

SAKETHRAM MADHUVARASU

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Education

University of California, San Diego

Sept 2023 - June 2025

MS in Electrical and Computer Engineering(Intelligent Systems, Robotics and Control)

GPA:3.82/4.00

- **Coursework:** Advanced CV, Image Synthesis(UE4), Statistical Learning, Robot Manipulation

Indian Institute of Technology, Tirupati

Aug 2019 - May 2023

Bachelor of Technology in Electrical Engineering

GPA:3.92/4.00

- **Key Coursework & PoR:** Robotics, Computer Vision, DSA, Digital Systems, Vice-president of Robotics club

Experience and Publications

ActiveInitSplat | 3D-Gaussian Splatting with active image selection

Aug 2024 – Mar 2025

Graduate Student Researcher

Python

- Developed an end-to-end(**E2E**) novel active image selection framework for Gaussian Splatting (3DGS), leveraging density and occupancy estimation using **Gaussian process(GP)** surrogate model optimization to ensure diverse coverage.
- Achieved almost **5%** improvement in LPIPS, SSIM, and PSNR metrics over passive selection baselines using only **45%** of training images, enabling faster, higher-fidelity real-time **3D scene rendering**.
- Manuscript under review at **ICCV** conference. ([Paper](#))

Vimaan Robotics | San Jose, CA

Apr 2024 – Sep 2024

Computer Vision Intern

Python, C++, ROS

- Deployed an end-to-end **transformer-based (DETR)** detection/segmentation system on cloud for pallet/ground recognition, improving mAP50-95 by **5%** by customizing decoder outputs.Utilized Roboflow for data annotation.
- Developed and optimized an end-to-end(E2E) Camera **calibration** module with **noise modeling** techniques achieving camera pose estimation accuracy within **0.25 degrees** and **2 cm**
- Coordinated the team in testing, configuring, and deploying a **TIM551** 2D-LiDAR to the company's equipment.

VLM-Based Semantic Odometry | Race car

Mar 2024 – Dec 2024

Graduate Student Researcher

Python, C++

- Designed an end-to-end(**E2E**) odometry pipeline using foundation models (**TinyCLIP**) to extract semantic-spatial embeddings from RGB images, fused with **FastSAM** masks for precise localization on **NVIDIA Jetson Nano**.
- Fine-tuned the **VLM** on domain-specific race track data (e.g., cones, barriers) and optimized inference via TensorRT, achieving 20% higher accuracy than geometric baselines (**FPFH**) at 10Hz.

Fog-based DCNS for Surveillance Applications

IEEE Robio-2023([PDF](#))

Projects

Multi-Object Tracking | Python, C++

Sep 2024 - Present

- Engineered an advanced KF-based multi-object tracking (**MOT**) system, leveraging probabilistic data association for superior tracking accuracy, increasing HOTA and MOTA metrics by almost **10%**.
- Integrating ReID features into the tracking pipeline, inspired by **StrongSORT**, to improve robustness in real-time tracking under occlusions and cluttered scenes, particularly for tracking in **football** matches

Designing Roomba prototype | ROS, Python

Sep 2023 - Dec 2023

- Built an autonomous robot (Roomba) using the Qualcomm RB5, incorporating a **LiDAR**, IMU and **camera** for environmental sensing. Performed ICP SLAM along with **Pose graph** optimization and Loop closure constraints
- Implemented **Visual-Inertial SLAM** by triangulating 3D landmarks from stereo feature correspondences and fusing IMU data using an **EKF** for robust 6-DoF pose estimation and mapping.

Other Projects

- **Text-to-3D Mesh Generation:** Enhanced the Gaussian Dreamer framework for Text-to-3D with **MV Dream** for better 2D diffusion and **Variational Score Distillation** for improved loss. ([Report](#))
- **Multimodal Edge-to-RGB Image Translation:** Designed an encoder-decoder architecture using **cVAE** and **GAN** to convert edge images into realistic RGB images, enhancing scene interpretation. ([Report](#))
- **BEV Perception:** Replicated a BEV system using multi-camera inputs and transformers to map 3D environments.

Technical Skills

Languages: Python, C++, Java, C, CUDA, Matlab

Developer Tools: ROS, OpenCV, Foxglove, iFogsim, REST, ROS2, GNU Octave, Eclipse, Git, Docker

Technologies/Frameworks: Pytorch, JAX, AWS Sagemaker, Kubernetes, GTSAM, SAPUI5