Surya Lakshmi Subba Rao Pilla

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Education

- **University of California San Diego** — San Diego, CA
  Master of Science in Electrical and Computer Engineering — Robotics — *Sep. 2022 – June 2024*
  Relevant Courses: Sensing and estimation for robotics, Planning and learning in robotics, Digital Image Processing, Statistical Learning (Bayesian probability), Visual Learning (Computer Vision)

- **Indian Institute of Technology** — Tirupati, India
  Bachelor of Technology in Electrical Engineering — *Aug. 2015 – Aug. 2019*

Technical Skills

- **Programming Languages/ Framework**: Python, C++, PyTorch, TensorFlow, Keras, OpenCV, TinyML
- **Software**: MATLAB(signal and image processing toolbox), IAR embedded workbench, Minitab
- **Computing Environments**: Linux, Windows, Nvidia Jetson, STM32/ TI micro-controller, ESP32 MCU

Experience

- **UC San Diego** — San Diego, CA
  Summer Research Internship — *July 2023 - Sep. 2023*
  - Created a self-supervised learning pipeline utilizing SuperPoint keypoint descriptor extraction from privacy-preserving lens images for Visual Inertial Simultaneous Localization and Mapping (SLAM)
  - Design a Neural Network pipeline to extract keypoints out of Event Camera to perform efficient SLAM

  Graduate Student Researcher — *Jan 2023 - June 2023*
  - Analysed visual attention in the context of machine learning and human vision by estimating gaze points
  - Implemented slippage correction algorithm for eyeglass-mounted cameras to accurately calibrate gaze estimation, reducing gaze mapping of real-world error from 40% to 20%

- **Honeywell** — Bangalore, India
  Embedded Engineer — *July 2019 - July 2022*
  - Introduced fire detection algorithm (into existing 3IR flame detector) compliant with EN54 (European certification), saving 10 months of development cycle and 10+ human resources for data collection
  - Developed Machine Learning (ML) framework utilizing Python scientific libraries, compatible with existing dataset, for Triple IR sensor-based flame detection, saving 150 man-hours of data collection
  - Trained and deployed state-of-the-art object detection model (YOLOv4) in NVIDIA Jetson Nano for autonomous maritime search-and-rescue purposes to gather project funding from the global team
  - Prototyped a novel visible plus thermal camera-based flame detection for annual innovation challenge (CV, deep learning and TinyML framework), contributing towards high value Intellectual Property
  - Mentored 3 interns with technical tasks in ML/Computer Vision (CV), and professional efficiency

  Key Achievements — *July 2019 - July 2022*
  - 8 IP awards: Filed 6 Trade Secrets and 2 U.S. patent applications (currently under review)
  - Diamond award: Awarded 2nd position out of 276 ideas presented at annual innovation competition
  - Certification: Six Sigma Green Belt DFSS Hardware and AI/ML Bootcamp

Research — Academic Projects — *Sep. 2022 - Present*

- **Particle Filter SLAM**: Modeled Particle Filter for indoor localization and mapping of differential-drive robot using LiDAR to generate probabilistic occupancy grid of unknown environment
- **Visual Inertial SLAM**: Implemented VI SLAM by designing Extended Kalman Filter for localization and landmark mapping to track 3D pose of robot using sensor fusion of gyroscope, accelerometer, and camera measurements
- **Autonomous Navigation**: Executed dynamic programming algorithm for deterministic shortest path problem to minimize the value function, optimize control actions to find the shortest path from door to key avoiding the obstacles
- **Trajectory Tracking**: Optimized non-linear problem using python CasADi solver to get optimal control policy for accurate trajectory tracking. Compared Receding-Horizon Certainty Equivalent Control and Generalized Policy Iteration
- **Motion Planning**: Compared search based (A*) and sampling based (RRT) algorithms in a continuos 3D environment
- **Image Segmentation**: Trained a PyTorch-based UNet with attention and compared it to Deeplabv3 with Resnet 101 backbone for road object detection, achieved pixel-level accuracy of 91 with UNet and 82 with Deeplabv3