SHREY SHAH

shreyzz@umich.edu | LinkedIn | GitHub | +1 734 489 4206

EDUCATION

University of Michigan, Ann Arbor — Aug 2023 - April 2025 (Expected)
Master of Science, Robotics — GPA - 3.8/4
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
Minor Specialization, Computer Science — GPA - 3.9/4

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

Hybrid Dynamics Robotics Lab | Robotics Department | *Prof. Xiaonan Huang* — Dec '23 - Present
- Developing a 6D pose estimation algorithm with SORT framework for a soft aerial blimp in aero-distributed environment enabling autonomous maneuvering with kalman state estimation and real-time tracking on Rpi.

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
- Design and Stress analysis of thermal equipment using Ansys and PVelite.
- Quality and reliability checking of turbines and centrifugal pumps.

PROJECTS

Non-Linear Filtering and state Estimation (Jan - present '23) *SLAM, ROS, Target tracking, Sensor fusion*
- Implemented EKF, UKF and PF for estimating 3D position of object's center by stereo cameras.
- Developed continuous semantic mapping algorithm with Invariant-EKF localization using the VN-100 IMU and LiDAR data in SE(2) motion model.

Depth rendering using Gaussian splatting (Nov - Dec '23) *Gaussians, 3D rendering, NeRF, Point Clouds*
- Replicated the original 3D Gaussian splatting, introducing optimizations to enhance speed & visual quality.
- Introduced Soft differentiable attention weights on the spatial data for enhancing detailed Regions of interests.

PointNet classification and 3D reconstruction (Aug - Oct '23) *3D perception, Pytorch, PointNets, openCV*
- Calculated epipolar correspondences to generate point clouds from different views.
- Implemented ICP for rigid transformation and matching different views of same point clouds.
- Re-Developed PointNet++ architecture to classify different 3D representations and identify specific parts of PCs

Robotics systems laboratory project (Aug - Dec '23) *CV, Manipulation, 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.

Vision Implementation on UR10e (Aug - Dec '22) *Machine vision, ROS, Gazebo, Matlab*
- Utilized shape analysis with reference markers and stereo vision for detailed object positioning and orientation.
- Implemented kinematic calculations for cobot joint angle determination using the Jacobian matrix.
- Configured extrinsic matrix for accurate world-to-image frame coordinate translation.

Path optimization of a snake Robot (Aug - Dec '22) *Design, SLAM, Image processing*
- Fixed the design of a used snake robot, improving circuits and employed PWM controller.
- Movement by a sine wave in servomotors instilling phase offsets with set amplitude and frequency.
- Path planning and optimization using SLAM and image processing from an initial viewpoint.