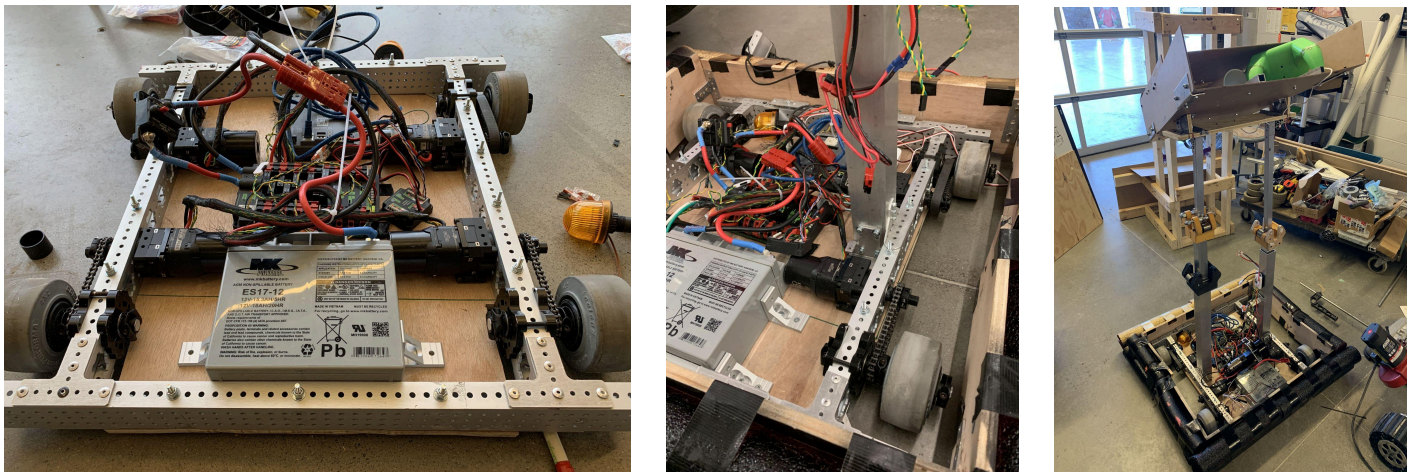
- Designed 3 DOF robotic arm and controller case using Solidworks, and assembled it using MG90 servos, MG996R servos, and potentiometers controlled by an Arduino Uno
- Completed several design iterations to create a functional robot arm, improving aspects such as weight and tolerances
- Soldered custom PCB to connect circuitry, integrating potentiometers for control, RGB indicator light, and push buttons
- Programmed robot movement and implemented a queue that stores motions to provide record/playback functionality



Robot in 3 Days Challenge

January 2025

- Aided with assembly of robot made to complete FIRST Robotics competition game for 2025
- Assembled drivetrain and arm mechanism for raising and dropping game piece
- Collaborated with other students and used drill press, chain tool, and horizontal band saw, to complete a remote controlled prototype



Tourist Information Provider

March 2025

- Raspberry Pi 4 + camera providing real-time foreign text translation and image recognition of popular landmarks
- Flask front end allows users to choose between text translation and image recognition
- Live camera feed captures images of popular landmarks, which is identified by OpenCV, and then Google Gemini provides an informative read-out using Google Cloud Text-to-Speech API
- Text translate feature uses OpenCV to read text, Google Cloud Translate and Text-to-Speech to read it out loud