

Chaitanya Chawla

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Education

Carnegie Mellon University

MS in Robotics - GPA: 4.13/4.00 – Advisor: Prof. Guanya Shi

Aug '24 – Jul '26

- Interests: Learning from Videos, Web-scale training, Reinforcement-learning

Technical University of Munich

BS in Electrical Engineering - GPA: 3.91/4.00 (Top 3%)

Oct '20 – Jun '24

- 4x National German Scholarship - Deutschlandstipendium

Publications

R. Qiu*, S. Yang*, X. Cheng*, **C. Chawla***, T. He, R. Hoque, ... G. Shi, X. Wang. **Humanoid Policy ~ Human Policy** Conference on Robot Learning: CoRL 2025

P. Yu*, P. Huang*, **C. Chawla***, G. Shi, J. Li, C. Li. **Ontology and skill graph for autonomous multi-robot assembly**, May 2025. IP filed on 2025-04-17. (PREPRINT).

T. Shankar, **C. Chawla**, J. Oh. **Translating Agent-Environment Interactions across Humans and Robots**

International Conference on Intelligent Robots and Systems: IROS 2024: Oral Presentation (Top 10%)

Research Experience

Generating Physically-Grounded Reference Motions for Cross-Embodied RL

May 2025 – Present

LeCAR Lab, CMU — Advisors: **Guanya Shi, Laszlo Jeni**

- Developed an embodiment-agnostic RL policy for zero-shot transfer of human-object interaction trajectories to various dexterous humanoids. Extended it to generate novel human trajectories by using an autoregressive diffusion transformer with Masked Autoencoder for bypassing jittery behaviour seen in similar VQ-VAE based techniques.
- To bring generated motions closer to the robot's manipulable space, designed a diffusion-steering pipeline integrating inverse kinematics guidance during inference. Sim evaluations demonstrate that this constraint-injection reduces proximity to singularities by 60% compared to post-hoc filtering baselines.
- Developing framework for sim2real transfer of learnt policies using retargeting and teacher-student distillation to a Unitree-G1 robot with Dex3 hands.
- In Preparation for **RSS 2026**

Data Engine for Web-Scale Robot Training

Aug 2025 – Present

LeCAR Lab, CMU — Advisors: **Homanga Bharadwaj**

- Leading a cross-university collaboration (Georgia Tech, UT Austin, UMD) to develop autonomous data engine processing thousands of internet videos for robotic manipulation training.
- Architecting pipeline integrating LLM-based semantic filtering with pixel-level kinematic analysis tools (eg. HaMeR) to lift 2D video into 3D trajectories, recovering spatial geometry, contact details, and precise object states to create physics-aware foundation for generalist robot learning

Autonomous Multi-Robot Assembly via Skill-Graphs and Foundation Models

Dec 2024 – Aug 2025

Intelligent Control Lab, CMU — Advisors: **Changliu Liu, Guanya Shi**

- Designed and implemented an ontology-driven Skill Graph architecture that encodes verb–noun semantics, pre/post-conditions, and executables to enable symbolic planning and composable robot control.
- Designed a VLM-based pipeline to segment skills and extract parameters from human demonstrations using G-DINO and SAM in a zero-shot manner. Integrated scene understanding, sim verification, and sim-to-real transfer.
- In Preparation for **RAL 2025**

Cross-embodiment Learning for Humanoid Manipulation

Sept 2024 – Mar 2025

LeCAR Lab, CMU — Advisors: **Xiaolong Wang, Guanya Shi**

- Co-developed HAT (Human Action Transformer), a unified cross-embodiment policy trained on large-scale egocentric human and small-scale humanoid robot data, achieving strong out-of-distribution generalization in dexterous manipulation.
- Designed a unified state-action representation enabling joint training of human and humanoid robot policies via wrist pose and fingertip retargeting, improving generalization across embodiments.
- Our approach is $\sim 5x$ faster than teleoperation ($\sim 4s$ vs. $\sim 20s$ per trial), and allowed us to scale our dataset to 26,000 demonstrations.
- Published at **CoRL 2025**

Learning Abstract Representations of Agent-Environment Interactions

Aug 2023 – Dec 2023

Bot Intelligence Group, CMU — Advisors: **Jean Oh**

- Proposed TransAct, a framework for learning temporally abstract interaction representations that jointly model agent behavior and environment dynamics from human and robot demonstrations.
- Developed a factored latent representation with auxiliary objectives (contrastive, Jacobian, and state reconstruction) to enable smooth, composable skill abstractions for zero-shot human-to-robot skill transfer.

Industrial Experience

Robotics Software Developer - Part-time

Roboverse Reply GmbH (Munich, Germany)

July 2023 – July 2024

- o Built a perception pipeline for autonomous analog gauge reading, including data annotation, real-time inference, and post-processing, integrated with Boston Dynamic's Spot via ROS and Docker for monitoring in a factory setup.
- o Created a webRTC pipeline using gRPC to transfer point cloud data from Spot's LIDAR sensor to Oculus VR Headset, enabling a remote user to observe Spot's immediate environment in real time.

Selected Projects

Self-supervised fine-tuning for Pre-Grasps through 3D Object Generation

- o Proposed a novel 3D latent diffusion framework for text- and image-conditioned voxel generation, integrating efficient VAE and attention-based UNet architectures.
- o Enhanced robotic grasp synthesis by fine-tuning pre-trained models on generated 3D assets, demonstrating improved generalization to diverse object geometries.

Learning Dexterous Manipulation from Human Video Pretraining using 3D

Point Tracks

- o Proposed a pipeline to benchmark pre-training methods using different state representations.
- o Extracted sensorimotor information from videos by lifting the human hand and the manipulated object in a shared 3D space in simulation (IsaacGym), i.e. either 3D point-tracks or 3D meshes.
- o Retargeting hand-trajectories to a Franka with a Shadow hand, followed by BC task-specific fine-tuning.

Scholarships and Awards

German National Scholarship: for academic excellence and community service

Oct 2020/21/22/23

Heinrich and Lotte Muhlfenzl Scholarship: for research excellence

Aug 2023

TUM Promos: merit scholarship for stay-abroad research

Aug 2023

Max Weber Program: Nominated by the TU Munich President

Oct 2022

Service and Leadership

Reviewer: RAL, ICLR, CoRL

Teaching Assistant:

- o *Introduction to Robot Learning* Carnegie Mellon University: Fall 2025
- o *Robotic Control Laboratory* TU Munich: Fall 2023
- o *Mathematical Analysis* TU Munich: Fall 2022

CMU SKY Campus President

2024 – 2026

- o Organized weekly meditation sessions to promote mental health care as preventive practice.
- o Grew participation to 100+ students
- o I established a peer-led structure with trained facilitators ensuring sustainability beyond my graduation.

CMU Graduate Assembly Representative

2025 – 2026

Art of Living Foundation

2010 – Present

- o Organized numerous rural-upbringing events for Indian villages near Haryana and New Delhi

Skills

Languages: Python, C++/C, MATLAB

Libraries and Frameworks: PyTorch, ROS, Docker, Git, IsaacGym, IsaacSIM, Mujoco, PCL, AWS

English Proficiency

GRE: Verbal Reasoning 158/170, Quantitative Reasoning 170/170, Analytical Writing 4.0/6.0

TOEFL: 114/120 (Reading 28/30, Listening 29/30, Speaking 29/30, Writing 28/30)