Shaunak A. Mehta

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EDUCATION

PhD in Mechanical Engineering   December 2025 (Expected)
Virginia Tech, Blacksburg, VA   GPA: 3.95/4.0

Master of Science in Mechanical Engineering   December 2024
Virginia Tech, Blacksburg, VA   GPA: 3.95/4.0

Bachelors of Technology in Mechanical Engineering   May 2021
Indian Institute of Technology, Jodhpur, India   GPA:8.33/10

PUBLICATIONS

- **Mehta, S. A.**, Ciftci, Y. U., Ramachandran, B., Bansal, S., snd Losey, D. P. (2025). Stable-bc: Controlling covariate shift with stable behavior cloning. IEEE Robotics and Automation Letters. DOI: 10.1109/LRA.2025.3526439
- **Mehta, S.A.** and Zarrin, R.S., (2024, November). On the feasibility of a mixed-method approach for solving long horizon task-oriented dexterous manipulation. In 2024 IEEE-RAS 23rd International Conference on Humanoid Robots (Humanoids). DOI: 10.1109/Humanoids58906.2024.10769963
- Keely, M., Kim, Y., **Mehta, S. A.**, Hoegerman, J., Sanchez, R. R., Paul, E., Mills, C., Losey, D.P., Bartlett, M. D. (2024). Combining and Decoupling Rigid and Soft Grippers to Enhance Robotic Manipulation. arXiv preprint. DOI: 10.48550/arXiv.2404.13755
- **Mehta, S. A.**, Habibian, S., Losey, D. P. (2024). Waypoint-Based Reinforcement Learning for Robot Manipulation Tasks. In 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). DOI: 10.48550/arXiv.2403.13281
- **Mehta, S. A.**, Meng, F., Bajcsy, A., Losey, D. P. (2024). StROL: Stabilized and Robust Online Learning from Humans. IEEE Robotics and Automation Letters.DOI: 10.1109/LRA.2024.3354626
- Jonnavittula, A., **Mehta, S. A.**, Losey, D. P. (2024). SARI: Shared autonomy across repeated interaction. ACM Transactions on Human-Robot Interaction. DOI: 10.1145/3651994
- **Mehta, S. A.**, Kim, Y., Hoegerman, J., Bartlett, M. D., Losey, D. P. (2023, April). RISO: Combining Rigid Grippers with Soft Switchable Adhesives. In 2023 IEEE International Conference on Soft Robotics (RoboSoft) (pp. 1-8). DOI: https:10.1109/RoboSoft55895.2023.10122030
- **Mehta, S. A.**, Losey, D. P. (2023). Unified learning from demonstrations, corrections, and preferences during physical human-robot interaction. ACM Transactions on Human-Robot Interaction.DOI: 10.1145/3623384
- **Mehta, S. A.**, Parekh, S., Losey, D. P. (2022, May). Learning latent actions without human demonstrations. In 2022 International Conference on Robotics and Automation (ICRA) DOI: 10.1109/ICRA46639.2022.9812230
- Mithun, P., **Mehta, S. A.**, Shah, S. V., Bhatnagar, G., Krishna, K. M. (2020). Student Mixture Model Based Visual Servoing. arXiv preprint. DOI: 10.48550/arXiv.2006.11347

RESEARCH EXPERIENCE

Graduate Student Researcher   August 2021 - Present
Institute: Virginia Tech
Advisor: Prof. Dylan Losey

- Formalized a method to learn latent mappings for complex robot actions without using human demonstrations.
- Unified learning from Demonstrations, Corrections and Preferences under a flexible reward learning framework.
- Developed a framework for assisted grasping using a novel rigid-soft gripper based on a soft switchable adhesive.
- Formulated conditions for convergence of a real time learning rule based on Lyapunov stability analysis.
- Developed an offline learning algorithm to modify the system dynamics and increase robustness for suboptimal inputs.

Undergraduate Student Researcher   July 2019 - May 2021
Institute: Indian Institute of Technology(IIT), Jodhpur
Advisor: Prof. Suril Shah

- Implemented the Basic Visual Servoing algorithm on a Universal Robots UR-5 Manipulator.
- Developed a novel approach for visual servoing based on student t-distribution mixture model (SMM).
- Extracted feature points from an uncooperative tumbling object to create an elliptical track in the image plane.
- Designed a controller to perform Visual Servoing for tumbling objects using an extracted eleptical track.
- Worked on vision based control and motion planning of a half humanoid robot.

