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: 4.0/4.0 — Aug. 2022 – May. 2024
- **University of Pune** — Pune, India
  Bachelor of Technology; CGPA: 9.32/10 — Aug. 2016 – Oct. 2020

Skills

- **Programming**: Python, C++, C, Matlab, Arduino, HTML, BASH
- **Frameworks**: Pytorch, Tensorflow, ONNX, CUDA, Open3D, NumPy, ROS, ROS2, Gazebo, Linux, Git, Docker, Flask
- **DL Architectures**: VGG16, NeRF, CompletionFormer, RangeNet, Segformer, Mask R-CNN, Transformers, LSTM

Experience

- **DEKA Research & Development (Manchester, NH)** | *Robotics Intern (Perception, ML) Sept 2023 - Ongoing*
  - Engineered an **end-to-end depth maps generation pipeline** to predict the terrain traceability for autonomous robot.
  - Developed a C++ and ROS based software for real-time data fusion from **solid-state LiDAR** and a **stereo camera**.
  - Constructed app backend leveraging **WiFi** communication protocol and **Flask** framework to operate the data collection.
  - Trained and Evaluated **CompletionFormer** depth completion model in Pytorch backend **enhancing 43% accuracy**.
- **Findability Sciences (Boston, MA)** | *Deep Learning Researcher (Generative AI, LLM)* *Jan 2024 - Ongoing*
  - Creating an **LLM-based** conversational interface for business users to request database records and market reports.
  - Fine-tuning foundational large language models like **Llama2** using market forecasts and real estate analyst reports.
  - Working on Retrieval Augmented Generation **(RAG)**, SQL Generation and Large Language Model (LLM) optimization.
- **Void Robotics (Marathon, FL)** | *Robotics Software Intern (Perception, Controls)* *May 2023 - August 2023*
  - **Fused Odometry** from **RTK-GPS+ZED2-camera+IMU** and achieved accuracy within 1cm for bot positioning.
  - Constructed a Docker-integrated ROS2 package with Error State Kalman Filter **(ESKF)** for precise pose estimation.
  - **Automated test cases** in ROS2 to validate line rendering in **RVIZ** by seamlessly invoking the service through **rqt**.
- **Vision, Intelligence and System Lab (WPI, MA)** | *CV/ML Graduate Researcher* *May 2023 - August 2023*
  - Developed and Trained **PointAttN:** Transformer Network for Point Cloud Completion | Guide: Prof. Ziming Zhang
  - Experimented with the Geometric Details Perceptron **(GDP)** and Self Feature Augment **(SFA)** blocks in the encoder.
  - Enhanced the baseline results by 23% by implementing cross-layer information integration in the PointAttN Network.
- **Aespaes Labs Pvt. Ltd. (Pune, India)** | *Computer Vision Intern* *May 2020 - Nov 2020*
  - Set up a computer vision pipeline for O-ring detection in Camshaft and Defect Inspection in the microscopic parts.
  - Prototyped an **Epipolar Geometry** based extrinsic calibration and the error detection system of an inspection tunnel.

Projects

- **Mobile NeLF** | *Skills: PyTorch Mobile, ONNX, Lens Studio, ML deployment, Knowledge Distillation* *Github*
  - Deployed a **NeLF** model on a M1 chip using **LensStudio** and **ONNX** after knowledge distillation and model pruning.
- **Embedded Deep Learning** | *Skills: Pytorch, CUDA, Deep Learning Network Optimization, MobileNet*
  - **P&Q** : Implemented **Pruning & Quantization** for optimizing the VGG16 network for CIFAR-10 classification. *Github*
  - **NAS** : Performed **Neural Architecture Search** for microcontroller deployment from MCUNet super-network. *Github*
  - **DNI** : Optimized a network using **Dynamic Network Inference** by entropy-based early exit on BranchyNet. *Github*
- **Point Cloud Semantic Mapping** | *Skills: Sensor fusion, Pytorch, SegFormer, Semantic Segmentation* *Github*
  - Built a raw LiDAR point cloud map, transferring semantic labels via **PointPainting**, and segmented using **SegFormer**.
- **Structure from Motion** | *Skills: Pointcloud, 3D geometric math, 3D Reconstruction from images* *Github*
  - Reconstructed 3D-scene via Non-Linear **Triangulation**, **PnP**, and **Bundle Adjustment** from stereo correspondences.
- **Panoptic Segmentation** | *Skills: Pointcloud, TensorFlow, CUDA, Feature Pyramid Network (FPN)* *Github*
  - Implemented **panoptic** (semantic + instance) segmentation on 3D LiDAR data for comprehensive scene understanding.
- **Dynamic Navigation** | *Skills: Sampling based planning, MPC, Gazebo, ROS2* *Github*
  - Integrated **AIT*** and **BIT*** based global navigation with **MPC** for efficient traversal of a bot in dynamic environments.
- **Complex Highway Navigation** | *Skills: Deep Reinforcement Learning, OpenAI, Discrete Action Space* *Github*
  - Executed **DQN**, **DQN-MR**, and **DQN-PER** in OpenAI's Highway-env, finding DQN-PER as the best performer.
- **3D Trajectory Tracking** | *Skills: Sliding Mode Control, UAVs, ROS, Gazebo, MATLAB* *Github*
  - Designed and deployed **Sliding Mode Controller** for trajectory tracking for micro UAVs within error range of 1%.