Maitrey Gramopadhye

maitreygram.github.io | maitrey@cs.unc.edu
linkedin.com/in/maitrey-gramopadhye | Google Scholar

Research Interests

Human Robot Interaction, Common Sense in Robotics, Robotic Perception, Computer Vision, Deep Learning

Research Objective - I am interested in improving robot reasoning, to enable human robot collaboration for complex long-horizon tasks.

Education

University of North Carolina, Chapel Hill *(Aug 2023 - present)*
Ph.D. candidate in Computer Science. Advisor: Dr. Daniel Szafir

University of North Carolina, Chapel Hill *(Aug 2021 - Aug 2023)*
Master of Science in Computer Science

Indian Institute of Technology, Bombay, India *(July 2016 - July 2020)*
Bachelor of Technology in Computer Science, with Honors

Research and Publications

- **The Cyber-Physical Control Room: A Mixed Reality Interface for Mobile Robot Teleoperation and Human-Robot Teaming**. Michael E. Walker, **Maitrey Gramopadhye**, Bryce Ikeda, Jack Burns, Daniel Szafir. *ACM/IEEE International Conference on Human Robot Interaction (HRI) 2024*

  We present the design and evaluation of an immersive **Cyber-Physical Control Room interface** for remote mobile robots. In a human subjects study, our interface improved robot operator effectiveness and various aspects of human-robot teaming, including social engagement.

- **Generating Executable Action Plans with Environmentally-Aware Language Models**. **Maitrey Gramopadhye** and Daniel Szafir. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023*

  We propose an approach to utilise **large language models** and convert high level tasks to environmentally-aware action plans that intelligent agents can directly execute. Our approach involves using the agent's environment to provide **situational awareness**.

- **Assessing the Impact of VR Interfaces in Human-Drone Interaction**. **Maitrey Gramopadhye**, Arran Zeyu Wang, Leonard Shearer, Tony Qin and Daniel Szafir. Horizons of an Extended Robotics Reality (XR-ROB Workshop) | IROS, 2023

  We design a novel VR interface to control a 6-DOF drone and explore the impact and differences of VR and 2D interfaces on layman human-drone interaction.

- **CuRL: Coupled Representation Learning of Cards and Merchants to Detect Transaction Frauds**. **Maitrey Gramopadhye***, Shreyansh Singh*, Kushagra Agarwal, Nitish Srivasatava, Alok Singh, Siddhartha Asthana and Ankur Arora. *International Conference on Artificial Neural Networks (ICANN) 2021*

  We propose to generate contextual embeddings for credit cards and merchants by capturing the **cross-interactions** in a bipartite graph of the payment entities. The proposed approach was faster and outperformed many SOTA representation learning algorithms.

- **3D Reconstruction in Cryo-Electron Microscopy**. **Maitrey Gramopadhye**, Ajit Rajwade. *Undergraduate Thesis, 2020*

  We built a pipeline for reconstructing 3D structures of viruses from 2D tomographic projections. We extended prior work for estimating projection angles by also estimating and correcting for translation errors in electron micrographs, thus adding (2+3) degrees of freedom to be estimated.

Industry Experience

AI GARAGE, MASTERCARD

Associate Analyst *(Aug 2020 - Aug 2021)*

- Research paper **CuRL: Coupled Representation Learning of cards and merchants to detect transaction frauds** got accepted in **ICANN 2021**
- Built models to predict whether transactions would **clear** as well as the details of clearing, i.e. **time taken to clear**, **is clearing amount same as the authorised amount** etc. with **99.5%** precision

SAMSUNG RESEARCH INSTITUTE, BANGALORE

Research Intern *(May 2019 - July 2019)*

- Worked in the **Advanced Technology Lab** at Samsung Research Institute, Bangalore
- Built real-time monocular **3D object detection** model in Pytorch for mobile phones
- Implemented methods to estimate 3D bounding box around objects in 2D images
- Received a job offer for outstanding performance during the internship

Selected Student Projects

IIT-B MARS ROVER TEAM

Student Technical Team, IIT Bombay *(May 2017 - July 2020)*

- The IIT Bombay Mars Rover Team builds rovers capable of traversing and conducting operations and experiments in Mars like terrain, for competing in the University Rover Challenge, Mars Society
- Intensively worked in the field of **Computer Vision** for autonomous tasks performed by the rover
- Worked on **Autonomous Object detection** task by implementing a hybrid method, using conventional CV approach followed by deep learning, to get real-time detection from a video stream
- Worked on **Autonomous Obstacle Avoidance** task of the rover, using data from **GPS** and **LiDAR**

Teaching and Mentoring Experience

GRADUATE TEACHING ASSISTANT

Department of Computer Science, UNC Chapel Hill *(Aug 2021 - May 2022)*

- TA for COMP 523 - Software Engineering Lab in Spring 2022, taught by Prof. David Stotts
- TA for COMP 475 - 2D Computer Graphics in Fall 2021, taught by Prof. Mike Reed
- Duties included regular meetings with students for tracking their progress, clarifying doubts with the course content, helping debug code in C++, python etc.

SOFTWARE SUBSYSTEM HEAD

Mars Rover Team, IIT Bombay *(May 2019 - July 2020)*

- **Head** of **Software Subsystem** of the IIT-Bombay Mars Rover Technical Team
- Responsible for supervising the team's progress on the software required for **URC 2020**

INSTITUTE STUDENT MENTOR

Institute Student Mentorship Program, IIT Bombay *(May 2019 - July 2020)*

- Responsible for guiding a group of 12 undergraduate freshmen for the academic year
- Providing counsel and mentoring them about any academic or personal problem

DEPARTMENT ACADEMIC MENTOR

Department Academic Mentorship Program, CSE Department, IIT Bombay *(Apr 2019 - July 2020)*

- Mentor to 5 sophomore students for helping them cope with the curriculum
- Responsible for guiding them with their academic and general concerns
- Mentor to additional 2 students in academic rehabilitation program, helping them get back on track