Aadhav Sivakumar

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Education

New York University, Tandon School of Engineering — Brooklyn, NY

Master's in Mechatronics and Robotics | GPA 3.95 — *Aug 2024 – May 2026*

- Mechatronics
- Advanced Mechatronics
- Foundations of Robotics
- Mathematics for Robotics
- Interactive Medical Robotics
- Reinforcement Learning and Optimal Control for Autonomous Systems
- Robot Perception

University of California, Santa Cruz — Santa Cruz, CA

Bachelor's in Robotics Engineering, Minor in Electrical Engineering | GPA 3.8 — *Jun 2020 – Jun 2024*

- Models of Robotic Manipulation
- Introduction to Mechatronics
- Feedback Control Systems
- Microprocessor System Design
- Sensing and Sensor Technologies
- Advanced Analog Circuits
- Analog Electronics
- Introduction to Electronic Circuits
- Signals and Systems
- Logic Design
- Computer Systems and C Programming
- Computer Systems and Assembly Language
- Introduction to EDA Tools for PCB Design
- Engineering Mechanics: Kinematics and Dynamics
- Statics, Strength of Materials, and Dynamics
- Introduction to Data Structures and Algorithms
- Programming Abstractions: Python
- Probability and Statistics for Engineers
- Mathematical Methods for Engineers II
- Vector Calculus
- Linear Algebra
- Applied Discrete Mathematics
- Introduction to Physics I
- Introduction to Physics III

Dublin High School — Dublin, CA

Bachelor's in Robotics Engineering, Minor in Electrical Engineering | GPA 4.2 — *Aug 2016 – Jun 2020*

Experience

Robot Technician — Jul 2025 – Present

Starship Technologies — *Bronx, NY*

- Conducted root cause analysis (RCA) on recurring hardware and software faults, developing and implementing long-term solutions that reduced specific error rates and kept up fleet health
- Performed component-level replacement of faulty equipment, including circuit boards, Lidar/camera sensors, and power systems, to restore full robot functionality
- Assembled, tested, and calibrated new robotic units to ensure they met operational specifications before deployment into the active fleet

Machine Learning and AI Instructor Jul 2025 – Aug 2025

NYU Tandon School of Engineering K-12 — IDEA program *Brooklyn, NY*

- Developed and delivered a comprehensive introductory curriculum on AI and Machine Learning, translating complex topics from classical algorithms to modern neural network architectures for a beginner-level audience
- Instructed students on key machine learning paradigms, including Supervised Learning (Classification, Regression), Unsupervised Learning (Clustering, Association), and the foundational principles of deep learning with neural networks
- Led coding projects using Python, Scikit-learn, and TensorFlow, culminating in a final project where students performed business analytics on real-world Kaggle datasets to derive actionable insights

Electrical Engineering Instructor Jun 2025 – Jul 2025

NYU Tandon School of Engineering K-12 — IeSosc program *Brooklyn, NY*

- Designed and delivered a multifaceted curriculum for NYU's pre-college program, integrating foundational electrical engineering concepts with introductory entrepreneurship principles to provide real-world context
- Led hands-on labs in circuit construction and Arduino programming with hardware like sensors and LCDs; developed and presented a key demonstration measuring Arduino PWM outputs with an analog oscilloscope
- Mentored student teams in developing a functional prototype for their capstone project, culminating in a "Shark Tank"-style presentation where they pitched their invention's technical design and market potential

Undergraduate Research Assistant Jun 2023 – Jun 2024

UCSC Tactile Manipulation Lab *Santa Cruz, CA*

- Worked under professor Tae Myung Huh to develop technologies related to soft robotics
- Engineered a complete sensor solution for a soft robotic end-effector, utilizing a flexible PCB, a Cypress Capsense chip, and custom-molded silicone to detect shear and transverse forces for simultaneous, pressure-sensitive grasping
- Set up lab equipment including laser cutters, Robot arms, 3D and Stereolithography printers, silicone molds, and CUDA for interfacing Ubuntu with an Nvidia RTX 3090 in computer vision applications

LSS Grader and Tutor Sep 2022 – Jun 2024

UCSC Baskin Engineering *Santa Cruz, CA*

- Provided expert tutoring and academic support across a diverse engineering curriculum, including the classes Introduction to Electronic Circuits, Logic Design, and Mechatronics, clarifying complex concepts for over 100 students
- Teaching topics covered: Circuit Analysis and Simulation (MATLAB), Digital Logic Design (Boolean Algebra, Finite-State Machines), Embedded Systems Programming (C), Microcontroller Integration (Sensors, Motors, A/D Converters), and Programmable Logic Devices (PLDs)
- Mentored students by simplifying complex topics, providing constructive feedback on assignments, and developing tailored learning strategies to improve academic performance
  Managed grading schedules and administrative tasks efficiently, ensuring timely and accurate assessment for multiple courses.

