# 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, Brian 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

- **Aeva Inc** — Mountain View, CA
  *Senior Perception Engineer* — *Nov 2022 - Present*
  - Working on machine learning techniques applied to 4D Lidar data
- **Path Robotics** — Columbus, OH
  *Computer Vision Research Engineer* — *Aug 2021 - Nov 2022*
  - Brought in $ 10 million in yearly revenue by developing and executing a welding seam recognition feature using images and pointclouds.
  - Worked on 3D reconstruction, rigid/non-rigid pointcloud registration and optimized meshing operations for point cloud data.
  - Built large scale in house point cloud and image datasets for joint type prediction ML models.

## Research Experience

- **Robot Perception Lab - CMU** Pittsburgh, PA
  *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 ICRA 2022 and NeurIPS DGM workshop 2021.
- **Robot Perception Lab - CMU** Pittsburgh, PA
  *Master's thesis with Prof. David Held* *Sept 2018 - Jun 2020*
  - Improved performance  sample efficiency of image based reinforcement learning 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, PA
  *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.
- **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)