Nehith Sai Vemulapalli

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Master's graduate in Robotics and AI with extensive experience in computer vision, SLAM, and 3D reconstruction. My master's thesis focused on developing a hybrid 3D reconstruction pipeline, and my portfolio includes multiple projects and four peer-reviewed publications. As a winner of the UCL Xplore program, I have a proven ability to innovate and solve complex technical challenges.

EDUCATION

University College London, Marshgate, Dept. of Comp. Sci. **London, UK**
MSc Robotics and Artificial Intelligence: September 2025

- Thesis: Hybrid 3D Reconstruction Pipeline for Cultural Heritage Preservation in Extreme Environments.
- Modules: Robot Vision & Navigation, Machine Learning for Robotics, Aerial Robotics, Soft Robotics, Estimation & Control, Computer Vision & Sensing, Motion Planning, Affective Computing.

Amrita Vishwa Vidyapeetham, Amritapuri, School of Computing **Kerala, India**
Bachelor of Technology in Artificial Intelligence Engineering: June 2024
First Class with Distinction

PUBLICATIONS

1. Vemulapalli, N. S. *Face Detection with Landmark using YOLOv8*. In IEEE 3rd International Conference on Electronics, Future Technologies and Engineering Trends (ICEFEET), 2023.
2. Vemulapalli, N. S. *Application of Unsupervised Learning in Detecting Behavioural Patterns in E-commerce Customers*. In Proceedings of the 5th International Conference on Data Science, Machine Learning and Applications (ICDSMLA), Volume 1, pp.1208–1217, October 2024.
3. Vemulapalli, N. S. *Reinforcement Learning-Based Autonomous Landing of AirSim Simulated Quadcopter in Unreal Engine*. In IEEE 15th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2024.
4. Vemulapalli, N. S. *Strategic Network Intervention: Simulating and Blocking Contagion Spread Using Dominating Sets*. In World Congress on Smart Computing, pp.109–122, April 2025.
5. Vemulapalli, N. S. *Hybrid 3D Reconstruction Pipeline for Cultural Heritage Preservation in Extreme* Environments (in preparation).
6. Vemulapalli, N. S. *Self-Reconfigurable Robots for Space Exploration & Morphology-Shifting Simulation* (in preparation).

EXPERIENCE

1. **Graduate Research Project – UCL Hereeast**, *May 2025–September 2025* **London, UK**
    - Developed a hybrid 3D reconstruction pipeline for cultural heritage preservation, combining COLMAP, LiDAR data and 3D Gaussian Splatting for robust reconstruction.
    - Designed and implemented structural inspection path planning and multi-agent swarm control for Crazyflie mini drones using ROS2, Gazebo, and RViz2 as part of the Aerial Robotics module.
    - Collaborated with cross-functional faculty and peers to conduct experiments and advance research objectives.

2. **Founder – AquaScout,** *November 2024 – March 2025* **London, UK**
    - Conceived and led AquaScout, a drone-based water quality testing startup, winning the **UCL Xplore programme** competition.
    - Advanced through a 12-week **Venture Builder programme**, refining the business model, technical roadmap, and go-to-market strategy.

3. **Student Ambassador – UCL Department of Computer Science**, *December 2024– September 2025* **London, UK**
    - Organized technical talks and networking sessions with visiting faculty and researchers.
    - Coordinated student engagement activities and logistics for departmental academic events.

PROJECTS

1. **Hybrid 3D Reconstruction Pipeline for Cultural Heritage Preservation in Extreme Environments**
    - Developed a pipeline combining unsynchronized photogrammetry and LiDAR data; aligned point clouds using ICP and trained a 3D Gaussian Splatting model for high-fidelity reconstruction.
    - Key Skills: *COLMAP, Open3D, Livox Mid-360 LiDAR, 3D Gaussian Splatting.*
2. **Graph-Based SLAM, ORB-SLAM2 Evaluation & Planning Integration**
    - Modified ORB-SLAM2 to analyze feature selection and loop closure effects on trajectory estimation; benchmarked performance using COLMAP and EVO tools on custom datasets.
    - Key Skills: *ORB-SLAM2, ROS2, COLMAP, EVO.*
3. **Structural Inspection Path Planning & Multi-Agent Swarm Control**
    - Designed inspection path planning using TSP optimization and implemented centralized/decentralized swarm control strategies for multi-agent drones; validated in simulation and on Crazyflie drones.
    - Key Skills: *ROS2, Aerostack2, Gazebo, RViz2, Crazyflie Drones, TSP Optimization.*
4. **Motor Modelling, Trajectory Learning & Control of 7-DoF Panda Arm**
    - Built neural networks and regression models for motor error correction and trajectory prediction; integrated into a feedback control loop for smooth robotic motion.
    - Key Skills: *7-DoF Panda Arm, Feedback Linearization Control.*
5. **EKF Localization & Model Predictive Control for Mobile Robots**
    - Developed an integrated EKF-based localization and MPC trajectory tracking system; validated under sensor noise in PyBullet simulation environments.
    - Key Skills: *EKF, MPC, PyBullet Simulation.*
6. **Object Segmentation, Geometric Estimation & Motion Analysis**
    - Applied computer vision techniques for object segmentation, geometric parameter estimation, and rotation cycle analysis using stereo camera and LiDAR data.
    - Key Skills: *Arducam Stereo Camera, Livox Mid-360 LiDAR.*
7. **Self-Reconfigurable Robots for Space Exploration**
    - Designed morphology-shifting robots with adaptive modes (“Octopus” and “Turtle”) in PyBullet for efficient planetary navigation across diverse terrains.
    - Key Skills: *PyBullet, URDF, Soft Robotics Simulation.*
8. **Multimodal Emotion Recognition in Video Games**
    - Developed real-time emotion classification using physiological (EDA, PPG) and video data; compared early vs late fusion with SVM and Random Forest classifiers.
    - Key Skills: *SVM, Random Forest, NeuroKit2, HeartPy, Physiological Sensors (EDA, PPG).*

SKILLS

1. **Programming:** Python (primary), C++ (working knowledge), MATLAB.
2. **Frameworks/Libraries:** PyTorch, TensorFlow, OpenCV, Open3D, PyBullet, Pinocchio, Matplotlib, NumPy, Pandas, Scikit-learn.
3. **Robotics Tools:** ROS2, Gazebo, Rviz2, Arduino, Raspberry Pi, Webots.
4. **3D Tools:** CloudCompare, Fusion 360.
5. **Environment & Dev Tools:** Anaconda/Mamba, Docker, Git, Linux, LaTeX.