SAYAN MONDAL

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Work Experience

- **Robotics Engineer, Dexmate** *Oct'24 – Present*
  Working on learning-based dexterous manipulation with a focus on real-world deployment and scalable simulation.
  - Built a reinforcement learning pipeline in NVIDIA Isaac Lab for vision-based bimanual box reorientation task.
  - Integrated learned RL policies with classical motion planning for tasks such as door opening.
  - Created a scalable simulation asset pipeline: sourced 3D objects (GLB) using BlenderKit and Sketchfab, processed them with Trimesh (scaling/alignment), converted to USD, and added collision meshes.
  - Led sim-to-real transfer experiments using a dual-arm robot system, validating the learned policies in physical setups.
  - Developed the control API for Dexmate's Vega robot, including teleoperation via PS5 controller for Cartesian-space and joint-space arm control, mobile base navigation, and head orientation.
  - Authored comprehensive user-facing documentation to streamline onboarding and accelerate development for external customers.
  - Worked on data-collection by teleoperating the robot using Apple Vision Pro for manipulation tasks.
- **Teaching Assistant** *Jan'24 - May'24*
  Carnegie Mellon University
  Course: Visual Learning and Recognition
- **Teaching Assistant** *Various Terms*
  University of California, San Diego
  Courses: Introduction to Autonomous Driving, Computer-Aided Analysis and Design, Fundamentals of Solid Mechanics

Education

- **Carnegie Mellon University, The Robotics Institute** *Sept'22 - Aug'24*
  Master of Science in Robotics **4.10/4.00 GPA**
- **Carnegie Mellon University** *Sept'20 - May'22*
  Master of Science in Biomedical Engineering **3.88/4.00 GPA**
- **University of California San Diego** *Sept'17 - April'20*
  Master of Science in Engineering Sciences (Mechanical Engineering) **3.67/4.00 GPA**
- **Jadavpur University, Kolkata, India** *May'12 - June'16*
  Bachelor of Engineering in Mechanical Engineering **8.00/10.00 GPA**

Selected Graduate Courses

- **CMU** - Planning and Decision-making in Robotics (A) | Robot Learning (A) | Deep Learning (A+) | Learning for 3D vision (A) | Optimal Control and RL (A) | Underactuated Robots (A) | Computer Vision (A+) | Mobile Robots (A)
- **UCSD** - Linear Systems Theory | Parametric Identification | Soft Robotics | Linear Control Design | Nonlinear Systems | Robot Reinforcement Learning | Cooperative Control/ Multi-Agent System

Research Experience

demos & more projects

Multi-Object Tracking for Recycling Facility Automation | *Staff, Biorobotics Lab* *May'21-May'22*

- Led a five-member team in automating the Gateway Recycling Facility, Pittsburgh.

- Implemented a YOLO-based object detection system to accurately identify various materials on a conveyor belt, complemented by DeepSORT for robust tracking. Leveraged Kalman filtering for precise state estimation, enabling re-identification across disparate camera views.

Controls and Perception Researcher, *Contextual Robotics Institute, UCSD* *Nov'19-March'20*

- Tested and modified AUTOWARE (an open source ROS-based software for autonomous driving) on Polaris GEM. Involved in the development of steering and throttle control based on the kinematic model.
- Developed a new approach to predicting driving attention maps which not only uses raw human gaze information, but also learns to detect the scene semantics directly. We showed that such combined attention mechanism serves as a powerful tool to focus on the relevant regions in an image frame in order to make driving both safe and efficient.

Masters' thesis, *Gravish lab, UC San Diego* Sept'18 - June'20

- Built a novel underactuated micro-gripper that facilitates mobile micro-robots in performing pick and place tasks. Developed a closed-chain linkage mechanism that allows the gripper to bend down and grasp objects simultaneously. Performed the kinematic and static analysis of the gripper.

Publications

1. **Sayan Mondal**, **"Efficient Quadruped Mobility: Harnessing a Generalist Policy for Streamlined Planning"**, *MS thesis, 2024*.
2. Anwesan Pal, **Sayan Mondal**, Henrik I. Christensen,**"Looking at the right stuff"- Guided semantic-gaze for autonomous driving**, *IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2020*.
3. **Sayan Mondal**, **"Design and analysis of a kirigami-based two-finger microgripper"**, *MS thesis, 2020*.

Skills

- Programming: Python, C++, CMake, CUDA, Java, Julia, MATLAB, Scripting(Bash)
- Robotics: Isaac Lab, Isaac Gym, MuJoCo, Gazebo, MoveIt, OpenCV, ROS, PyTorch, Simulink