INTERNSHIP EXPERIENCE

STUDENT ASSOCIATE, HONDA RESEARCH INSTITUTE (HRI-US)   January 2024 - May 2024
San Jose, California, USA

A HIERARCHICAL FRAMEWORK FOR SOLVING LONG HORIZON DEXTEROUS MANIPULATION TASKS
- Explored and implemented state-of-the-art algorithms to determine best approaches to solve for different subtasks of long horizon dexterous manipulation task using multi-fingered robot hand.
- Proposed a novel teacher-student reinforcement learning approach combining real world data to enable efficient sim-2-real transfer.
- Developed a hierarchical framework combining different methods — imitation learning, reinforcement learning and model based control — to solve for different parts of a long horizon task.

MECHATRONICS, INSTRUMENTATION AND CONTROL LAB (MICL), IIT PATNA   May 2019 - July 2019
Indian Institute of Technology (IIT), Patna, India

LAPAROSCOPIC SIMULATOR WITH 3 DOF HAPTIC FEEDBACK
- Aimed at the development of a novel kinesthetic haptic device for laparoscopic simulation.
- Worked on user interaction with virtual organs instead of cadavers for realistic experience, for training and improving the skills in surgical process of laparoscopy.
- Achieved force feedback in x and y direction using a cable driven parallel mechanism and in z direction using a ferrofluid based damper and a capstan drive mechanism.

AUTOMATION + MECHANICAL ENGINEERING INTERN, GODREJ INTERIO   May 2018 - July 2018
Company: Godrej Interio, Mumbai, India

DESIGN AND DEVELOPMENT OF A RAIL GUIDED VEHICLE (RGV)
- Designed and prototyped an automated vehicle for inter plant material transfer to reduce risk of human lives and to improve efficiency.
- Integrated LIDAR sensor for working in an open environment to avoid the obstacles in its path for the purpose of avoiding hazards. Link to Model on Grabcad

SELECTED PROJECTS

INTEGRATING PREFERENCES WITH ADVERSERIAL INVERSE REINFORCEMENT LEARNING   JAN 2022 - MAY 2022
Institute: Virginia Tech
- Analyzed the existing loss functions for imitation learning that leverage different sources of feedback — crossentropy loss for preferences and causal entrpoy for reward learning.
- Integrated the loss functions for reward learning and preferences under a unified framework.
- Evaluated our proposed approach of combining different feedback forms against state-of-the-art methods that learn from demonstrations and preferences.

VISION BASED CONTROL AND MOTION PLANNING OF A HALF HUMANOID ROBOT   MARCH 2021 - MAY 2021
Indian Space Research Organisation (ISRO) Respond Project
- Set up and controlled the custom half humanoid developed by ISRO using ROS and MoveIt.
- Extracted pose from vision data in 3D Cartesian space to implement motion planning with and without obstacles.
- Implemented eye to hand Image Based Visual Servoing in Joint Space for the custom robot.

IMAGE BASED VISUAL SERVOING FOR TUMBLING OBJECTS   JUNE 2020 - FEB 2021
Institute: Indian Institute of Technology(IIT), Jodhpur, India
- Extracted feature points from an uncooperative tumbling object to create an elliptical track in the image plane. The controller minimizes the error between the current elliptical track and the desired features.
- This algorithm was successfully implemented on a 6 DoF UR-5 robot.
- Focused on grasping of tumbling objects and implementation of the algorithm on a dual arm system for On-Orbit Service.

TECHNOLOGY SUMMARY
- **Software:** Linux, GitHub, Robot Operating System (ROS), Pytorch, OpenCV, PyBullet, MATLAB, Arduino IDE, Fusion 360, SolidWorks, Unity 3D, ADAMS.
- **Landuages:** Python, C/C++.
- **Interests:** Learning from Demonstrations, Imitation Learning, Human-Robot Interaction, Robot Learning, Reinforcement Learning, Vision Based Control, Soft Robotic Grippers.
- **Robots:** FrankaEmika Panda, Universal Robots UR10, UR5, Fetch, Kinova Gen-3 Lite.