NEHITH SAI VEMULAPALLI

London, United Kingdom

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Master's graduate in Robotics and AI specializing in 3D Reconstruction, SLAM, and Multi-Agent Systems. Published author with 6 papers (4 peer-reviewed), bridging theoretical algorithm design with practical ROS2 implementation. Award-winning innovator (UCL Xplore Winner) with proven success delivering end-to-end autonomous systems—from multi-sensor fusion pipelines to deployed swarm hardware.

EDUCATION

University College London (UCL) – Marshgate, Department of Computer Science   London, UK
MSc Robotics and Artificial Intelligence — Merit   Sep 2024 – Sep 2025
Thesis: Hybrid 3D Reconstruction Pipeline for Cultural Heritage Preservation in Extreme Environments
Key Modules: Robot Vision & Navigation, Machine Learning for Robotics, Aerial Robotics, Soft Robotics, Estimation & Control, Computer Vision & Sensing, Motion Planning, Affective Computing

Amrita Vishwa Vidyapeetham – School of Computing   Kerala, India
Bachelor of Technology in Artificial Intelligence Engineering   Oct 2020 – Jun 2024
First Class with Distinction — GPA: 8.27/10

TECHNICAL SKILLS

Programming Languages: Python (Proficient), C++ (Working Knowledge), MATLAB, LaTeX
Robotics & Simulation: ROS/ROS2, Gazebo, RViz, Aerostack2, PyBullet, Webots, Arduino, Raspberry Pi, Pinocchio
Computer Vision & SLAM: ORB-SLAM, COLMAP, OpenCV, Open3D, Multi-sensor Fusion, Point Cloud Processing
3D Reconstruction & Sensing: 3D Gaussian Splatting, LiDAR Processing (Livox Mid-360), Photogrammetry, CloudCompare
Machine Learning: PyTorch, TensorFlow, Keras, Scikit-learn, NumPy, Pandas, Matplotlib
Development Tools: Git, Docker, Linux, Anaconda/Mamba, Fusion 360

KEY PROJECTS

Hybrid 3D Reconstruction Pipeline for Cultural Heritage Preservation
- Developed hybrid pipeline combining unsynchronized photogrammetry (COLMAP) and LiDAR data for robust 3D reconstruction in extreme environments, addressing temporal and spatial misalignment challenges
- Implemented ICP algorithm for precise point cloud alignment and trained 3D Gaussian Splatting model for high-fidelity scene reconstruction with photorealistic rendering capabilities
- *Technologies:* COLMAP, Open3D, Livox Mid-360 LiDAR, 3D Gaussian Splatting, Python

Graph-Based SLAM, ORB-SLAM Evaluation & Multi-Sensor Integration
- Implemented Factor Graph SLAM with pose graph optimization, demonstrating superior performance over EKF by preventing cumulative drift in long-term navigation scenarios
- Systematically evaluated Monocular ORB-SLAM on KITTI and TUM datasets, achieving RMSE of 4.91m through feature detection optimization and loop closure refinement
- *Technologies:* ORB-SLAM, ROS2, COLMAP, EVO, Factor Graph Optimization, Python, C++

Structural Inspection Path Planning & Multi-Agent Swarm Control
- Designed autonomous inspection system using TSP optimization for efficient coverage path planning of bridge and building structures
- Implemented centralized and decentralized swarm control strategies for coordinated multi-agent navigation with collision avoidance, validated in simulation and deployed on physical Crazyflie drones
- *Technologies:* ROS2, Aerostack2, Gazebo, RViz, Crazyflie Drones, TSP Optimization, Python

Motor Modeling, Trajectory Learning & Control of 7-DoF Panda Arm
- Developed neural network and regression models for DC motor error prediction achieving accurate torque-to-position mapping for precise robotic control
- Implemented trajectory learning using GMM and GMR for smooth motion generation from demonstration data, integrated into feedback linearization control loop
- *Technologies:* 7-DoF Franka Emika Panda Arm, PyTorch, Feedback Linearization, GMM/GMR, Python

