

Shreyas Kumar

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Education

Indian Institute of Engineering Science and Technology

B.S. in Mechanical Engineering

Jul 2021 – Jun 2025

8.68/10, Distinction

Research Experience

IITGN Robotics Laboratory

[advised by Prof. Harish PM]

Staff Researcher

Jun 2025 – Present

- Empowering low-cost, velocity-controlled manipulators with object-level compliance and force-closure grasps – capabilities typically reserved for torque-controlled systems – through a control framework robust enough for dynamic tasks like (bimanual) throwing!

Research Fellow

Dec 2024 – Jun 2025

- Developed an end-to-end bimanual snap-fit assembly framework integrating SnapNet, a novel CNN-GRU attention network trained solely on joint velocity data, with a unified DS-based multi-arm coordination scheme and event triggered impedance ramp down to absorb residual energy. [\[Manuscript Under Preparation\]](#)
- Grasping at the Edge of Instability: studied robotic squeezing task posed as a control problem, evaluated the role of GDI and redundancy, and transformed required control inputs from task space into tendon space. [\[Manuscript Under Preparation\]](#)

SRIP Fellow

Jun – Jul 2024

- Worked on rapid task generalization in robotic grasping using a novel Iterative Learning Control (ILC) based approach, combining adaptive null-space control, path-dependent object impedance control, and sensor fusion via EKF for real-world deployment. [\[Under Review: Autonomous Robots\]](#)

Indian Space Research Organization

[advised by Dr. Pradeep Ananthanarayanan]

Student Researcher

Apr – May 2024

- Developed a real-time momentum observer and adaptive force estimator for dynamic manipulation tasks in microgravity, enabling accurate force tracking during contact, lift, and manipulation phases.

Indian Institute of Engineering Science and Technology

[advised by Prof. Roshni Maiti]

Research Fellow – Dept. of EECS

Jan – Mar 2024

- Designed a fuzzy predictor with Lyapunov-based adaptation for real-time disturbance estimation, integrated with a fast terminal sliding mode controller to reject the estimated disturbances and ensure finite-time convergence. [\[ICC 2024\]](#)

Work Experience

Black Coffee Robotics

Robotics Intern

Oct – Dec 2024

- Developed an autonomous pick-and-place framework in Gazebo using ROS 2, MoveIt!, and a custom robot using URDF for parcel handling from conveyor belts.
- Wrote a custom Gazebo plugin for Vacuum Gripper.
- Set up a training environment in Isaac Lab using Kinova Gen3 7 DoF Manipulator to fine tune OpenVLA.

ARTPARK, IISc Bangalore

Robotics Intern

Dec 2023

- Implemented ArUco-SLAM, an algorithm for localization using node graph of landmarks based on fiducial markers, improved efficiency by 30% through object oriented refactoring.
- Used a particle filter to map the environment by fusing depth data with IMU data.

New Jersey Institute of Technology

ML Intern

Sep – Oct 2023

- Worked on crystal structure prediction for Si-alloys using CNNs with OFM and Magpie descriptors; improved accuracy over traditional regressors (SVM, RF) via GridSearchCV and Bayesian hyperparameter optimization.

Publications

*Equal Contribution

1. Grasping at the Edge of Instability

Barat S*, [Shreyas Kumar*](#), Harish J. Palanthandalam-Madapusi
Manuscript Under Preparation

2. A Unified Framework for Bimanual Snap-Fit Assembly with Robot-Agnostic Snap Detection and Event-Triggered Compliance

[Shreyas Kumar](#), Debojit Das, Barat S, Siddhi Jain, Rajesh Kumar, Harish J. Palanthandalam-Madapusi
Manuscript Under Preparation

3. Iterative Learning for Manipulation and Grasping Against Unknown Resistance Fields that is Generalizable to Arbitrary Trajectories

Barat S*, Suyash Patidar*, Debojit Das, [Shreyas Kumar](#), Shail Jadav, Harish J. Palanthandalam-Madapusi.
Under Review: Autonomous Robots

4. Adaptive Fuzzy Predictor based Fast Terminal Sliding Mode Controller Design for Two-link Robot Manipulator

[Shreyas Kumar](#), Bishesha Dash, Roshni Maiti, Dipayan Guha
Indian Control Conference 2024

Awards and Achievements

- Awarded travel grant of \$100 by IEEE CSS for ICC 2024.
- Recieved a prize money of \$500 under 1965 ME Alumni Award for Technical Excellence.
- Awarded GAABESU Research Award (10 of 720 graduating students).
- Prize money of \$100 at regional round of Boeing National Aeromodelling Competition, 2023.
- Awarded with the prestigious IASc-INSa-NASi Summer Research Fellowship, 2023.
- Shortlisted for the Institute Innovation Council's 'Alpona Banerjee Memorial Endowment Funding Scheme' and received a \$1000 USD funding for research in Robotics and Artificial Intelligence.
- Secured a global critical design review rank of 25 and an innovation rank of 32 in ASME Human Powered Vehicle Challenge, 2022.

Skills

Languages	Python, C/C++, MATLAB
Frameworks	ROS/ROS2, MoveIt!, Gazebo, MuJoCo, Isaac Sim, Mathematica
Libraries	OpenCV, PyTorch, Mink
Fabrication	SolidWorks, Design, Failure Analysis, 3D Printing, CNC Lathe and Milling, Laser Cutting

Extracurricular

- Tutor at Robotics Summer School, IIT Gandhinagar.
- President of The Robotics Society at IEST, led the team at multiple national level competitions.
- University team Basketball player, played SF.
- Team lead at Prerana, a NGO with an aim to raise awareness of women's rights in rural areas of India.
- Tutor under NSS, taught math at an evening school for over 100 underserved children.

More to Know?

I'm deeply interested in nature, music, and philosophy. I enjoy playing the guitar, writing about human condition, and taking reflective photo-walks. I love trekking and have travelled solo to over 11 states in India within 4 months. When time permits, I also let myself out on the canvas board.

Research Interest

My vision is to build generalizable robotic systems capable of physically interacting with complex environments in ways that are robust, safe, and adaptable. I am particularly fascinated by how we can combine conventional control theory with data-driven learning to achieve reliable, real-world manipulation. I aim to contribute towards making contact-rich robot behavior both intelligent and reliable, not just in the lab, but in everyday human settings.