Amitabh Sharma

International Institute of Information Technology, Hyderabad

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Education

International Institute of Information Technology, Hyderabad **Aug 2022 – Present**

MS by Research (Robotics) *CGPA: 9.67/10.00* ***Supervisor:*** *Dr. Spandan Roy*

Birla Institue of Technology and Science, Pilani **Aug 2016 – July 2020**

Bachelor of Engineering (Electronics and Instrumentation)

Publications

A. Sharma, S. Gupta, S. Singh, R.D. Yadav, H. Song, W. Pan, S. Roy and S. Baldi, *"Impedance and Stability Targeted Adaptation for Aerial Manipulator with Unknown Coupling Dynamics"*, Proceedings of the 25th International Conference on Control, Automation, and Systems (ICCAS), 2025, in press.

S. Gupta, **A. Sharma**, A. Mulgundkar, R.D. Yadav, and S. Roy, *"Adaptive Control of Quadrotor under Actuator Loss and Unknown State-dependent Dynamics"*, at the 2024 IEEE 20th International Conference on Automation Science and Engineering, doi: 10.1109/CASE59546.2024.10711418

R.D. Yadav, B. Jones, S. Gupta, **A. Sharma**, J. Sun, J. Zhao and S. Roy, *"An integrated approach to aerial grasping: Combining a bistable gripper with adaptive control"*, in *IEEE/ASME Transactions on Mechatronics*, doi: 10.1109/TMECH.2025.3586888

Technical Reports and Under Review

A. Sharma, S. Gupta, R.D. Yadav, W. Pan, S. Roy, and S. Baldi, *"Achieving Adaptive Impedance Control for Autonomous Aerial Manipulation under Unknown Dynamics"*, under review at *IEEE/ASME Transactions on Mechatronics*, 2025.

S. Gupta, **A. Sharma**, R.D. Yadav, S. Roy, W. Pan, and S. Baldi, *"A Switched Adaptive Control Framework for Aerial Manipulators Under Dynamic Transitions"*, under review at *IEEE Transactions on Robotics*, 2025.

Ongoing Projects

Reinforcement Learning Based Control for Robotic Arms in Aerial Manipulation

Robotics Research Center, IIIT Hyderabad

- Creating custom simulation environments in Nvidia IsaacLab for training RL agents for aerial manipulators with a 2-DOF robotic arm.
- Learning policies for efficient interaction behavior for the robotic arm via PPO using state and end-effector force feedback

Diffusion Models for Robust System Identification

Collaboration with University of Manchester

- Researching novel applications of diffusion models for system identification in aerial manipulators
- Developing parameter estimation techniques that are robust to model uncertainties and environmental disturbances
- Implementing PyTorch-based framework for online learning of dynamic parameters during flight operations

Experience

Research Associate, *Non-Linear Control for Aerial Manipulation* **Aug 2022 – Present**

Supervisor: Dr. Spandan Roy *Robotics Research Center, IIIT Hyderabad.*

- Working on non-linear control algorithms for aerial manipulators including adaptive control, switched controllers, and impedance controllers. Analyzing the role of impedance control methodologies to add compliance in aerial manipulation.

Teaching Assistant, *Robotics – Dynamics and Control; Mechatronics System Design* **Monsoon 2023; Spring 2025**

Supervisors: Dr. Nagamanikandan Govindan, Dr. Spandan Roy and Dr. Harikumar Kandath *IIIT Hyderabad.*

- Drafted and graded assignments, quizzes, projects, and exam papers; conducted weekly doubt-clearing sessions.

Research Associate, *Controller Design for Super-maneuvering Fighter Aircraft* **Jan 2020 – June 2020**

Supervisor: Dr. Bijoy Krishna Mukherjee *EEE, BITS Pilani.*

- Worked on designing a H-infinity optimal controller for F-18 High Alpha Research Vehicle (HARV) and tested it for Herbst maneuver in Matlab and Simulink.

Project Associate, *Design of an Intelligent Fuzzy Controller for Flow control systems* **Aug 2019 – Dec 2019**
Supervisor: Dr. Puneet Mishra *EEE, BITS Pilani.*

- Used the Takagi-Sugeno model to design an Intelligent fuzzy controller for rectification of stiction based non-linearities in pneumatic valves and tested it on a flow control plant setup. Compared the designed controller against the PID controller using the IAE and ITAE performance indices.

Research Collaborations

Simone Baldi: Southeast University, Nanjing, China and guest with Delft Center for Systems and Control, TU Delft.
Wei Pan: University of Manchester, England.
Jianguo Zhao: Head Adaptive Robotics Lab, Colorado State University, USA.

Technical Skills

- **Languages:** Python, C/C++, MATLAB, Bash
- **AI & Control Libraries:** PyTorch, TensorFlow, SKRL - Reinforcement Learning library, Stable-Baselines3, SciPy, Control Toolbox
- **Middleware & Planning:** ROS 1, ROS 2, MoveIt 2, micro-ROS
- **Simulation & Flight:** Gazebo, IsaacSim, IsaacLab, PX4 SITL/HITL, MAVROS
- **DevOps & Tooling:** Docker, Docker Compose, Git/GitHub, VS Code Dev Containers
- **Hardware & Sensors:** Pixhawk 2.4.8, CUAV X7, NVIDIA Jetson, Dynamixel XM430, OptiTrack MoCap, Robotous RFT60, LiDAR, RGB-D cameras

Relevant Courses

- **Graduate:** Robotics: Dynamics and Control; Mobile Robotics; Advances in Robotics and Control; Topics in Applied Optimization; Mechatronic System Design
- **Undergraduate:** Robotics; Internet of Things (IoT); Control Systems; Control Systems Lab; Industrial Instrumentation and Control; Medical Instrumentation
- **Audited Courses:** Statistical Methods in Artificial Intelligence; Computer Vision

Key Highlights

Scholarships

- IIIT Hyderabad research student fellowship to cover tuition fee during Masters program. (Aug 2022 - Present)

Responsibilities and Volunteering

- Member of Student Parliament, IIIT-H (2024-2025))
- Student Volunteer, Student Union - BITS Pilani (2016-2017)

Achivements

- Ranked **582nd** in Graduate Aptitude Test in Engineering (Feb 2021)
- Scored within the **99th** percentile nationwide in BITSAT (May 2016)
- Ranked **125th** in the State Engineering Test (CGPET, Apr 2016)

Presentations

- Paper Oral Presentation in CASE 2024.
- Poster Presentation of autonomous aerial manipulation project during IIIT-H R&D Showcase 2024 and 2025.

Referrals

Dr. Spandan Roy **Assistant Professor, Robotics Research Center, IIIT-H**
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Dr. Puneet Mishra **Assistant Professor, EEE, BITS Pilani**
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