Ojas Mediratta

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Education

Georgia Institute of Technology — Atlanta, GA

M.S. Robotics | Specialization in Artificial Intelligence, Perception, and Controls — *Expected May 2027*

Coursework: *Artificial Intelligence, Machine Learning, Computer Vision, Deep Learning, Deep Reinforcement Learning, Linear and Nonlinear Control Systems*

Georgia Institute of Technology — Atlanta, GA

B.S. Computer Engineering | Graduated with High Honors — *May 2025*

Coursework: *Data Structures & Algorithms, Digital System Design, Circuit Analysis, Prototyping Intelligent Devices, Embedded Systems Design, Fundamentals of Machine Learning, Network Security, Cybersecurity*

Experience

Graduate Research Assistant — Aug 2024 – Present

Georgia Institute of Technology - Contextual Computing Group — *Atlanta, GA*

- Conducted field robotics research in collaboration with Georgia Aquarium and the Wild Dolphin Project nonprofit, contributing to real-time dolphin communication research initiatives and enrichment for captive cetaceans.
- Engineered a custom bone-conduction headset for underwater use by researchers, enabling clear audio playback for real-time dolphin vocalization translation and two-way communication between researchers and dolphins.
- Developed and optimized tools for dolphin vocalization analysis using autocorrelation, waveform reconstruction, and spectrogram visualization in Python, enabling researchers to accurately mimic essential sounds for testing.

Graduate Teaching Assistant — May 2025 – Present

Georgia Institute of Technology - College of Computing — *Atlanta, GA*

- Served as a teaching assistant for *Mobile and Ubiquitous Computing* and *Prototyping Intelligent Devices*; graduate-level, project based courses on embedded systems, firmware development, and edge machine learning.
- Guided 6–8 student teams in developing mobile-based prototypes and custom microcontroller projects, providing mentorship on report authorship that contributed to higher project success rates and more polished deliverables.
- Hosted office hours and asynchronous feedback sessions, guiding students through technical and research hurdles.

Projects

Cetacean Research AUV | *C++, ESP32, Android, Python, Fusion, KiCAD* — Aug 2024 – Present

- Built an autonomous underwater vehicle (AUV) controlled by dolphin vocalizations, enabling responsive, hands-free operation. Successfully deployed in 15+ controlled pool trials and 4 open-water trials in the Atlantic Ocean.
- Programmed an Android app to enable real-time acoustic control of the AUV, using a DSP pipeline with autocorrelation dolphin click detection and Goertzel algorithms to detect tone patterns from hydrophone input.
- Designed and fabricated parts in Fusion, iterating rapidly for waterproofing and durability for field deployment.
- Engineered and fabricated custom PCBs for ESP32 and internal electronics, tightening integration of inner layout.
- Programmed multi-threaded ESP32 firmware with PID-based closed loop control, stabilizing a 4-DOF underactuated vehicle at depths up to 7 m.

TurtleBot3 Autonomy | *ROS2, Python, OpenCV, Gazebo, Control, Motion Planning* — Aug – Dec 2025

- Built a computer vision ROS2 pipeline for real-time object detection, enabling visual servoing with >95% success.
- Designed and tuned PID controllers for differential-drive motion, reducing steady-state error by 35%.
- Programmed grid and probablistic path planners with python and ROS2, in a multi-node architecture, raising navigation success from 60% to 95% and eliminating collisions.
- Fused odometry and sensor data with particle/Kalman filters, maintaining <10 cm localization error over multi-meter runs.

Smart Guitar Effects Processor | *C, C++, Arduino, Fusion, DSP* — May – Aug 2024

- Built a guitar-mounted audio effects controller using C++ on the Teensy 4.1 for analog to DSP via ADC.
- Implemented 6 effects, including drive, chorus, octave, and reverb, mimicking real-world guitar pedals.
- Designed a physical UI with LCD, improving usability and enabling real-time effect switching for live performance.

Skills

Hardware: Arduino, Raspberry Pi, ESP32, ARM, RISC-V, FPGA
Software: C, C++, Java, MATLAB, Python, Pandas, Pytorch, TensorFlow, Android, Kotlin, ROS2
Protocols: TCP/IP, I2C, CAN, UART, SPI, Serial, USB, PWM
Developer Tools: VSCode, Arduino IDE, Android Studio, Fusion, Gazebo, KiCAD, Git, Docker
Lab Tools: Oscilloscope, Multimeter, Soldering, 3D Printing, CNC Mill, Laser Cutter, Logic Analyzer