SHREY SHAH

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EDUCATION

University of Michigan, Ann Arbor Aug 2023 - April 2025 (Expected)
Master of Science, Robotics GPA - 4/4
Courses - Mobile Robotics, 3D Robot Perception, Robotics Systems lab, Foundations of Computer Vision, MPC

Institute of Technology, Nirma University July 2019 - June 2023
Bachelor of Technology, Mechanical Engineering GPA - 3.93/4

SKILLS

Programming: Python, C/C++, R, MatLab, SQL plus
Tools: ROS/ROS2, Gazebo, CoppeliaSim, LaTex, Creo, SolidWorks, Git, Rviz, simulink
Libraries: Pytorch, Keras, OpenCV, numpy, SKlearn, Tensorflow, pandas, Matplotlib

RESEARCH EXPERIENCE

CURLY Lab | Robotics Department | *Prof. Maani Ghaffari* May '24 - Present
- Integrating Unet and LSTM architecture in the MotionSC Architecture from previous work. Developing BEV based temporal fusion of features to create a local map around the ego vehicle.
- Tested the network for scene completion on nuscenes dataset, achieving the completion rate of 85.7 % (best)

Hybrid Dynamics Robotics Lab | Robotics Department | *Prof. Xiaonan Huang* Dec '23 - Present
- Developed a 6D pose estimation algorithm with SORT framework for a soft aerial blimp with kalman state estimation and real-time tracking on orange-pi.
- Designing a multi-agent SLAM framework for multiple aerial-blimps for localization with a BEV input

Indian Space Research Organization (ISRO) | *Controls Research Intern* June '22 - May '23
- Designed a Dual-motion actuator capable of coarse and fine movement with a fine resolution of 4 nm.
- Implemented Adaptive-Proportional control system for the operation of a single actuator.
- Integrated 6 actuators to act as a Hexapod System controlling 6 DOF required for the application.

Reliance Industries Limited | *Vocational trainee* June '21 - July '21
- Analyzed thermal equipment using Ansys and PVelite, while also ensuring turbine and centrifugal pump quality.

PROJECTS

Splatam++: Full-stack splatting based SLAM (Mar - April '24) *Visual SLAM, Metric Depth Prediction*
- Sampled sparse data from depth senors and optimized for dense metric depth for Splatam usinf disparity maps.
- Reproduced the trajectory and performed end-to-end localization with L1 loss of 6 cm given 10 sparse points compared with original complete dense depth with loss 1.5 cm

Attentive Gaussian splatting (Mar - April '24) *Gaussians, 3D rendering, Point Clouds*
- Added a Attention mechanism on 4 parameters to impose high priority on them while adding a pixel-wise error mask as an optimization criteria increasing overall rendering quality
- Decreased "empty holes" in sparse regions and can render distinguished gaussians with the same accuracy.

Data-Driven Adaptation for MPC-CBF controller (Feb - April '24) *HO-CBF, Gaussian process, MPC*
- Developed real-time MPC-CBF parameter adaptation using data-driven approach with offline sampled Gaussian Process classification, optimizing safety and performance in autonomous vehicle navigation.

Non-Linear Filtering and State Estimation (Jan - Mar '23) *SLAM, ROS, GTSAM, Sensor fusion*
- Implemented EKF, UKF and PF for estimating 3D position of object's center by stereo cameras.
- Developed semantic mapping with discrete and continuous Counting sensor model and Invariant-EKF localization using VN-100 IMU data in SE(2) motion model.

Robotics systems laboratory project (Aug - Dec '23) *CV, C/C++, ROS, SLAM, Path Planning,*
- **Armlab -** Designed a CV pipeline integrating forward kinematics for a robot arm to autonomously pick, sort, and stack colored blocks of various sizes. This project resulted in securing first place in 2 of 4 final lab competitions.
- **Botlab -** Created a mobile robot system with PID control, SLAM, A* planning for exploration, and designed a novel gripper. Achieved first place in one competition and outperformed in path traversal with Pure Pursuit.