Electrical Engineering Instructor Sep 2022 – Dec 2022

UCSC Sustainability Lab *Santa Cruz, CA*

- Created and taught a 3 credit elective electronics course through the university, requiring technical support, project management skills, technical documentation, and procurement of electrical drawings and schematics.
- Lectured to students about topics about the EDA workflow, including soldering and pcb designing/manufacturing.
- Supervised projects that included electrical circuits, specifically the 555 timer circuit and a buck converter circuit.

Learning Technologies Assistant Sep 2021 – Jun 2022

UCSC Learning Support Services *Santa Cruz, CA*

- Maintained and updated technologies within classrooms, including projectors, computers and recording hardware.
- Kept inventory and rented out equipment to organizations and students on campus.
- Assessed and troubleshot computer problems brought by students, faculty and staff.

Stock Data Analyst Intern Jun 2021 – Aug 2021

Foliowiz *Remote*

- Developed and implemented Python scripts utilizing the requests library to automate the extraction of time-sensitive financial data from a third-party API, ensuring an accurate and up-to-date dataset for analysis
- Applied quantitative algorithms using Pandas for data manipulation and NumPy for mathematical operations to analyze stock market data, successfully identifying key performance indicators and forecasting top-performing equities

- Designed and generated client-facing data visualizations and reports with Matplotlib to translate complex analytical findings into clear, actionable insights
- Utilized the Polygon API to build an automated pipeline for ingesting and processing comprehensive market data.

Code Coach Jul 2019 – Jun 2021

theCoderSchool *San Ramon, CA*

- Mentored over 30 students (ages 7-18) in core programming principles, utilizing languages such as Python, Lua, and Scratch to guide them from basic syntax to fully functional project completion
- Translated complex computer science concepts, such as object-oriented programming and data structures, into digestible, age-appropriate lessons, fostering critical thinking and debugging skills in 1-on-1 coaching environments
- Analyzed and documented student progress through weekly reports to identify knowledge gaps, enabling data-driven adjustments to lesson plans for improved concept mastery

Projects

3D Fruit Ninja Simulation Sept 2025 – Present

- Created as a final project for the students as a TA for Foundations of Robotics
- Uses mujoco to handle control and collisions
- Requires inverse kinematics and dynamics calculations to control robot to hit 4 moving balls in a given time frame

Project Millet Sept 2025 – Present

- Currently building a pixhawk drone to test effectiveness of auto-administering pesticides through an orchard
- Designing system to interface a UGV with liquid payload and a drone with a high-powered sprayer
- Both a small scale drone (for planning) and a large scale drone (for experimentation) are under development
- Will utilize an Nvidia Jetson with an Intel Realsense 3d camera for path planning and object recognition

SoleGait Foot Sensor | *NYU Vertically Integrated Project* Jan 2025 – Present

- Developed a smart shoe sole that track the gait and pressure of your foot as you walk or run
- Integrates force sensors with an Arduino Uno, transmitting the force and gyroscope data over UART to a computer to display real time data on MATLAB
- Won final prize for best design at the NYU 2025 capstone competition

CV Controlled Desktop Arm Jun 2025 – Present

- Creating a small custom-built robot arm controllable through hand gestures
- Using a Raspberry pi with a picam and utilizing the opencv and mediapipe libraries to recognize hands, arms, and gestures
- Robot arm body is made of 3D printed parts and a mix of servo and stepper motors

Glass-2-Bot Apr 2025 – May 2025

- Completed as the last mini-project of the Advanced Mechatronics course at NYU
- Engineered a hands-free user interface by streaming 720p video from a depreciated Google Glass Explorer Edition to a Raspberry Pi, enabling real-time item selection via object detection
- Built a mobile manipulator by modifying and 3D-printing an open-source design and developed a dual-microcontroller architecture where a Raspberry Pi handles computer vision and a C++ programmed Arduino executes a state machine for autonomous navigation and grasping

2R Manipulator Sand Table Mar 2025 – Apr 2025

- Completed as the second mini-project of the Advanced Mechatronics course at NYU
- Engineered a low-cost kinetic sand art table by fabricating a 3D-printed 2R manipulator and programming a C-based state machine on a Parallax Propeller to translate joystick inputs into stepper motor commands via inverse kinematics, enabling user-drawn and autonomous patterns
- Designed the project's physical assembly in Fusion 360 and simulated the manipulator's motion in MATLAB before fabricating the 3D-printed arm links and wooden housing

Arduino PONG Jan 2025 – Feb 2025

- Completed as the first mini-project of the Advanced Mechatronics course at NYU
- Engineered a portable Pong game by integrating hardware with an Arduino Mega and developing optimized code to resolve complex LED matrix mapping and memory-usage constraints

