SWATHI JADAV

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EDUCATION

Carnegie Mellon University | Pittsburgh, PA **May 2023**
Master of Science in Electrical and Computer Engineering-Applied **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-May 2023**
- ***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**.

Voaige 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
- **WSDDN**: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 TransfromerNet**.
- **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.