

Aayan M. Mukul

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Objective

Electrical engineering student with hands-on experience in machine learning, autonomous navigation, and embedded systems. Demonstrated ability to lead technical teams and develop real-world robotic solutions. Strong background in ROS, OpenCV, and CUDA with successful application in defense and research environments. Seeking a Fall 2025 internship to apply skills in robotics development, system integration, and real-time perception.

Education

Georgia Institute of Technology | Atlanta, GA

Bachelor of Science in Electrical Engineering, GPA 3.93

August 2024 – Present

Expected Graduation, May 2027

Skills

Languages: MATLAB, Python, C/C++, Verilog, Java, Typescript, HTML/CSS, R

Frameworks: ROS, MoveIt!, OpenCV, NumPy, NetworkX, Matplotlib, Viam, TensorFlow, PyTorch

Developer Tools: Xilinx Vivado, ModelSim, OpenCL, CUDA, Git, Docker, Google Cloud Platform

Technologies: Computer Vision, Machine Learning, GPU Optimization, Autonomous Robotics, FPGA

Experience

Sandia National Laboratories | Albuquerque, NM

May 2025 – Present

Robotics R&D Intern

Premier U.S. national security lab focused on science and engineering solutions for national defense and energy.

- Engineering communication systems for autonomous mobile robots, focusing on system integration and microelectronic applications for defense technologies.
- Programming a robust autonomous multi-agent coordination and communication system using a novel jam-resistant wireless method constrained to line-of-sight, enhancing resilience in contested environments.

Complex Rheology & Biomechanics Laboratory | Atlanta, GA

August 2024 – February 2025

Undergraduate Research Assistant

Georgia Tech research lab focusing on biomechanics, soft robotics, and granular material interactions.

- Implemented machine learning algorithms for a model NASA VIPER Rover and Bipedal Robot to optimize gaits through reinforced learning in complex granular media environments, enhancing navigation efficiency by 13%.
- Built a control system in MATLAB to automate the granular media test bed, eliminating the manual adjustment process. Utilized OpenCV to optimize data collection from computer vision systems, improving feedback for gait adjustments.
- Optimized GPU usage by 30% and decreased simulation runtime by 22% in Project Chrono by modeling granular media simulations using novel granular kinetic theory compared to Newtonian theories per particle and applied CUDA, enabling a specialized GPU solver for granular physics.

Georgia Tech Research Institute – CIPHER Laboratory | Atlanta, GA

May 2024 – August 2024

Software Engineer Intern

Cybersecurity, systems modeling, and autonomous robotics lab within Georgia Tech's applied research division.

- Designed a pathfinding algorithm using Rapidly Exploring Random Trees (RRT) to efficiently determine routes for supply chain robots in complex environments with NetworkX, Matplotlib, and NumPy.
- Improved RRT to support non-holonomic constraints for robot maneuverability, incorporate dynamic replanning in response to obstacles, and employ general Bezier curve fitting to ensure smoother navigation, improving real-world applicability.
- Streamlined RRT-generated path by introducing bias, Informed-RRT*, and dynamic rerouting techniques that decreased computation time by 35% and memory usage by 48%, crucial for efficient operation in warehouse environments.

Projects

Autonomous Serial Dilutions | Georgia Tech Research Institute

Summer 2023

Technical Engineer Team Member

Constructed a robotic platform that performed serial dilutions autonomously for the GT Marcus Center for Therapeutic Cell Characterization using a UR3 Robotic Arm and ROS Noetic with a team of 6.

- Developed a computer vision algorithm with a 97% accuracy that detects the location of wells in a PCR plate relative to a robotic arm using inverse kinematics, OpenCV, and NumPy.
- Fabricated and 3D printed a versatile, compliant 3-dimensional electronic pipette gripper for a UR3 Arm in SolidWorks, Fusion360, and Ultimaker Cura.