Swapneel Wagholikar

+1(774)-312-9964 | Worcester, MA | swagholikar@wpi.edu | 🔗 LinkedIn | ⚙ GitHub | ⚲ Portfolio

EDUCATION

- **Worcester Polytechnic Institute** — Worcester, MA
  Master of Science in Robotics Engineering; GPA: 4.0 — *Aug. 2022 – May. 2024*
- **University of Pune** — Pune, India
  Bachelor of Technology; GPA: 3.75 — *Aug. 2016 – Oct. 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

EXPERIENCE

- **Void Robotics (Marathon, FL)** | *Robotics Intern (Vision, Perception)* — *May 2023 - Present*
  - Working on ZED2/GNSS Odometry Fusion to get an accuartate position of the voidwalking bot. The odometry will be integrating RTK GPS + Visual Odometry + IMU. Also working on obstacle avoidance using spatio temporal voxel layer.
  - Constructing a Docker-integrated ROS package for SLAM of the environment using ROS2, Docker, Gazebo, and Rviz.
- **Vision, Intelligence and System Lab (WPI, MA)** | *CV/ML Graduate Researcher* — *May 2023 - Present*
  - Proposed implementation of Density-preserving Deep Point Cloud Compression which takes into account the factor of local density information which has been overlooked by the current state-of-the-art methods. Guide: Prof. Ziming Zhang
- **Atlas Copco, GECIA (Pune, India)** | *Design & Development Engineer* — *Nov 2020 - Jul 2022*
  - Assisted Robotics Process Automation (RPA) team to automate the repetitive tasks in design process. Part of the OFA team and worked on projects with short lead time for WUX China product company with customers across the globe.

PROJECTS

- **Panoptic Segmentation** | *Skills: Pointcloud, TensorFlow, OpenCV, CUDA, Feature Pyramid Network (FPN)*   *Github*
  Implemented Panoptic segmentation in Tensorflow 2.0 on 3D LiDAR Point Cloud data to combine the outputs of semantic and instance segmentation using a shared encoder-decoder backbone and novel parameter-free panoptic head.
- **Path Planning of Non-holonomic Robots** | *Skills: Sampling based path planning, (MPC), Gazebo*   *Github*
  Planned path traversal for non-holonomic robots by state-of-the-art algorithms like AIT* and BIT* for global and APF, MPC for local path planning. Evaluated based on time-complexity and accuracy of optimal path detection+traversal.
- **Point Cloud Semantic Mapping** | *Skills: Pointcloud, Sensor fusion, Pytorch, SegFormer*   *Github*
  Built a map from raw LiDAR point cloud and transferred the predicted semantic labels from camera RGB images using point painting technique onto the LiDAR's 3D point cloud. Classified each point using SegFormer NN on KITTI dataset.
- **3D Reconstruction from images** | *Skills: Pointcloud, 3D geometric math, SfM (Structure from Motion)*   *Github*
  Simultaneously reconstructed 3D scene Mapping and extracted camera pose Localization from given stereo camera correspondences using Non-Linear triangulation, Non-Linear PnP and Bundle Adjustment BA pipeline.
- **Boundary Detection** | *Skills: Edge Detection, Filtering, OpenCV, Image Noise Removal*   *Github*
  Detected edges in image using probability based boundary detection using K-means clustering of Oriented DoG (ODoG), Leung-Malik (LM) and Gabor Filter bank responses. Outperformed the results from classical canny and sobel filters.
- **Auto Calib** | *Skills: Camera Calibration, Classical CV, OpenCV, Geometric Mathematics*   *Github*
  Implemented Zhang's camera calibration research paper by nonlinear optimization of intrinsics and extrinsics.
- **Complex Highway Navigation** | *Skills: Deep Reinforcement Learning, OpenAI, Discrete Action Space*   *Github*
  Implemented discrete action space algorithms such as DQN, DQN-MR and DQN-PER on OpenAI Gym's Third party environment, Highway-env. Compared training time and accuracy to discover DQN-PER has the best performance.
- **Path Planning of Continuum Robots** | *Skills: Sampling based path planning, MATLAB, Robot Dynamics*   *Github*
  Reconstructed informed RRT algorithm for path planning of continuum robots which are needle sized manipulators used in image-guided surgical procedures resulted in accurately generating optimal and feasible path in a dynamic environment.
- **Real Time Object Detection** | *Skills: YOLO, PyTorch, Pipeline from Scratch, Multi-Object Detection*   *Github*
  Scripted YOLO Algorithm from scratch in PyTorch using YOLO Network Architecture for real-time multi-object detection. Mean Average Precision(mAP) & Intersection over Union(IoU) were recorded for bounding boxes for evaluation.