Anushka Satav

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Education

Arizona State University *Tempe, AZ*
Master of Science in Robotics & Autonomous Systems (AI Concentration) – *Aug 2024 – May 2026*
GPA: 4.0/4.0
Scholarships: NAMU Scholarship ($10K), Engineering Graduate Fellowship ($1K)

MIT World Peace University *Pune, India*
Bachelor of Technology in Robotics & Automation – **GPA: 9.7/10** *Aug 2019 – Jul 2023*
Silver Medalist, Rank 2 | Scholarships: Merit Scholarship (2019, 2020-21, 2021-22) – $3K total

Publications & Recognition

Towards Robotic Trash Removal with Autonomous Surface Vessels – *IEEE ICRA 2025 (Accepted)*
First author. Developed autonomous trash collection system for Heron USV in ROS with boustrophedon survey pattern and detour logic to collect floating trash without compromising data collection. Trained YOLOv8 on floating trash dataset; used RGB spheres as simulation proxies. Achieved 108% survey coverage, 0.34m lateral deviation, 54% target interception with <25% lateral offset threshold. Accepted for poster presentation at IEEE ICRA 2025 Workshop, Atlanta, GA.

A State-of-the-Art Review on Robotics in Waste Sorting – *IJIDeM Journal (Q2, May 2023)*

Overview of Autonomous Vehicles and its Challenges – *Techno-Societal 2022 Conference*

Awards: 2nd Winner & Best MATLAB Use At InnovationHacks 2025 ($300) | ASU Innovation Showcase Presenter 2025

Technical Skills

Robotics & Autonomy: ROS/ROS2, Gazebo, MoveIt!, Nav2, PX4, Sensor Fusion (EKF/UKF), Motion Planning, SLAM, Path Planning
Programming: Python, C/C++, MATLAB/Simulink, Linux (Ubuntu), Git/GitHub, Docker
Perception & AI: YOLOv7/v8, OpenCV, Computer Vision, Deep Learning, NLP, LLMs, TensorFlow Lite, Embedded ML
Platforms & Hardware: TurtleBot4, Heron USV, Parrot Mambo, MyCobot Pro 600, Arduino, Raspberry Pi, Drones
CAD, FEA & Simulation: SolidWorks, Fusion 360, ANSYS Workbench, ABAQUS, FEA, MSC Apex/Nastran/Dytran
Core Competencies: Autonomous Navigation, Robot Manipulation, Control Systems, Sim2Real Transfer, Embedded Systems

Professional Experience

Research Volunteer – Robotic Systems & Dynamics Group Lab *Arizona State University, AZ*
Motion Planning, Path Planning & Applied Project Research *Dec 2024 – Present*
- Designed and implemented EKF-based state estimation fusing wheel odometry, IMU, and LiDAR measurements in ROS2.
- Derived nonlinear motion and measurement models; validated covariance propagation and noise modeling assumptions.
- Evaluated robustness under sensor drift, noise, and different motion conditions.

Robotics Engineering Intern (Remote) *Void Robotics*
Autonomous Navigation & ROS2 Software Development *May 2023 – Nov 2023*
- Developed Nav2-based autonomous navigation systems and ROS2 software components using Arduino libraries
- Debugged and optimized code for mobile robots; mastered ROS2 fundamentals, Linux workflows, and Git/GitHub version control

R&D Intern – FEA & Automation
Finite Element Analysis & Python Automation Tools

Hexagon Manufacturing
Intelligence, Pune, India
Feb 2023 – Sep 2023

- Conducted static, linear, non-linear, dynamic FEA simulations on 10+ models using MSC Apex, Nastran, Dytran; created custom material libraries and validated non-linear analysis against industry benchmarks
- Engineered Python automation tool reducing Top Load Analysis model creation time by 90% (20 min to <2 min) by automating model building, constraints, boundary conditions, and post-processing

Key Technical Projects

Sensor Fusion for Mobile Robots (TurtleBot4)
Sep 2024 – Ongoing

- Implementing Kalman Filter, EKF, and UKF algorithms for mobile robot state estimation with multi-sensor integration
- Developing EKF sensor fusion pipeline fusing wheel odometry, IMU, LiDAR in ROS2; validating in Gazebo and on hardware

Voice-Controlled Mobile Robot with Object Detection – TurtleBot4 & MyCobot
Jan 2025 – Apr 2025

- Developed voice-controlled navigation with PyQt5 GUI and Whisper.cpp transcription for real-time command processing
- Implemented YOLOv8 object detection with live LiDAR/IMU sensor visualization; addressed Sim2Real perception and noise filtering challenges
- Deployed MyCobot Pro 600 alongside TurtleBot4 for manipulation demos; future integration planned for mobile manipulation

Autonomous Drone – Rock Detection, Mapping & Precision Landing (PX4)
Mar 2025 – Apr 2025

- Developed ROS2 drone system using PX4 SITL to identify & map cylindrical rocks with boustrophedon search
- Implemented ArUco marker detection and precision landing; designed mission pipeline: TAKEOFF → SURVEY → GOTO_MARKER → HOVER → DESCEND → LAND

Real-Time Embedded Keyword Spotting – Arduino Nano 33 BLE Sense
Sep 2024 – Dec 2024

- Deployed TensorFlow Lite Micro keyword spotting on microcontroller; trained 7-class CNN (95% accuracy), applied int8 quantization reducing model 74% (116KB to 29.5KB), implemented MFCC feature extraction

4-DOF Robotic Arm for Waste Sorting – Undergraduate Capstone
Sep 2022 – Nov 2022

- Designed and fabricated complete robotic arm from scratch using AUTODESK FUSION 360 for CAD and ANSYS Workbench for FEA structural validation
- Developed electronics with Arduino Mega controller, motor drivers, wiring for 4-DOF actuation; implemented YOLOv7 vision system for waste classification (glass, paper, metal, plastic) with vacuum gripper (200g payload)
- End-to-end development: mechanical design, FEA stress analysis, embedded programming, vision integration (100/100 grade)

Additional Technical Projects

- CNN-based food image classification using transfer learning (PyTorch).
- LLM-based multimodal agent with context engineering and embedding-based loop detection.
- Parrot Minidrone visual tracking and autonomous landing.
- 4x4 maze navigation with digital-twin validation.

Leadership & Service

Robotics Instructor: Led online robotics sessions for ages 7-15; **ASU Volunteer:** Southwest Robotics Symposium coordinator and lab tour guide; **National Student Exchange:** Completed Biomechanics course at SRM IST