

Rohit Bhikule

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EDUCATION

- **University of Pennsylvania** Philadelphia, PA
Master of Science in Mechanical Engineering and Applied Mechanics (Robotics); GPA: 3.7 Aug. 2021 – May. 2023
 - **Coursework:** Autonomous Racing, Advanced Topics in Machine Perception, Modern Robot Control, Machine Perception, Advanced Robotics, Learning in Robotics, Design of Mechatronic Systems, Machine Learning
- **University of Pune** Pune, India
Bachelor of Technology in Mechanical Engineering; GPA: 3.75 Aug. 2016 – June. 2020

SKILLS

- **Languages:** C/C++, Python, Matlab, Arduino
- **Frameworks:** ROS, ROS2, Linux, Git, Docker, Pytorch, Numpy, OpenCV, Matplotlib, sklearn, Open3D, Drake
- **Application Software:** Solidworks, Catia, Creo, HyperWorks, Ansys, Autodesk
- **Leadership experience:** Led a team of 20 members to design and manufacture a go-kart (Gokarting team, Pune University). Achieved 3rd place in ISK-2019, 4th place in IKC-19, 1st place in KDC-19 (Best Design prize).

EXPERIENCE

- **mLAB - Autonomous Gokart** Philadelphia, PA
Graduate Research Assistant (GRASP, UPenn) Jan 2023 - Present
 - **Localization:** Working on sensor fusion of LiDAR, Camera, IMU, GPS to perform localization on the gokart. Exploring use of traffic cones as landmarks to implement Graph-SLAM for localization on racetrack.
- **SkyMul** Atlanta, GA
Robotics Intern(R&D Vision, Perception) | [Github](#), [Video](#) May 2022 - Aug 2022
 - **Vision:** Successfully developed a novel algorithm to detect rebar intersections and pose from pointclouds real-time in a densely multilayered rebar network. Assigned unique ids to track intersections in global frame.
 - **Localization:** Explored g2o, gtsam optimization packages to minimize the drift in odometry of the robot.
 - **Skills:** ROS, Rviz, rqt, Pytorch, Open3d, pcl, pptk, g2o, gtsam, 3D geometric math, Nvidia Jetson

PROJECTS

- **Object Detection and Instance Segmentation** | *Skills: Pytorch, OpenCV, CUDA*
 - **MaskRCNN** : Implemented a Feature Pyramid network based two-staged model to predict instance segmentation masks over 3 classes: Vehicles, Animals and People on COCO dataset. MAP achieved: 0.503. [Github](#)
 - **SOLO** : Implemented a Feature Pyramid network based model (*Segmenting objects by location*) to predict instance segmentation masks over 3 classes: Vehicles, Animals and People on COCO dataset. [Github](#)
 - **YOLO** : Scripted YOLOv1 object detection pipeline from scratch in Pytorch to predict classes and bounding boxes for detecting pedestrians, cars and traffic lights. MAP achieved: 0.43. [Github](#)
- **Localization and Estimation** | *Skills: Particle Filter, UKF, Visual-inertial odometry*
 - **SLAM** : Integrated the orientation and odometry information from IMU and 2D LIDAR scan to build occupancy map of environment by updating the log odds while simultaneously performing particle filter based localization. [Github](#)
 - **3D Orientation tracking** : Implemented a Quaternion based Unscented Kalman filter to track 3D orientation from IMU data and compared it against ground truth data obtained from motion capture system. [Github](#)
 - **VIO** : Implemented controller on quadrotor to follow path obtained by A*. Fused the IMU and stereo pair information to estimate the 3D pose of a flying robot using Error State Kalman Filter(ESKF). [Github](#)
- **Controls and Planning** | *Skills: MPC, LQR, iLQR, Value iteration, Drake solver, Gazebo*
 - **MPC manipulator arm** : Implemented MPC controller on 7 DoF manipulator arm to plan collision-free trajectories in an obstacle cluttered environment. Also, implemented forward kinematics, inverse kinematics to grasp dynamic blocks by detecting Apriltags on their faces. Path-planning using potential fields. [Github](#)
- **3D Reconstruction from images** | *Skills: Pointcloud, 3D geometric math, SfM (Structure from Motion)* [Github](#)
Obtained the 3D reconstruction of a scene by implementing two-view stereo and multi-view stereo algorithms to convert multiple 2D viewpoints into a 3D scene.