Naitri Rajyaguru

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Domain Skills: Robot Perception, Localization, Deep Learning, Computer Vision, Sensor Fusion, Calibration, Mapping, Artificial Intelligence

Education

University of Maryland, College Park ***Aug 2021 - May 2023***

Master of Engineering in Robotics ***GPA: 3.78/4.00***

Courses: Perception for Autonomous Robots, Foundations of Deep Learning, Visual Learning and Recognition, Planning for Autonomous Robots, Software Development for Robotics, Computer Processing of Pictorial Information

Roles: Robotics Tutor (Robot Modelling), Lead Peer Research Mentor (Autonomous Unmanned Systems)

Gujarat Technological University, India ***Aug 2015 - Jul 2019***

Bachelor of Electronics and Communication Engineering ***GPA: 8.78/10***

Courses: Fundamental of Image Processing, Embedded Systems, Microcontroller and Interfacing, Digital Signal Processing

Skills

Languages: Python, C, C++, Embedded C, MATLAB

Libraries and Tools: TensorFlow, Keras, PyTorch, NumPy, Pandas, Robot Operating System (ROS), OpenCV, Open3D, CUDA, Rviz, Gazebo, MoveIt, Linux

Deep Learning Architectures: VGG16, ResNet, GANs, HomographNet, SfMLearner, Position Map Regression Network, VAE, Transformers, NeRF

Work Experience

Ford Motor Company, United States ***Jun 2022 – Aug 2022***

Mapping, Localization, & Perception Research Intern

- Researched & developed object removal pipeline using Semantic Segmentation for clean HD map generation and improved localization using classical and deep learning techniques.

Perception & Robotics Group (PRG), University of Maryland ***Aug 2021 – Dec 2021, Present***

Graduate Research Assistant

- Worked on **receding horizon**-based control and planning for autonomous navigation of drone in an unknown region and conducted experiments based on drone navigation in cluttered environments using monocular camera.
- Performed theoretical analysis of on-going research in 3D vision & active perception and simulated scenarios in Blender.

Swaayatt Robots, India ***Feb 2021 – July 2021***

Research Engineer (Associate)

- Researched on Visual and LiDAR odometry pipeline for localization in self-driving cars.
- Implemented modular LiDAR Odometry and Mapping (**LOAM**) pipeline from scratch.

Omnipresent Robot Tech, India ***Dec 2020 – Feb 2021***

Software Engineer Intern

- Evaluated on hot pepper stress detection using drone and analyzed various multi-spectral Image processing techniques.
- Programmed on Data augmentation in QGIS, data classification and detection based on SVM with 80% accuracy.

Doozy Robotics, India ***Oct 2020 – Dec 2020***

Robotics Engineering Intern

- Developed an autonomous navigation stack in ROS for DUV-A20 Robot using Intel Realsense D435i with sensor fusion for better robot localization in indoor environments and incorporated RTAB-Map **SLAM** for mapping of the location.

Projects

- **Structure From Motion -** 3D reconstruction of a scene and pose estimation from a given set of images by feature correspondence. (**Non-linear PnP** and **triangulation**)
- **Multi -Task Regression learning based Autonomous Drone -** Estimated Depth using **multi-task regression network** for autonomous navigation of drone in Blender and AirSim.
- **Multi-Agent based Search and Rescue system in ROS** - An autonomous system with 20 robots which will detect humans and navigate them to nearest exit where implementation was accomplished in C++ ROS and simulation in Gazebo.
- **Depth Fusion -** Created 3D geometry of a scene using Truncated Sign Distance Function by fusing depth images.
- **Point Cloud Object Detection and Segmentation –** Used **SegFormer** and Yolov4 for Semantically segmenting point cloud and detecting objects using images.
- **Super pixel generation using SLIC and Image Segmentation -** Implemented image segmentation using super pixels generated with **SLIC** and k-means resulting in 95% accuracy with VGG16.
- **Auto Calib -** Implemented Zhang's camera **calibration** technique with **non-linear optimization**
- **Auto-Pano –** Stitched images to create **panorama** using classical (Homography estimation) and Deep learning supervised & unsupervised (HomographNet).
- **Marine Rescue Drone -** A drone capable of detecting drowning person with the help of **3DCNN** and dropping ring for saving.
- Other **-** LQR and LQG controllers (**Kalman filter**) for two inverted pendulums, Visual Odometry, Voice controlled Biped Robot