

# SREEHARSHA PARUCHURI

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## EDUCATION

### Carnegie Mellon University, School of Computer Science

Master of Science in Robotic Systems Development (MRSD) GPA: 4.11/4.0

Pittsburgh, PA

May 2026

- Teaching: Introduction to Deep Learning
- Coursework: Learning for 3D Vision, Generative Artificial Intelligence, Deep Reinforcement Learning and Control

### International Institute of Information Technology (IIIT-H)

Bachelor of Technology in Electronics and Communication Engineering (Honours) Major CGPA: 9.02/10

Hyderabad, India

Jul 2022

- Awards: Deans Merit List, Undergraduate Research Award
- Coursework: Statistics in Artificial Intelligence, Applied Optimization, Mobile Robotics, Data Structures and Algorithms

## EXPERIENCE

### Mach9 | Computer Vision and Machine Learning Systems

Perception Software Engineering Intern

San Francisco, CA

May 2025 - Aug 2025

- **Multimodal Painted Symbol Extraction:** Engineered and integrated a **multi-stage** feature extractor in the **HD Map generation** pipeline, delivering a **50x acceleration** on geometric transformations across RGB-Pointcloud-BEV frames via a custom **CUDA kernel**, and preserving panoptic instancing across **multi-view 2D-3D correspondences** using a **self-correcting vector-field** and DBSCAN.
- **VLM Inference & Scalable Deployment:** Achieved **91% F1 score** on MUTCD classification of painted symbols in BEV by developing an orientation-robust **RAG pipeline** using VLM embeddings & LLMs (**Gemini, GPT-o3**). Designed this software as a **high-throughput asyncio system** deployed on AWS, using **semaphores** to stably manage 200+ concurrent API calls and prevent rate-limiting.
- **Uncertainty Estimation:** Created a tool to quantify uncertainty in a **DETR**-style model via self-calibration, and Bayesian dropout, enabling semi-automation of QA workflow. Developed with full unit testing with PyTest for quick **CI/CD** integration.

### TCS Research - Visual Computing and Embodied AI Group | Reinforcement Learning

Pre-Doctoral Research Fellow

Kolkata, India

Jul 2022 - Jul 2024

- **Audio-Visual RL for Embodied AI:** Led research on developing a novel Actor-Critic approach for **mapless navigation** to an audiogoal in unseen environments trained using **PPO** and an **Entropy Loss** to encourage exploration in a dense-reward setting. Constructed a state-space encoding a **scene graph** created from depth and binaural **audio spectrogram features** fused using cross-attention.
- **Imitation Learning & Data-Collection:** Setup a **Behaviour Cloning** pipeline within the audio-enabled HabitatSim simulator. This system collected human demonstrations to bootstrap the RL policy, **reducing online training time by 30%**.

### Robotics Research Center (RRC, IIIT-H) | Computer Vision and Robotics

Research Assistant

Hyderabad, India

Jan 2020 - Jun 2022

- **Embedded Robotics & Classical SLAM:** Spearheaded the **sim-to-real** development of a **Visual-SLAM stack** for an autonomous sanitization robot. Processed real-time data from RGBD cameras for marker detection and loop-closures **onboard an Intel NUC**.
- **Depth Estimation for Autonomous Driving:** Adapted and evaluated both **classical vision (Structure-from-Motion)** and **neural network-based** disparity-estimation and refinement techniques on data from autonomous vehicles on Indian roads.

## PROJECTS

### Apple Vision Pro Guided Precision Robotics for Knee Replacement Surgery | [Link](#)

CMU

- Achieved **sub-4mm precision** with a KUKA MED7 arm using SAM2 and ICP to register DICOM imagery with **RealSense** data.
- Architected an **error-recovery system** using **visual feedback** and DINOv3 features to counter bone movement during pin drilling.

### IROS '25 Vision-Language-Autonomy Challenge

CMU

- Secured **3rd Place** by building a **modular state machine** for a vision-language navigation system with **active perception** to decompose a **natural-language query** into subtasks to reason about semantic and spatial relationships and act in an unseen environment.
- Guided **Gemini 2.5 Pro** planner reasoning through Chain-of-Thought prompting, explicit mathematical conditioning and scene graphs.

### 3D Foundation Models for Neural Reconstruction from Monocular Video | [Link](#)

CMU

- Engineered a **DUST3R**-style pipeline for neural pointmap refinement from video, using a **hierarchical keyframe selection** strategy to populate a **Transformer-based memory** with fused DINOv2 and ViT embeddings to recover per-frame camera pose.

### Multimodal Representation Learning for Language and Audio | [Publication](#)

IIIT-H

- Applied **BERT-based sentiment analysis** and **k-means clustering** to uncover nuanced links between language and acoustic music features in data scraped from user discourse on mental health related subreddits during COVID-19.

## SKILLS

- **Languages & Tools:** Python, C++, CUDA-Numba, ROS2, Protobuf, Docker, CI/CD PyTest, AWS, GCP, ONNX, Swift, Cursor
- **Libraries & Simulators:** PyTorch (Lightning, 3D), JAX, OpenCV, Scikit-learn, OpenAI, HabitatSim, Unity 3D, MuJoCo