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*

Georgia Institute of Technology — Atlanta, GA
B.S. Computer Engineering | *Graduated with High Honors* — *May 2025*

Experience

Graduate Research Assistant — Aug 2024 – Present
Georgia Institute of Technology - Contextual Computing Group — *Atlanta, GA*

- Led field-robotics work with an aquarium and a nonprofit, running controlled pool trials and open-water deployments of a custom marine robot to advance real-time dolphin communication and enrichment research.
- Designed and built a 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 Python tools for autocorrelation, waveform reconstruction, and spectrogram analysis that turned raw recordings into testable audio stimulus libraries and reduced manual preprocessing.
- Co-authored research papers documenting system design and field findings for submission to international conferences in animal-computer interaction and marine robotics

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 8 student teams in developing application 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 ROV | *C++, ESP32, Raspberry Pi, Python, Fusion, KiCAD* — Aug 2024 – Present

- Built a remotely operated vehicle (ROV) for dolphin research and enrichment, contributing across firmware, electronics, and mechanical design; successfully deployed in 15+ pool trials and 4 open-water trials in the Atlantic.
- Designed and implemented an ESP32 firmware stack, orchestrating a cascaded PID-based controller, ESC-driven thrusters, internal sensors, over-the-air telemetry, and LED signaling, unifying system operation in the field.
- Developed a real-time DSP pipeline that parsed dolphin vocalizations using advanced signal processing techniques on audio with Raspberry Pi to generate robot control commands, enabling an animal controlled interface.
- Engineered PCBs unifying microcontroller, power, and sensor interfaces, cutting wiring volume and failure points.
- Designed parts in Fusion, iterating and fabricating rapidly for waterproofing and durability for field deployment.

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

- Developed a ROS2 vision pipeline with OpenCV for real-time object tracking and following with >95% success.
- Designed and tuned PID controllers for differential-drive motion, reducing steady-state error by 35%.
- Programmed grid and probabilistic path planners with python and ROS2, in a multi-node architecture, raising navigation success from 60% to 95% and eliminating collisions across multi-waypoint maze runs.
- Fused odometry and sensor data, maintaining <10 cm localization error over runs with moving obstacles.

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

- Designed a self-contained, guitar-mounted effects processor that digitizes and manipulates sound directly on the instrument, enabling portable, cable-free live performance with onboard digital signal processing.
- Engineered a Teensy-based DSP audio chain in C++ that converted analog guitar input to digital, running six real-time effects (drive, chorus, octave, delay, reverb, filter) with low-latency playback.
- Developed an integrated LCD and rotary-encoder interface for intuitive control and on-the-fly effect switching.

Skills

Software: C, C++, Java, MATLAB, Python, Pandas, Pytorch, ROS2, Android, Kotlin
Hardware: Arduino, Raspberry Pi, ESP32, ARM, RISC-V
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