Sreeharsha Paruchuri

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EDUCATION

Carnegie Mellon University, School of Computer Science **May 2026**
Master of Science in Robotic System Development (MRSD) Pittsburgh, PA
Current Positions Held: Editor for the MRSD Newsletter
Current Relevant Courses: Advanced Computer Vision, Generative Artificial Intelligence, Robot Autonomy

International Institute of Information Technology (IIIT-H) **Jul 2022**
Bachelor of Technology (Honors) in Electronics and Communication Engineering Hyderabad, India
Junior/Final year CGPA: 9.02/10; Deans Merit List; Undergraduate Research Award
Teaching Experience: CS7.503 Mobile Robotics, CS9.434 Music, Mind, and Technology, EC5.205 Introduction to Coding Theory
Relevant Coursework: Mobile Robotics, Robot Planning and Navigation, Robot Dynamics and Control, Statistical Methods in Artificial Intelligence, Topics in Applied Optimization, Computer Vision, Data Structures and Algorithms, Game Theory

EXPERIENCE

Tata Consultancy Services **Jul 2022 - Jul 2024**
Pre-Doctoral Research Fellow - Multimodal Learning and Reinforcement Learning Kolkata, India

- Led the project to enhance the navigation capabilities of **audio-visual** Embodied Artificial Intelligence agents with a novel, sound-agnostic reward to train an **online Reinforcement Learning policy** that decreased path length by 21%
- Developed the **exploration and navigation algorithms** that led to an improvement of 60% in metrics over the baseline, which led to our globally ranked fourth at Habitat Open Vocabulary Mobile Manipulation Challenge at NeuralIPS '23
- Created and evaluated uncertainty-based rewards for a Reinforcement Learning policy that resulted in significant improvements to Object-Centric Scene Exploration methods, enhancing efficiency in multi-room rearrangement tasks.

Robotics Research Center (RRC), IIIT-H (Link) **Dec 2019 – Jun 2022**
Research Assistant - Computer Vision and Motion Planning Hyderabad, India

- Spearheaded development of the computer vision and navigation stack to simulate, build, test, and deploy (**Sim2Real**) an **autonomous robot** for washroom sanitization; represented my university and finished runners-up out of over 140 teams (Link)
- Researched and adapted **monocular** and **stereo vision depth estimation** algorithms for **real-time SLAM** and **3D scene understanding**, integrating them into large codebases and enabling trajectory visualization using Open3D and RViz

Cognitive Science Research Center, IIIT-H **Dec 2020 – May 2022**
Research Assistant - Information Retrieval and Computational Social Science Hyderabad, India

- Applied **statistical machine learning** in tandem with concepts in Music Information Retrieval to analyze lyrical regularities in individuals' music listening history as an early indicator of mental illness; Published our results at INTERSPEECH 2021 (Link)
- Scraped data from X (formerly Twitter), Reddit, and Wikipedia to link music-sharing trends on social media platforms with the mental health of individuals during COVID-19 and movements such as #blm; Published our results in a medical journal (Link)

Bosch Research and Technology Center **May 2021 – Aug 2021**
Software Development Engineering Intern - Computer Vision Bangalore, India

- Fused Laser, Camera, and Odometry data to boost online **Multi-Object Tracking** performance by 11% IoU on outdoor datasets
- Augmented difficult-to-obtain real-world LiDAR datasets using **synthetic data** obtained from generative models and physics engines, thus improving the performance of **3D object detection** networks

PROJECTS

Augmented Reality and Robot-Assisted Knee Surgery | *Computer Vision* (Link) **Smith + Nephew | Sep 2024 - Present**

- Gathered and analyzed requirements from user studies, market competition, and sponsors to inform system development
- Conducted experiments to inform our trade studies on the robot manipulator and **AR headset** subsystems

Neural-Assisted Depth Disparity Estimation | *Computer Vision and TinyML* **Hackathon | Nov 2022 – Jan 2023**

- Finished in the top 25 teams internationally in developing an algorithm respecting onboard compute constraints to improve the **real-world depth estimation** accuracy of the OAK-D Pro while adhering to rigid frames-per-second constraints
- Designed and thoroughly validated a pipeline using the DepthAI API to efficiently process raw data streams from the camera

Image Segmentation using Foundational Models | *Computer Vision* **CMU | Oct 2024 - Nov 2024**

- Implemented **2D-to-3D segmentation** pipeline using S.A.M. and camera geometry, generating dense 3D point clouds from 2D masks
- Optimized **multi-view 3D reconstruction** workflow by automating mask generation across unseen views, improving fps by 12%

Research Paper Implementations | *Deep Learning and Robotics* (Link) **IIIT-H | Aug 2020 – Jul 2022**

- Implemented classical algorithms such as GrabCut, Bag of Visual Words, Lucas Kanade Tracking, Bundle Adjustment Rapidly-Exploring Random Tree, Pose-Graph Optimization, Model Predictive Control, Bahdanau Attention
- Implemented learning methods such as Semantic Inpainting, Photo-Enhancement, and Recommender Systems

SKILLS

Programming Languages: Python, C/C++, MATLAB, Racket, Swift, JavaScript, GoLang, Bash
Application Software: PyTorch, TensorFlow, Jax, OpenCV, Scikit-Learn, ROS, NVIDIA Omniverse, Unity3D, Docker, MongoDB, WandB