Sai Swaroop Reddy Vennapusa

www.linkedin.com/in/sai-swaroop-reddy-vennapusa | svennap2@asu.edu | (480) 740-5545

EDUCATION

Master's in Robotics and Autonomous Systems **December 2023**
Arizona State University GPA : 4.0/4.0

TECHNICAL SKILLS

OS :	Windows, Linux/Unix
Packages :	Pandas, NumPy, Scikit-learn, Matplotlib, Pytorch, TensorFlow, TensorRT, ROS, Gazebo
Workflow :	Git, Jira, Docker, Cloud
Technologies :	OpenCV, SLAM, UAV, LiDAR
Hardware Platforms :	Nvidia Embedded boards, LiDAR, INS, Depth cameras
Programming Languages :	Python, C++, R, SQL

PROFESSIONAL EXPERIENCE

Robotics Intern - HC Robotics **April 2023 - July 2023**

- Designed and 3D printed components required for mounting the LiDAR, INS, and 360° Camera system using SolidWorks and Bambu Lab Printer, resulting in faster prototyping.
- Streamlined setup and calibration of LiDAR(Ouster and Velodyne) and INS(KVH and VN300) on vehicles, resulting in a 25% reduction in calibration time.
- Applied the Extended Kalman Filter (EKF) sensor fusion algorithm to integrate IMU data, point cloud, and GPS data, achieving accurate and real-time trajectory estimation.
- Integrated Ardusimple technology and dual wheel encoders to enhance trajectory and heading accuracy, achieving a 40% improvement in RTK positioning precision and a 25% increase in trajectory correction respectively.
- ***Skills*** **: Point Cloud Processing, Sensor Fusion algorithms, Camera and INS Calibration, LiDAR and INS Integration, RTK Positioning Enhancement.**

Robotics and AI Engineer - HC Robotics **April 2020 - July 2022**

- Developed a compact, integrated control unit integrating a camera on a custom gimbal system, with real-time control and streaming capabilities, leading to a 30% increase in operational efficiency and user experience.
- Developed an efficient video streaming solution utilizing multi-threading for enhanced processing, implemented HLS for adaptive streaming, leveraged chunked transfer encoding, and employed CDN integration with Xavier board for edge content caching, achieving a significant decrease in latency from 7 seconds to 1 second.
- Implemented and fine-tuned CNN architectures-YOLOv4 for object detection, Deep SORT for tracking, and Mask R-CNN for segmentation on live camera feeds, achieving a significant 25% increase in processing speed on NVIDIA platforms.
- Employed transfer learning for specific surveillance needs, enhancing accuracy and reliability. Utilized cross-validation and early stopping methods to ensure optimal training performance, resulting in more efficient and effective machine learning solutions on live camera feeds.
- Engineered an application for comprehensive control of gimbal and camera operations, and real-time monitoring of processed streams. Incorporated features for automated alert generation and image transmission to users upon detection, streamlining surveillance operations and enhancing user engagement and response capabilities.
- Developed multiple AI-driven applications for varied uses, including Advanced Perimeter Surveillance with near-zero false alarms; Smart ANPR for vehicle identification using YOLOv4 and LPR Net (mAP: 0.92); Secure Attendance & Visitor Management through facial recognition; and Road Damage Estimation with FasterRCNN (mAP: 0.85), all utilizing Resnet 50 and Resnet 101 backbones.
- Delivered insightful, data-driven reports, highlighting the impact of AI solutions. Actively kept abreast of industry trends to maintain a competitive edge, while fostering a culture of R&D and continuous learning within the team.
- ***Skills*****: Image Processing, Convolutional Neural Network (CNN), Fine-Tuning, Transfer Learning, AI-Driven solutions, Edge AI Deployment, Data-Driven Analysis, R&D, Deep Learning Model Optimization, Machine Learning Model Validation and Optimization, IoT, Application Development, Git, Docker.**

Database and Automation Engineer - Oracle **July 2016 - April 2020**

- Developed a proprietary tool using Python and SHELL scripts for automating administrative tasks, resulting in a 40% improvement in workflow efficiency and a 50% reduction in manual interventions.
- Configured and optimized Cron jobs tailored to customer needs, automating cleanup processes, and enhancing data backup procedures, which increased data integrity by 25% and reduced backup times by 35%.
- Integrated machine learning techniques and conducted thorough Exploratory Data Analysis (EDA) and implemented feature engineering, focusing on identifying key factors influencing customer retention.
- ***Skills*****: Exploratory Data Analysis(EDA), Feature Engineering, Machine Learning, Visualisaton, Jira, Cloud, Automation, Shell scripting**

PROJECTS

- **Advanced Regression Analysis:** Directed fuel economy analysis with data cleaning, exploratory data analysis(EDA), and feature engineering; used linear/quadratic regression to assess horsepower, vehicle weight on fuel efficiency (EPA data). Hypothesis testing was integrated to statistically validate the relationships, with p-values and confidence intervals determining the statistical significance of the findings.
- **Autofinder**: Developed the 'AutoFinder' desktop application, utilizing real-time web scraping to aggregate car options from various manufacturers. Streamlined the car selection process, reducing search time for users.
- **Quadcopter Gazebo Simulation**: Successfully programmed and executed an autonomous drone mission on an alien terrain using ROS, achieving precise data-muling and mapping of geological features with ORB-SLAM2, incorporating techniques like velocity control and trajectory optimization for efficient and accurate surveying.
- **Football Analysis Project:** Utilized machine learning and computer vision to develop a real-time football analysis system, employing YOLO for object detection, K-means for pixel segmentation, optical flow for motion tracking, and perspective transformation to represent scene depth and perspective. This system provided detailed tactical insights by analyzing player movements and game dynamics.
- **Segment Anything Interactive Web App:** Developed a Python and Streamlit-based web application that integrates the "Segment Anything Model" for real-time image segmentation. This application provides an intuitive interface for users to remove backgrounds from images, emphasizing the primary subject, similar to technology currently used in modern smartphone cameras.