

MADHAV LODHA

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EDUCATION

Worcester Polytechnic Institute

August 2023 - May 2027

BS in Robotics Engineering & Computer Science. Minor in Data Science.

GPA: 3.6

- **Relevant Coursework:** Intro to Program Design, Intro to Computer Eng, Machine Organization & Assembly, Embedded Computing, Data Structures & Algorithms, Object-Oriented & Systems Programming, Discrete Maths.
- **Master Skills:** Fusion 360, SolidWorks, Keyshot, 3D Printing, CNC, Sheet Metal, FEM/FEA, ANSYS, Generative Design, Arduino, STM32, Raspberry Pi, ESP32, Altium, Signal Processing, Data Logging, IMUs, MQTT, REST APIs, AWS IoT, PX4, Python, C/C++, Flutter, Firebase, Flask, TensorFlow, YOLO v5, OpenCV, Git, Docker, NoSQL, MATLAB, Adobe After Effects, PID Control
- **Software Engineering Skills:** Python, C/C++, Flutter, Firebase, Flask, TensorFlow, YOLO v5, OpenCV, Git, Docker, NoSQL, REST APIs, AWS IoT, Raspberry Pi, STM32, Arduino, Altium, MATLAB, Fusion 360, Keyshot, 3D Printing, CNC

WORK EXPERIENCE

Liger Mobility - Mumbai, MH, India

May 2024 - July 2024

Software Design and Embedded System Engineer

- Developed a scooter testing app that logs and stores ride data for future data analytics, capturing 1.7 million data points weekly from 20+ test riders, using Flutter and Firebase for a NoSQL database storage.
- Integrated a Bluetooth module with the Liger Scooter to enable data transmission to a phone, using cyclic redundancy checks to reduce errors and achieving data compression through run-length encoding.
- Reduced rider steering effort and enabled precise steering control for sharp turns on the scooter by creating an Electrically Assisted System using a PID-controlled motor with an encoder.
- Implemented teleoperation of the scooter's steering handle with sub-50 ms latency by leveraging AWS IoT Core, Rest API's and a flutter web dashboard for the interface.
- Prototyped a local Flask server on Raspberry Pi with Open OCD to enable wireless software updates for the scooter, reducing upload times by 90%.
- Devised 15+ design ideas for the second-generation scooter, suggesting a cost-saving new camera technique for distance mapping, which reduces the number of cameras and cuts processing by 50%.

Ayurhythm - Bangalore, KA, India

April 2022 - July 2022

Product and Software Design Engineer

- Engineered a testing platform with health sensors for 30 company developers, enabling real-time algorithm testing and data collection, improving performance for over 750,000 app users.
- Designed a compact PCB with sensors, a microcontroller, and a display using Altium Designer. Cad Designed and 3D printed a small chassis, achieving a 40% cost reduction compared to version 1.
- Programmed Arduino functions to process data from the heart rate and oxygen sensors, increasing accuracy with signal processing using a Kalman Filter, which was quickly integrated by developers into their algorithms.

Design Flyover - Mumbai, MH, India

September 2021 - October 2021

Product Design Engineer

- Upgraded a window lock for Virtum India using Fusion 360 and FEA, incorporating a pinion door mechanism with telescoping rods to create a robust snap-fit solution that prevents windows from shattering.
- Rapidly Prototyped the design in three weeks using 3d printing, applied DFM principles to cut costs by 15%, and presented the findings to the company founders.

PROJECTS & COMPETITIONS

Singapore Amazing Flying Machine Challenge - Singapore

August 2022 - September 2022

Team Leader, CAD Specialist

- Engineered a lightweight, stable, and maneuverable indoor RC plane using Fusion 360 with generative design and ANSYS Fluent for simulations, resulting in an easy-to-repair bi-wing structure.
- Achieved a top-three finish in the competition, showcasing the plane's superior design and performance.

MATE ROV Competition – Singapore**July 2021 - June 2022***CEO, CAD and Software Specialist*

- Directed a team of 15 in building an underwater robot for cable repair and marine life surveying. Integrated modular components, waterproof systems and custom electronics in 2 months.
- Oversaw software development using Ardupilot for control, YOLO v5, and OpenCV to implement color grading, contour detection, and run a fish vitality deep learning model.
- Overhauled the architecture to increase electronic system reliability by 80%, incorporating a Raspberry Pi, optimizing wiring, and building a modular housing system, which significantly reduced downtime.
- Designed a rotatable claw with high-torque servos and CNC-machined parts, paired with a modular six-thruster propulsion system for 6 degrees of freedom, enabling complex underwater maneuvers.
- Oversaw high-quality renders and comprehensive documentation over six months. Coordinated design documents, schematics, and test reports, presenting to a panel of 10 judges.
- Achieved 2nd place out of 200 global teams and received the 1st place award for engineering presentation.

Together 4 Good Challenge - Singapore**November 2021 - December 2021***Team Leader, Product Designer*

- Crafted micro wireless-powered audio playback tags for the visually impaired, providing a cost-effective solution that a community member uses 400+ times monthly to live independently.
- Demonstrated the projects impact at a exhibition with 300+ attendees.

In Code We Trust, Owl Hacks - Singapore**June 2021 - June 2021***Programmer and Designer*

- Built a fridge management and logging system using TensorFlow and OpenCV running the COCO model to use a camera to automatically track the items in a fridge with a fail rate of 1 in every 50 tries.
- Developed a Flutter app with Firebase for item tracking, connected to a vision recognition system. The app includes expiry tracking and recipe suggestions, and the project was completed within 2 days.
- Engineered and 3D printed the frame using Fusion 360, embedded magnets for easy installation, created a quick interface module for adding and removing items, and used Keyshot to craft realistic renders for product demos.
- Won 1st place and 1000 Euros in Code We Trust and Best Executed Hack and \$50 in Owl Hacks.

FIRST Robotics Competition - Singapore**October 2019 - May 2021***Leader, Design Lead*

- Led a CAD design team of 10 to create a 6-wheel drive and hooded shooter robot, building a 4-stage scissor lift with a 50kg capacity in the first iteration and a spring-loaded telescoping lift with a 90kg capacity in the second.
- Implemented autonomous navigation using encoders and developed a sophisticated targeting system with OpenCV, achieving 80% shooting accuracy.
- Individual Dean's List Semi-Finalist; Innovation Challenge Semi-Finalist & Rookie Game Changer (200+).

Enable Exoskeleton - Singapore**December 2020 - February 2021***Co-Founder, Personal Project*

- Prototyped a low-cost, 3D-printed exoskeleton for elbow support using EMG sensors, stepper motors, and Arduino. Achieved a 40% increase in force, demonstrating significant physical support.
- Shaped a detailed business proposal on custom exoskeleton solutions using photogrammetry and 3D printing
- Presented the concept to 5 investors, refining the business model based on their feedback.

DIY Ventilator – Singapore**May 2020 - August 2020***Personal Project*

- Constructed a low-cost ventilator with a motorized Ambu-Bag mechanism, designed for rapid manufacturability by using 3D printing, enabling deployment in critical COVID-19 situations.
- Prototyped a ventilator with adjustable airflow and oxygen levels, integrating temperature and humidity sensors for data logging, and using a Raspberry Pi to create a server for hospital's to monitor performance.