

Pranay Mathur

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EDUCATION

M.S. Robotics (AI and Perception)	Georgia Institute of Technology	GPA: 3.92/4	Aug 2022 – May 2024
B.E. Electronics and Instrumentation	Birla Institute of Technology and Science, Pilani	GPA: 8.87/10 (Dept. Rank 3)	Aug 2017 – July 2021

EXPERIENCE

MathWorks — EDG Software Engineer Natick, MA	June 2024 – Present
<ul style="list-style-type: none">Working in the image-processing and computer vision team on implementing and deploying vision foundation models in MATLABDeveloped an ML-based recommendation algorithm using language embeddings and KNN to match development teams with candidates	
MathWorks — Engineering Development Group Intern Natick, MA	May 2023 – Aug 2023
<ul style="list-style-type: none">Developed the test harnesses search feature in the Simulink Test Toolbox using graph search algorithms and deployed it to productionOptimized the C++ and MATLAB back-end of the Simulink Test Toolbox achieving a 70% speed-up over original execution time	
Google Summer of Code — Open-source Developer Remote	June 2022 – Aug 2022
<ul style="list-style-type: none">Utilized 3D multi-view geometry and object detection for mapping landmarks and path-finding for a 1:10 scale autonomous racing carImplemented model compression using quantized EfficientDet to improve inference speed on an embedded PC with an Edge TPU	
Addverb Technologies — Perception Engineer, Mobile Robotics India	Aug 2021 – July 2022
<ul style="list-style-type: none">Prototyped appearance-based navigation using spatio-temporal LSTM for semantic-scene understanding and efficient image retrievalUsed bag-of-words of learnt key-point descriptors for Visual-Place Recognition (VPR) to augment SLAM and de-localization recoveryShipped monitoring and control infrastructure for a fleet of autonomous mobile robots on the cloud for low-latency visualization	
Autonomous Robots Lab, UNR— Undergraduate Researcher Reno, NV	July 2020 - Jan 2021
<ul style="list-style-type: none">Developed a generalizable Resource-Aware algorithm for deployment of Visual Inertial Odometry (VIO) algorithms on computationally constrained aerial vehicles achieving a reduction in average CPU usage of up to 50% under the guidance of Prof. Kostas AlexisReleased two official ROS and ROS2 perception packages - a ROS wrapper for Open3D and example use-cases with pointcloudsContributions selected for presentation as a Lightning Talk at ROSCon 2020 and are part of official ROS-Perception repositories	
KPIT Technologies — Research Intern India	May 2020 – July 2020
<ul style="list-style-type: none">Developed CNN based multi-modal sensor fusion architecture for object detection using a 3D LiDAR, monocular camera and RADARImplemented architecture for low-latency inference in self-driving cars during adverse weather, low-illumination and partial occlusions	

PUBLICATIONS (Selected)

EgoMimic: Scaling Imitation Learning through Egocentric Video

Simar Kareer, Dhruv Patel*, Ryan Punamiya*, **Pranay Mathur***, Shuo Cheng, Chen Wang, Judy Hoffman, Danfei Xu – X-Embodiment Workshop, Conference on Robot Learning (CoRL), 2024

Neural Visibility Field for Uncertainty-Driven Active Mapping

Shangjie Xue, Jesse Dill, **Pranay Mathur**, Frank Dellaert, P. Tsiotras, Danfei Xu – IEEE/CVF Computer Vision and Pattern Recognition (CVPR), 2024

Proactive Human-Robot Interaction using Visuo-Lingual Transformers and Object Interaction Graphs (Best Paper Award)

Pranay Mathur – Geriatrics Workshop - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023

Resource-aware Online Parameter Adaptation for Computationally-constrained Visual-Inertial Navigation Systems

Pranay Mathur, Nikhil Khedekar, Kostas Alexis - IEEE-RAS International Conference on Advanced Robotics (ICAR), 2021

A Generalized Kalman Filter Augmented Deep-Learning based Approach for Autonomous Landing in MAVs (Best Paper Award)

Pranay Mathur, Yash Jangir, Neena Goveas - IEEE International Symposium of ACA on Intelligent Robotics and Industrial Automation (IRIA), 2021

Multi-Sensor Fusion-Based Object Detection Implemented on ROS

Pranay Mathur, Ravish Kumar, Rahul Jain - Springer International Conference on Machine Learning and Autonomous Systems (ICMLAS), 2021

PROJECTS (Selected)

Embodiment Agnostic Long-Horizon Manipulation with Differentiable Kinematics using Human-Play Data

Faculty Advisor: Dr. Danfei Xu, Assistant Professor at Georgia Tech and Research Scientist at NVIDIA AI

Aug 2023 – May 2024

- Worked on generalizable manipulation policies by scaling imitation learning through egocentric videos of human-play data
- Implemented vision encoder for a trajectory prediction model using the DINOv2 foundation model with LoRA. Achieved embodiment agnostic visual representations by aligning latent-space visual embeddings using an auxiliary KL divergence loss and manipulator masking
- Implemented a modified version of action-chunking with transformers (ACT) using Differentiable-Kinematics and integrated it with low-level controllers for a modified version of the ALOHA robot platform.

Long-Horizon planning of Next-best-view of NeRFs and Gaussian Splats

Faculty Advisor: Dr. Danfei Xu, Assistant Professor at Georgia Tech and Research Scientist at NVIDIA AI

Aug 2023 – Nov 2023

- Established SOTA in visibility-based uncertainty quantification in Neural Radiance Fields (NeRFs) applied to active mapping approaches
- Implemented pose optimization pipeline and active mapping baselines to evaluate and compare our proposed approach with current SOTA

Human-Motion Prediction: With great power comes great res-pose-ability

Faculty Advisor: Dr. Zsolt Kira, Assistant Professor at the School of Interactive Computing

Jan 2023 – May 2023

- Implemented transformers and Convolutional Seq-to-Seq models for human-motion prediction on computationally-constrained systems
- Achieved comparable performance to several baselines implemented in the fairmotion library at reduced computational costs

SKILLS

Skills: C, C++, Python, Java, Bash, CUDA, PyTorch, TensorFlow, CMake, OpenCV, OpenMP, ROS 1/2, MATLAB, Linux, GitHub

Courses: Deep Learning, Data Structures and Algorithms, Object Oriented Programming, Advanced Computer Vision, State Estimation and Localization