

# SWATHI JADAV

sjadav@andrew.cmu.edu | (412) 954-7941 | [LinkedIn](#) | [swathijadav.com](#)

## EDUCATION

**Carnegie Mellon University** | Pittsburgh, PA

Master of Science in Electrical and Computer Engineering-Applied

May 2023

CGPA :3.95/4

**Relevant Coursework:** Deep Learning, Visual Learning and Recognition, Computer Vision, Deep Learning for Robotics, Machine Learning, Estimation and Detection, SLAM, Path Planning, Autonomous Driving

## EXPERIENCE

**AirLab - Graduate Research Assistant**

Dec 2022-Present

- Research focused on **Navigation and Guidance for Autonomous Drone exploration** advised by **Prof. Sebastian Scherer**.
- Visual SLAM - Multi-view Wide-Angle State Estimation and Reconstruction for Autonomous Flight** to estimate the relative motion and create 360 depth maps to enable a drone to fly autonomously.

**Carnegie Mellon University**

May 2022-Present

- Graduate Teaching Assistant** Intro. to Deep Learning under **Prof. Bhiksha Raj**. Assignment and course planning, Mentoring projects, conducting recitations[1][2] and office hours. Developed, deployed and validated pipeline for **VGGFace2** training.
- Graduate Research Assistant** advisor - **Prof. Bhiksha Raj**. Research focused on Deep learning strategies for **unsupervised adaptations** of test datasets applied to Audio Speech Transformers with AudioSet data.
- Research Assistant, CyLab**. Developed **Augmented Reality** based Laryngoscopy simulator for clinical encounters using **MagicLeap**.

**Voage Inc. - Robotic Software Development Intern**

May 2022-Aug 2022

- Led a team of 2, at a **seed-level startup**, in conceptualization and development of **DeepSpace** platform, a framework for real-time programming, control, monitor, and task sequencing of vision-enabled pick and place General Purpose Robotic Arm.
- Built a point cloud preprocessing pipeline with **Intel Realsense**, PCL, and gRPC to filter and downsample point cloud data for real-time streaming. Wrote production-level, low-latency python and C# code for communicating with ROS-based controller; extended existing SDK to support gRPC for a **6 DOF UFactory X-Arm**.

**Bharat Electronics Limited - Design and Development Engineer**

Oct 2017-Jan 2022

- System Integration and Sub-System Design of **Autonomous Marine Defense Systems** such as Anti-Torpedo/Rocket countermeasure systems. **Multi-modal sensor inference** optimization to provide multi-sensor track correlation and target management of underwater targets to generate an accurate fire control solution utilizing Deep learning methodologies.
- Proposed and developed a simulation software for predicting Azimuth and Elevation angles for Automatic target designation and engagement from ship-borne robotic Rocket and Torpedo launchers, reducing testing and integration time 10 folds.
- Introduced and executed an extensible software called "External Simulator Interface" to impart Naval Tactical Simulation of sensors such as **Active/Passive Sonar, Radar** to predict underwater targets through Deep Learning.
- Led a three-member project team in conceptualization, design, and development of **three Virtual Reality** based commercial training simulators to deliver hazard perception training, testing, and evaluation of drivers [Images].

## PROJECTS

**Autonomous Drone Exploration**

- Implemented **ORB SLAM-3 Visual Odometry**, for State Estimation and Reconstruction utilizing drone's Stereo fisheye multi-camera(6) feed. Research focused on Visual Odometry for navigation of Autonomous drones in complex environment[Link].

**SuperDeepSORT- Multi-object Real-time tracking**

- Combined SOTA object tracking algorithm- **DeepSORT with SUPERGlue** feature detector, Kalman filter and YOLOv8 for real-time Multi-object tracking. Improved object detection, matching and re-association in presence of occlusion by 2%.
- Deployed this pipeline to track apples real time in an orchard - count and determine precise location for a robot to pick[Link].

**Perception in Snow-covered conditions for Autonomous vehicles - ADAS**

- Modeled a comprehensive perception module for Progressive LiDAR adaptation for road detection in adverse Snow-Covered conditions through **Sensor Fusion of Camera and LiDAR** data achieving an AP of 92.5% on KITTI and CADC dataset.
- Leveraged Semantic 3D object detection, vehicle tracking, and obstacle detection, to enhance the AV's safety and performance.

**VLOAM- Visual LiDAR Odometry and Mapping**

- Implemented a robust real-time ROS-based framework for accurate trajectory estimation, 3D Mapping, and Localization by fusing stereo RGB image and LiDAR data using ICP in a non-linear optimization framework to achieve an ATE of 1.773m.

**HEXA - Human Demo Augmented Explorer and Achiever**

- Augmented **SOTA LEXA** - RL based algorithm which learns a policy for robotic arm to explore and achieve new goals to solve diverse tasks in complex visual environment (Franka-Kitchen) through Human demonstrations under **Prof. Deepak Pathak**.

**Monte Carlo Localization - Particle Filter for Robot Localization**

- Particle filter to localize a robot in an indoor environment. Implemented motion model, sensor model and ray tracing algorithm.

**Deep Learning**

- WSDN**: Weakly supervised object localization and deep detection network performing simultaneous region selection and classification without image-level annotations using AlexNet backbone and PASCAL VOC dataset.
- Visual Question Answering**-Built VQA Multi-modal Cross-Attention network using pre-trained **RoBERTa and TransformerNet**.
- Multi-head Attention based end-to-end Speech to Text** translation utilizing "Listen, Attend and Spell" paper as baseline.

## SKILLS

**Programming languages:** Python, C#, C++, HTML, CSS.

**Technologies/Frameworks:** ROS, Mujoco, PyTorch, numpy, OpenCV, gRPC, Unity 3D game engine, Git, AWS, GCP, **Virtual Reality, Augmented Reality**, WPF, UWP, MS-SQL, QT cross-platform embedded development, QML, Django, CARLA.