Vedant Mundheda

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Education

Carnegie Mellon University (CMU) GPA 4.11/4.00
MS in Robotics (Research) *Aug. 2023 – May 2025*

IIIT Hyderabad GPA 8.22/10 (Dean's list)
Integrated B. Tech + MS in ECE *Aug. 2018 – May 2023*

Experience

Carnegie Mellon University Aug. 2023 – Present
Research Assistant *RL, LLMs, Sim2Real, Planning, Control*

- **Autonomous Driving**: Developed a novel PPO-based RL algorithm for end-to-end perception, trajectory planning, and control of off-road autonomous vehicles improving performance from SOTA by **200%**.
- **Few-shot Sim2Real**: Used LLM priors to trasfer vision-based RL policy trained in simulator to real world.
- **Hardware Deployment**: Deploying RL policy on a full-scale off-road vehicle (Sabrecat) using ROS.

JP Morgan Chase & Co. May 2022 – Aug. 2022
Data Science Research Intern *Machine Learning, Explainability*

- Developed a model-agnostic ML tool for **interpretability** of ML models and data using SHAP values.
- Deployed an internal Python library for machine learning teams, enhancing data and model interpretability and reducing model deployment time by **80%**.

Robotics Research Center, IIIT Aug. 2020 – May 2023
Research Assistant *RL, Model Predictive Control, Robotics, Manipulation*

- **Aerial Manipulation:** RL-MPC control with contraints from Barrier Function for Aerial Manipulator.
- **Hardware:** Deployed RL-MPC for safe UAV tunnel navigation, designed an aerial manipulator for object retrieval.

Publications

Towards Off-road Autonomous Driving via Planner Guided Policy Optimization *ICLR'2025*
Vedant Mundheda, Zhouchonghao Wu, Jeff Schneider (Under Review)

Teacher-guided Off-road Autonomous Driving *AAAI-W'2025*
Vedant Mundheda, Zhouchonghao Wu, Jeff Schneider

Predictive Barrier Function based Control for Safe Trajectory Tracking of an Aerial Manipulator ECC'2023
Vedant Mundheda, Karan Mirakhor, KS Rahul, Harikumar Kandath, Nagamanikandan Govindan

Projects

Multi-room Rearrangement using Common-sense Knowledge | *LLMs, Reinforcement Learning, Manipulation*
Developed a POMDP-based manipulation planner for embodied agents, utilizing visual input, large language models, and deep RL to optimize object search and rearrangement in cluttered environments..

Autonomous Janitorial Mobile Manipulator | *Hardware, Full-stack Robot Autonomy, Manipulation, CAD*
Deployed a completely autonomous janitorial bot to perform tasks including picking trash, detecting and cleaning wash basins and markers using a novel scissor mechanism manipulator.

Zero-Shot Sim2Real Transfer of visual RL Manipulation Policies | *Gaussian Splatting, RL, Manipulation*
Developed a simulator using Gaussian Splatting for photorealistic synthetic data, enabling RL policy training and zero-shot deployment on real manipulators with reduced Sim2Real gap.

Trajectory generation for autonomous driving | *Diffusion Models, Pytorch*
Method leveraging trajectory denoising to optimize non-differentiable objectives for autonomous driving.

CUDA Accelerated Physics simulation for autonomous robots | *CUDA, Reinforcement Learning*
Developed a GPU-accelerated real-time simulator for autonomous robot training, integrating CUDA-based physics simulation and reinforcement learning for task optimization.

Skills and Classes

Selected Coursework: Visual Learning and Recognition · Generative AI · DL Systems · 3D Vision · Robot Learning · Computer Vision · Mechanics of Manipulation · AI & ML · Mobile Robotics

Languages & Platforms: Python, C++, MATLAB, CUDA, Pandas, NumPy, PyTorch, TensorFlow, Keras, Matplotlib, sklearn, OpenCV, React, Node.js, AWS, JAX

Teaching Assistant: Robot Dynamics and Control, UAV Design, Robotics Workshop, VLSI Design