Saayuj Deshpande

saayuj@outlook.com | +91 98925 99160 | saayuj | saayuj

Education

University of Pennsylvania, U.S.A — Aug 2024 – May 2026 (exp.)
Master of Science & Engineering in Robotics | GPA: 3.84/4.0

Courses: Engineering Product Management, Mechatronic System Design, Applied Machine Learning, Autonomous Vehicle Racing, State Estimation & Filtering, Reinforcement Learning, Dynamics & Control of Manipulators

Indian Institute of Technology Bombay, India — Nov 2020 – May 2024
B.Tech (Honours) in Mechanical Engineering & Minor in Controls | GPA: 8.91/10.0

Professional Experience

Real-to-Simulation Research Intern | Parallax Worlds, U.S.A. — May 2025 – Jul 2025
Isaac Sim 5, Simulated Annealing, OpenVLA, Photorealistic Simulation, Mesh Processing, Standard Bots RO1

- Optimized joint stiffness & damping in Isaac Sim using annealing to minimize real-to-sim gap in joint dynamics
- Deployed OpenVLA on a 6-DoF arm & replicated the environment in Parallax Sim with reconstructed 3D meshes

Robotic Controls & Dynamics Intern | AXIBO & McMaster University, Canada — May 2023 – Jul 2023
ROS, MATLAB, Simscape, BLDC motors, Harmonic Drives, Field-Oriented Control, PID Control, Input Shaping

- Implemented FOC for BLDC motors & simulated robot links in Simscape with PID control for velocity tracking
- Applied Time-Varying Input Shaping on a 6-DoF robotic manipulator, reducing end effector oscillations by 81%

Automotive Mechatronics Intern | Mahindra & Mahindra Ltd, India — May 2022 – Jul 2022
Embedded C, CAPL, Vector CANoe, CANape, In-Vehicle Networking, ECU, ABS, CAN, Unified Diagnostic Services

- Studied the automobile IVN & tested 5+ ECUs like Anti-lock Braking, Speed Control, Instrument Cluster Systems
- Performed diagnostics on CAN bus using the UDS protocol & automated 4+ diagnostic services like I/O Control

Publications

Drone Delivery Optimization [Link] | Guide: Avinash Bhardwaj, IIT Bombay — Jan 2023 – May 2024
AMPL, Gurobi, Python, Mixed-Integer Programming (MIP), MTZ Subtour Elimination, Dijkstra's Algorithm

- Optimized charging locations & generated battery-constrainted shortest paths & minimal time drone trajectories

Leadership Experience

- Teaching Assistant | MEAM 2030, ENM 2510, MEAM 5170 | *UPenn* — Jan 2025 – Present
- Institute & Department Student Mentor | Mentorship Program | *IIT Bombay* — May 2022 – May 2024
- Alumni Secretary | Student Alumni Relations Cell | *IIT Bombay* — Jun 2021 – Jun 2022

Projects

F1Tenth Autonomous Vehicle Racing — Jan 2025 – May 2025
C++, Python, ROS2 Jazzy, Nvidia Jetson Xavier NX, VESC, Hokuyo LiDAR, RRT, SLAM, Pure Pursuit, MPC, RL

- Built a SLAM & online localization stack for autonomous cars using LiDAR & RRT* with real-time path planning
- Trained YOLO models & deployed TensorRT pipelines for real-time dynamic obstacle detection & race navigation

Pick & Place using 7-DoF Franka Emika Panda Arm — Jan 2025 – May 2025
ROS, Gazebo, RViz, Forward & Inverse Kinematics, A*, Bi-RRT*, Artificial Potential Field, Bezier Interpolation

- Creating an E2E pipeline for position, velocity kinematics, motion planning & control for dynamic manipulation

Robot Wars - Mobile Robot Competition — Aug 2024 – Dec 2024
Embedded C, ATmega32U4, ESP32 C3/S2, Arduino, Time-of-Flight, HTCVive, UDP, ESP-NOW, I2C, SPI, CAN

- Manufactured a 4-wheel autonomous robot using ESP32, L298N motor drivers & ToF sensors for wall following
- Enhanced localization & path planning with HTCVive & enabled remote control using UDP & I2C communication

Control of Snake Robot | Guide: Abhishek Gupta, IIT Bombay — Jan 2023 – May 2024
Simscape, MATLAB, ROS, Gazebo, Solidworks, Finite Element Analysis, PID Control, Filters, Dynamics Analysis

- Modeled dynamic friction & computed 2mm-accurate robot link deflections via FEA simulations in MATLAB-ROS
- Developed a Simscape-Gazebo cosimulation for a 10-link snake robot with PID control loop for position tracking