Precision Manipulation & Adaptive Classification in Cluttered Environments
- Designed pick-and-place system implementing shape-specific grasp planning using geometric primitives and force closure analysis for reliable object manipulation
- Developed collision-free motion planning using RRT* algorithm with dynamic obstacle avoidance and integrated 2D/3D shape classification pipeline for adaptive grasping
- *Technologies:* Point Cloud Segmentation, Grasp Planning, RRT*, PyTorch, Open3D, Python

Self-Reconfigurable Robots for Space Exploration
- Designed morphology-shifting robotic system with adaptive locomotion modes optimized for planetary exploration across diverse terrains
- Simulated multi-modal locomotion strategies in PyBullet using URDF modeling and soft robotics principles, implementing RL controller for autonomous mode switching
- *Technologies:* PyBullet, URDF, Soft Robotics Simulation, Reinforcement Learning, Python

PROFESSIONAL EXPERIENCE

Graduate Research Assistant – UCL Here East   London, UK | May 2025 – Sep 2025
- Conducted research on hybrid 3D reconstruction for cultural heritage preservation, combining photogrammetry, LiDAR, and neural rendering
- Collaborated with cross-functional research teams to design experiments and advance state-of-the-art in 3D reconstruction

Founder – AquaScout   London, UK | Nov 2024 – Mar 2025
- Won UCL Xplore programme competition among 50+ teams with drone-based water quality testing proposal
- Completed 12-week Venture Builder programme, developing business model, market analysis, and go-to-market strategy
- Designed technical architecture for autonomous UAV water monitoring system with preliminary simulation validation

Student Ambassador – UCL Department of Computer Science   London, UK | Dec 2024 – Sep 2025
- Organized technical talks and networking sessions with visiting faculty, researchers, and industry professionals

Research Intern – National Institute of Technology Karnataka   Remote | Nov 2021 – Jan 2022
- Conducted data analysis on heart attack rates based on age and demographics across India, applying statistical methods to identify risk patterns
- Developed predictive models for cardiovascular risk assessment, gaining hands-on experience in data preprocessing, feature engineering, and model selection

RESEARCH PUBLICATIONS

Peer-Reviewed Publications:
1. **Vemulapalli, N. S.** (2025). Strategic Network Intervention: Simulating and Blocking Contagion Spread Using Dominating Sets. *World Congress on Smart Computing*, pp. 109–122.
2. **Vemulapalli, N. S.** (2024). Reinforcement Learning-Based Autonomous Landing of AirSim Simulated Quadcopter in Unreal Engine. *IEEE 15th International Conference on Computing, Communication and Networking Technologies (ICCCNT).*
3. **Vemulapalli, N. S.** (2024). Application of Unsupervised Learning in Detecting Behavioural Patterns in E-commerce Customers. *Proceedings of the 5th International Conference on Data Science, Machine Learning and Applications (ICDSMLA)*, Volume 1, pp. 1208–1217.
4. **Vemulapalli, N. S.** (2023). Face Detection with Landmark using YOLOv8. *IEEE 3rd International Conference on Electronics, Future Technologies and Engineering Trends (ICEFEET).*

Publications in Preparation:
5. **Vemulapalli, N. S.** Hybrid 3D Reconstruction Pipeline for Cultural Heritage Preservation in Extreme Environments. *(Target: IEEE/CVF Conference on Computer Vision and Pattern Recognition).*
6. **Vemulapalli, N. S.** Self-Reconfigurable Robots for Space Exploration: Morphology-Shifting Simulation and Terrain-Adaptive Locomotion. *(Target: IEEE International Conference on Robotics and Automation).*

CERTIFICATIONS & ACHIEVEMENTS

Certifications: Deep Learning with PyTorch | Fundamentals of Deep Learning | Image Processing with Keras in Python | Introduction to Cloud Computing | Create Machine Learning Models
Honors: UCL Xplore Programme Winner | First Class with Distinction (B.Tech)

LANGUAGES

English (Professional Working), Telugu (Native), Hindi (Professional Working)