Satyapalsinh Gohil

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Education

Master of Science in Mechatronics and Robotics Sept 2022 - May 2024
New York University (NYU)

Bachelor of Technology in Mechatronics July 2016 - May 2020
SRM Institute of Science and Technology (SRMIST)

Skills

Programming Python, Modern C++, MATLAB, BASH scripting
Libraries PyTorch, Scikit-Learn, NumPy, Pandas, Matplotlib, OpenCV, PCL, Open3D
Tools CUDA, AWS SageMake, ROS, Git, Dockers, Slurm, Blender, Omniverse, COLMAP
Architectures Transformer, UNET, ResNet, DeepLabV3+, Habitat-sim, YOLO, NeRF, OpenVSLAM
Publication – Design and Development of wireless controlled serial manipulator. **[link]**
Provisional Patent – System for Automated Analysis and Cloud Storage of Digital Content. **[link]**

Work Experience

AI4CE Lab, NYU *(Graduate Researcher)* **[link]** June 2023 - April 2024

- Developed **Transformer based Point Cloud Registration** [link] pipeline that aligns sparse 3D point cloud maps to 2D overhead image plane enhancing **Indoor Mapping** [link] for GPS deprived environments.
- Contributed to the Mapping NYC project by **integrating and calibrating sensor** *(camera and 360-Lidar)*, generating **3D point cloud maps** using visual SLAM for autonomous vehicle testing and urban research.

Honda Research & Development *(Research Engineer)* **[link]** Sep 2020 - Aug 2022

- Designed and trained **UNet architecture** with data augmentation on a customized dataset for surface defect detection, achieving **93.7% mAP at IoU 0.5** for identifying cracks, pits, and patches.
- Developed ANN-based learning algorithm to predict **Battery health, SOC, and SOH with 94.2%** accuracy using data from real-world riding pattern and conditions, improving **BMS efficiency by 14%**.

NR Tech Poly Plast LLP *(Research Intern)* **[link]** Nov 2019 - April 2020

- Designed and simulated a 3 DOF Cartesian robotic system in **MATLAB Simulink**, deploying the **YOLO** algorithm for detecting the injection molded parts, and enhancing production efficiency by **150%**.

Robocon Lab, SRMIST *(Research Student)* **[link]** Aug 2017 - May 2020

- Developed perception stack for Omnidirectional robot, integrating **Monocular camera, and Raspberry Pi**. Deployed YOLO for tetracube detection & stereo geometry for efficient grasping.

Projects

Implementing-DDPM-DDIM for Diffusion Models [link]

- Designed and implemented **DDPM and DDIM** sampling methods, to generate new sprites and evaluate sampling efficiency and the quality of generated samples.

Maze Mapping and Navigation [link]

- Developed mapping and navigation algorithm for a robot with a monocular camera, incorporating **Vanishing Points, SuperGlue**, and **A*** path planner for autonomous navigation to goal location in a maze.

Passenger Occupancy Tracker Using YOLO [link]

- Implemented **YOLOv4** for person detection and classification at NYC MTA bus stations, optimizing bus stops based on individual tracking, resulting in saving **39 days** annually for the NYC bus system.

Transformers based Point Cloud Segmentation [link]

- Generated **Synthetic Point Cloud** data using SDR on **Nvidia Omniverse** to train **Point Cloud Transformer** for shape inspection, achieving 92.46% accuracy on point cloud segmentation [ModelNet40 dataset].
- Trained the model in a **multi-GPU** setting on a high performance cluster for performance profiling.

SFM and NeRF Implemantation [link]

- Implemented classic **SFM** pipeline: feature matching, pose estimation, triangulation, & bundle adjustment.
- Implemented **NeRF** architecture to model novel views and synthesize photorealistic renderings of 3D scene.

3D Semantic Mapping fusing LIDAR & Camera data [link]

- Developed a pipeline to semantically label a **3D point cloud** by transferring **semantic segmentation** predictions from RGB images onto corresponding LiDAR points for high-definition **semantic mapping**.