Puru Ojha

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Research Interests

Robot learning for long-horizon manipulation tasks, with a focus on zero-shot policy transfer, language-grounded perception, and developing neuro-symbolic systems that combine the generalization of deep learning with the verifiability and safety of formal methods.

Education

International Institute of Information Technology, Hyderabad **2022 – Current**
Master of Science By Research in Computer Science and Engineering (8.3 CGPA) *Telangana, India*

GRE: 322 (Quant: 169, Verbal: 153)

The LNM Institute of Information Technology **2014 – 2018**
Bachelor of Technology in Mechanical Engineering, ***Specialization in Mechatronics*** *Rajasthan, India*

Research Projects

Zero-Shot Policy Transfer for Cross-Embodiment Robotic Manipulation

- Developed a zero-shot policy transfer framework for cross-embodiment manipulation, enabling a generalist policy (π_0) trained on Franka Panda data to control a morphologically distinct uFactory xArm without any fine-tuning.
- Implemented a Brownian bridge diffusion model for visual domain adaptation, translating sensory inputs from the target robot (xArm) to the source domain (Panda) to ensure seamless, real-time policy execution.
- Engineered a robust policy transfer pipeline that leverages real-world data, addressing the critical challenge of generalization across different robot hardware and environments.

Sequential Rearrangement Planning with Language-Guided Graph Transformer

- Designed a graph-based transformer model for predicting object removal sequences in cluttered tabletop scenes, conditioned on natural language goals.
- Built a large-scale simulation and training pipeline with expert A* supervision and PPO fine-tuning, achieving state-of-the-art performance over GRN and NRP baselines.

Enhanced Transformer-Based Framework for Grounded Image Situation Recognition

- Developed a transformer framework for grounded situation recognition to enable robots to follow complex natural language instructions.
- Improved noun grounding and verb prediction by integrating CLIP and Faster-RCNN features into a CoFormer architecture, achieving state-of-the-art performance on the SWiG dataset.

Procedural Generation of Architecturally Consistent Simulation Environment

- Engineered an efficient framework for procedural generation of complex, structured environments, ideal for benchmarking reinforcement learning agents and studying sim-to-real transfer of navigational policies.
- Designed a novel graph-based algorithm to generate scalable, architecturally consistent layouts with dynamic multi-path structures, ensuring structural fidelity for realistic simulation.

Research Publications

- **ACMGVR: Architecturally Consistent Mazes for Games in Virtual Reality** In Proceedings of The Annual Symposium on Computer-Human Interaction in Play **(CHI PLAY 2024)**.
- **The POMS Effect: Measuring the impact of overlapping architectures on User Engagement in Virtual Reality** In Proceeding of International Conference on Virtual Reality **(ICVR 2025)**

Leadership & Mentorship Experience

- **AI Olympiad Coach**, IIIT-H: Coached India's IOAI 2025 team; taught RL and motion planning bridging classical robotics with modern deep RL (DQN, PPO).
- **Teaching Assistant**, Mobile Robotics, IIIT-H: Supported instruction and projects on robot kinematics, SLAM, and path planning using ROS and Gazebo.

Technical Skills

Languages & Tools: Python, C++, C#, Bash, Git, Linux, Tmux
Robotics & Simulation: ROS, PyBullet, Gazebo, MoveIt, RViz, OpenCV, PCL, Unity, Blender
Deep Learning & RL : PyTorch, Stable Baselines3, TensorFlow, CLIP, PointNet++, PyTorch Geometric, RLlib, HDF5