Anurag Paresh Shetye

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Research Focus

Perception and control for decision making under uncertainty as applied to robotic autonomy, with the objective of advancing the science of safe autonomy so that robots can perceive, decide, and act reliably in unstructured environments without human supervision.

Education

Bachelor of Technology, Computer Science and Business Systems — Navi Mumbai, India
*Ramrao Adik Institute of Technology, DY Patil Deemed to be University | CGPA: 9.48/10.00 | **3.79/4.00*** — *Aug 2022 – Jun 2026*

Research Experience

Centre for Systems and Control, Indian Institute of Technology Bombay — Mumbai, India
Research Intern (Robotics), Guide: Dr. Arpita Sinha — *Jan 2026 – Present*

- Built an **autonomous motion planning** architecture for **robotic refuelling** and validated it on a **Kinova 6-DOF arm**: analytical **inverse kinematics**, STOMP planning, elastic-strip obstacle avoidance, and **admittance control** for contact-rich insertion, with **closed-loop** validation in **ROS2/Gazebo**; bachelor thesis.
- Did the **neural kinematic modelling** for a **cable-driven flexible manipulator** (LSTM forward model, mixture-density inverse model, Qualisys motion-capture ground truth), submitted to the Indian Control Conference; contributed the control mathematics to work validating **control barrier functions** for reinforcement-learning policies.
- Designed a grasp pose predictor with a **vision-language-action model** and built a **200 Hz** reactive control layer for **on-the-move grasping** on an **OpenManipulator-X** with a **TurtleBot 3** base, solved as a single **whole-body QP** that corrects joint velocities continuously from measured base pose; first-author manuscript in preparation.

Autonomous Systems Group, Imperial College London — London, United Kingdom
Research Collaborator, Guide: Dr. Johannes Köhler — *Aug 2026 – Present*

- Extending an **MPC** framework for efficient navigation of mobile robots in cluttered environments to navigate efficiently around **moving obstacles**.
- Carrying its shortest-path planner to the dynamic case with **tube-based robust MPC**, preserving **recursive feasibility** and collision-avoidance guarantees under obstacle motion; validated in **acados** and **ROS**.

Nakama Robotics Lab, University of Twente — Enschede, Netherlands
Research Intern (Robotics), Guide: Dr. ir. Mark Vlutters — *Mar 2026 – Present*

- Architected the **perception** module for the lab's **learning-from-demonstration** pipeline on a **Franka Research 3**, where grasp and contact events from the robot's own **proprioception** label the task-relevant objects automatically, with no human annotation.
- Built the lab's **ROS2** pipeline converting **MCAP** robot recordings into synchronized multimodal datasets (joint states, force-torque, vision), and extraction of **6D object poses** from manipulation demonstrations; first-author manuscript in preparation.

RAIT Robotics Laboratory, DYPU — Mumbai, India
Undergraduate Robotics Researcher, Guide: Dr. Vishwesh Vyawahare — *Mar 2024 – Nov 2025*

- Coded the **ORB-SLAM** stack and built the drone and its **perception** stack for *RUDRA*, an autonomous **GPS-denied** UAV for Martian-analogue terrain, writing the algorithm that used **LiDAR** and **Intel RealSense** depth to pick out safe landing spots and arena boundaries; designed and built the test arena; top 16 of 500+ teams, **IRoC-U 2025** (ISRO Robotics Challenge, URSC).
- Built autonomous UAV navigation and control on **Crazyflie 2.1** quadrotors: **PID-based stabilization**, precision landing, and leader-follower swarm coordination through consensus algorithms with Lighthouse positioning; validated on real flight hardware.

Publications

Under Review / Submitted

- **Data-Driven Kinematic Modelling of Cable-Driven Flexible Manipulators**
  Second Author | Under review, Indian Control Conference, submitted Jul 2026

Manuscripts in Preparation

- **Validating Control Barrier Functions for Reinforcement-Learning Policies** | Second Author | IIT Bombay
- **Vision-Based Task-Relevant Object Semantics for LfD** | First Author | University of Twente

Patents

An Advanced Rescuing Robotic Device and System for Disaster Response and Quick Survivor Detection
Indian Patent Application No. 202421050737 | Filed Jul 2024

System and Method for Pothole Detection
Indian Patent Application No. 202521060776 | Filed Jun 2025

Awards & Achievements

- Top 16 of 500+ teams, Final Field Round, **IRoC-U 2025** (ISRO Robotics Challenge, URSC) certificate — *2025*
- **2nd Place**, National Space Hackathon (IIT Delhi × ISRO/HSFC), 5,000+ participants certificate — *2025*
- **Bronze Medal**, 33rd CASTIC (Chongqing, China), 44+ countries & 755 projects certificate — *2018*