- Designed and manufactured a custom game console chassis and ergonomic controllers using Fusion 360, laser cutting, and 3D printing while managing the complete 3-week project lifecycle from validation to final testing

ASL Glove Interpreter Nov 2024 – Dec 2024
- Created for the final project of the Mechatronics class at NYU
- Utilized multiple flex sensors, an LCD screen, and the Basic Stamp 2, for inputs, outputs, and processing
- Was able to correctly identify all numbers, input multiple digit numbers, and do basic mathematical operations

SMART Compost Sorting | *Senior Capstone Project* Sep 2023 – May 2024
- Created a solution for the problem of contaminated compost streams on UC Santa Cruz campus
- Used OpenCV with DexNet to determine compost versus contaminant and remove it with a robot arm
- Utilized 3D space mapping with transformation matrices to map the depth camera output to robot joint space

Stockbot: Grocery Robotics Feb 2024 – Mar 2024
- Completed as part of ECE215 (Models of Robotic Manipulation)
- Developed and implemented a PID-based feedback control system in each joint of a 7-Degree-of-Freedom robotic arm (Franka Panda) to create a multi-item pick-and-place testing environment
- Instrumented the robotic workcell to log and analyze real-time performance telemetry, including cycle times and task success rates, creating a validation framework to benchmark system efficiency against human trials

IMU driver calibration Feb 2024 – Mar 2024
- Completed as part of ECE167 (Sensors and Systems)
- Developed an embedded C-based AHRS, fusing 9-DOF IMU data with a complementary filter and propagating attitude via a Direction Cosine Matrix (DCM)
- Performed full IMU calibration (gyro bias, axis misalignment) and tuned complementary filter gains after validating the model in MATLAB

PCB Design for milling Nov 2023 – Dec 2023
- Completed as part of ECE174 (Intro to EDA Tools)
- Learned about all of the intricate design philosophies involved with PCB layout and fabrication
- Created an audio amplifier out of base components and milled PCB

Tactile Manipulation Sensor Jul 2023 – Jun 2024
- Developed as part of research at the UCSC Tactile Manipulation Lab
- Designed and developed a sensor for a soft gripper that can be mounted on the end effector of a robotic arm, allowing objects to be sensed and grabbed simultaneously using varying pressures
- Sensor consists of flexible PCB, cypress Capsense chip, and custom molded and cured silicone

Mechatronics Competition Apr 2023 – Jun 2023
- Final Project as part of Mechatronics course at UCSC
- Involved fully prototyping an ping-pong ball shooting robot in Solidworks, and manufacturing it with a laser cutter and power tools
- Competed against other teams within the class, aand got the most points in a single round

FPGA VGA Game May 2022 – Jun 2022
- Completed as part of a lab in CSE100 (Logic Design) at santa cruz
- Used the Digilent Basys 3 board, programmed with verilog
- utilized manual recreation of VGA protocol, while processing inputs to create a fully functional Flappy bird-like game

MATE ROV Competition Robot | *Slugbotics* Sep 2021 – May 2023
- Created PCBs and other electrical circuits to control the movement and sensors of an underwater drone
- Designed CAD model for the inside of the waterproof enclosure housing the main electronics
- Coordinated troubleshooting and maintenance of power equipment

VEX Robotics Aug 2016 – May 2020
- Served as captain of VEX robotics team 5327B
- Created competitive robots that of competed at the regional, state, and world level
- Learned concepts like PID control, slew rates, and CAD for complex constructions
- Incorporated complex design processes, like CAD, simulation, decision matrices, and iterative design

Automated Dog Feeder Jun 2016 – Aug 2016
- My first real project, completed with my dad
- Created a system that dispenses the standard amount of dog food in a bowl
- Connected with IFTTT to activate remotely based on sending an email to a private account
- Uses a simple DC motor, a cereal dispenser, and a drum of dog food to be refilled manually for dispensing

Technical Skills

Languages: C, C++, Python, Micropython, MATLAB, Verilog, Java, HTML/CSS, Javascript, SQL
Frameworks: ROS2, PyTorch, Tensorflow, numpy, pandas, scikit
Boards: Arduino, Raspberry Pi, Digilent Basys 3 FPGA, STM32, ESP32, Parallax Propeller, BASIC Stamp 2
Hardware: Franka Research 3 (7 DOF robotic arm), NI DAQ, Google Glass, Bambu Lab printer, Glowforge
Software: Solidworks, Altium, EAGLE, Fusion 360, Cadence, Mujoco, WeBots, PSpice, AutoCAD
Other tools: AI image recognition, Communication protocols (SPI, I2C, UART), Inverse kinematics, PID control, Signal Filtering, Driver Creation/Calibration, Statics and Dynamics, ATI multi-axis force/torque, 9-axis IMU