Gautham Narayan Narasimhan

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Education

- **Carnegie Mellon University** — Pittsburgh, PA
  Master of Science in Mechanical Engineering - Robotics Concentration — *Aug. 2018 – May 2020*
- **Vellore Institute of Technology** — Vellore, India
  Bachelor of Technology in Mechanical Engineering — *Aug. 2013 – Jul 2017*

Publications

Transparent Liquid Segmentation for Robotic Pouring
Gautham Narayan, Kai Zhang, Ben Eisner, Xingyu Lin, David Held
ICRA 2022 and NeurIPS Deep Generative Models Workshop

ROLL: Visual Self-Supervised Reinforcement Learning with Object Reasoning
Yufei Wang*, **Gautham Narayan***, Xingyu Lin, Brain Okorn, David Held
Conference on Robot Learning (CoRL), 2020

Segmentation For Learning Image Based Goal Conditioned Policies
Gautham Narayan, David Held
Master's thesis - Carnegie Mellon University, 2020

Experimental Droplet Spatter Analysis Using Computer Vision
Gautham Narayan, Bill Eddy
Internal Report - CSAFE, 2020

Effect Of Winglet Induced Tip Vortex Structure On The Performance Of Subsonic Wings
Gautham Narayan, Bibin John
Elsevier - Aerospace Science and Technology, 2016

** denotes equal contribution*

Invited Talks

- **Intel Embodied AI Lab:** — July 2022
  Transparent Liquid Image Segmentation For Robotic Pouring. [Slides]

Work Experience

- **Path Robotics** — Columbus, USA
  Computer Vision Research Engineer — *Aug 2021 - Present*
  - Research and implement non-rigid registration algorithms for point clouds
  - Working with open source ray tracing engines for internal tools
  - Working on machine learning methods for weld seam recognition/segmentation from images
  - Welding joint type prediction using large scale in-house pointcloud datasets

Research Experience

- **Robot Perception Lab - CMU** — Pittsburgh, USA
  Research Assistant with Prof. David Held — *Jun 2020 - Aug 2021*
  - Utilized self supervised unknown object segmentation to improve sample efficiency, goal sampling and reinforcement learning(RL) policy performance on a range of manipulation tasks
  - Presented a novel matching loss along with VAE+LSTM neural network architecture that improved RL policy robustness to occlusions at CoRL 2020
  - Developed a novel transparent liquid segmentation framework without requiring annotations
  - Presented a pouring system using Franka Panda robotic arm for transparent liquids at NeurIPS DGM workshop 2021 (In review at ICRA 2022).
  - Currently working on a physics based differentiable simulator to learn a particle dynamics model for granular/liquid media
- **Robot Perception Lab - CMU** — Pittsburgh, USA
  Master's thesis with Prof. David Held — *Sept 2018 - Jun 2020*
  - Improved performance and sample efficiency of image based reinforcement learning algorithms using segmentation.
  - Transferred human demonstrations to robots through imitation learning.
  - Worked with Sawyer Robots for large scale segmentation data collection.
  - Worked on a grasping end effector system for cloth manipulation using pinch grasps.
- **General Motors Collaborative Research Lab - CMU** — Pittsburgh, USA
  Research Assistant with Prof. Raj Rajkumar — *Nov 2018 - Jan 2019*
  - Curated a pointcloud dataset using a Velodyne VLP16 LiDAR within the CMU campus
  - 3D reconstructed surfaces of cars and pedestrians using Point Cloud Library(PCL) Poisson Solver.
  - Utilized PointNet and VoxelNet for detecting cars and pedestrians around the CMU campus.
  - Further utilized predicted bounding boxes to improve surface reconstruction around pedestrians.
- **Image and Video Understanding Lab - KAUST** — Jeddah, SA
  Visiting Research Student — *Sept 2017 - Feb, 2018*
  - Implemented state of the art Imitation Learning algorithms for autonomous flying using Tensorflow.
  - Utilised MaskRCNN and SORT algorithms for real-time object detection and tracking.
  - Programming using C++ and visual scripting within Unreal game engine for a photo-realistic simulator.
  - Implemented high speed TCP socket communication between Unreal and Tensorflow for real time image transfer during training and testing.
  - Solved and submitted fast algorithms for reinforcement learning problems in OpenAI Gym.

Programming Skills

Programming Languages: C/C++, Python

Open-Source Frameworks: Tensorflow, PyTorch, OpenCV, Robot Operating System(ROS), Point Cloud Library(PCL)

Robots & Sensors: Franka Panda, Rethink Sawyer, Azure Kinect, Kinect v2, Realsense, Primesense

Service

Teaching experience:

- Robotics Systems and IoT, CMU, *Instructor*: Prof. Kenji Shimada

Reviewing experience:

- International conference on Learning Representations (ICLR 2021)