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, Latex
- **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++, ROS based real-time data fusion (within 50ms) software for **solid-state LiDAR** & **stereo camera**.
  - Trained **CompletionFormer** depth completion network in Pytorch **reducing RMSE by 63% and MAE by 67%**.
  - Constructed an app utilizing **WiFi** communication-protocol and **Flask** framework to streamline the data collection.
- **Findability Sciences (Boston, MA)** | *Deep Learning Researcher (Generative AI, LLM)* *Jan 2024 - Ongoing*
  - Creating an **LLM-based conversational interface** for business users to request economic records and market reports.
  - Utilized **LSTM, VARIMA** models, in **rolling-window forecasting** on 50-year data of 118 economic indicators (with data cleaning), for future predictions of key-indicators with **0.04 MAPE**, and working on **recession prediction**.
  - Fine-tuning LLMs like **Llama2** with **Retrival Augmented Generation (RAG)** from Market Forecasts Databse.
- **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.
  - Performed rigorous testing for positioning accuracy, demonstrating a **reduction in localization error by 28%**.
  - Constructed a **Docker-integrated** ROS2 package with Error State Kalman Filter **(ESKF)** for **SLAM** on environment.
- **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 various network architectures such as Geometric Details Perceptron **(GDP)** and Self Feature Augment **(SFA)** blocks. Evaluated based on the **chamfer distance** metrics with a great result of **0.0929 mm**.
  - Enhanced the baseline results by **33%** by implementing **cross-layer information integration** in the PointAttN model.
- **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 error detection system of an inspection tunnel correctly inspecting 9 out of 10 parts **(90% success rate)**.

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.
  - Achieved a significant model size reduction to **9MB** (compared to MobileNeRF - 125MB) boosting latency by **10 FPS**.
- **Embedded Deep Learning** | *Skills: Pytorch, CUDA, Deep Learning Network Optimization, MobileNet*
  - **P&Q** : Implemented **Pruning (75%) & Quantization (uint8)** for optimizing VGG16 classification network. *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.
- **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%.