Harsh Senjaliya

(240)-438-1222 hsenjali@umd.edu harshsenjaliya.com harsh-senjaliya harshsenjaliya

Summary

Creative and results-driven Robotics and AI Engineer with expertise in computer vision, path planning, and deep learning, dedicated to developing high-impact, innovative solutions for autonomous systems through collaboration and advanced problem-solving.

Education

University of Maryland, College Park **Expected: May 2025**
Master of Engineering (M.Eng.) in Robotics *College Park, MD*

- **Research Areas**: Computer Vision, Reinforcement Learning, Path Planning, Multimodal AI, AR/VR

Uka Tarsadia University (UTU), Bardoli **May 2023**
B.Tech. Mechatronics *Bardoli, India*

- **Thesis**: Developed an efficient inverse-kinematics model to optimize state-bound estimation for rover-terrain interactions in extraterrestrial environments.

Experience

AIES Labs, Dalhousie University **May - Aug 2022**
Summer Research Intern | Guide: Dr. Ahmad Al-Mallahi *Truro, Canada*

- Developed a machine-learning-powered spectrophotometer technology for detecting nutrient deficiencies in potato plants
- Integrated machine learning with YOLOv5 and YOLOv6 for real-time health monitoring, achieving 92% accuracy.

Chhotubhai Gopalbhai Institute of Technology **Nov 2021 - Apr 2022**
Undergraduate Research Assistant | Guides: Dr. Paresh Gujarati, Dr. Pooja Shah *Bardoli, India*

- Designed and optimized the Rocker-Bogie mechanism for an extraterrestrial rover's wheel suspension system using seven distinct heuristic algorithms, focusing on geometry and kinematics to meet defined performance metrics.
- Demonstrated that Simulated Annealing (SA) achieved a 20% stability improvement, with an empirical fitness score of 760.

Nirma University's Institute of Technology **June 2021 - Jan 2022**
Research Intern | Guides: Dr. Pooja Shah, Dr. Kirti Bardhan *Ahmedabad, India*

- Conducted a comparative study on deep learning architectures, achieving 88% accuracy in deficiency prediction.
- Developed a data collection system using Raspberry Pi, Arduino Uno, DHT22, and ESP32.

Projects

Enhanced Path Planning with Expanding Path RRT* |*Python, ROS2, OpenCV* **Apr 2024**

- Developed Expanding Path RRT* algorithm, reducing path planning time by 30%.

Paper Corner Detection and Panoramic Stitching |*Python, OpenCV, NumPy, Matplotlib* **May 2024**

- Built a pipeline for corner detection and panoramic stitching using SIFT and RANSAC.

A*-Algorithm Path Planning on Differential Drive TurtleBot3 |*Python, ROS 2, Gazebo* **Dec 2023**

- Developed and simulated a 2D A* algorithm for maze navigation on a non-holonomic TurtleBot3.

Object Tracking and Centroid Detection | *Python, OpenCV, NumPy, Matplotlib* **Oct 2023**

- Developed a script to track the centroid of an object using contour detection and polynomial fitting.

Publication

H. Senjaliya, P. Gajjar, V. Dodia, P. Shah, K. Bardhan, and M. Shukla, "A Comparative Study on Modern Deep Learning Architectures for Predicting Nutritional Deficiency in Rice Plants," *2023 IEEE IAS Global Conference on Emerging Technologies (GlobConET)*, London, United Kingdom, 2023. doi:10.1109/GlobConET56651.2023.10149936

Technical Skills

Programming Languages: C, C++, Python, MATLAB, CMake, CUDA, MySQL, MongoDB, RISC-V asm
Frameworks and Libraries: PyTorch, TensorFlow, Keras, OpenCV, Open3D, OpenAI Gym, Pygame, SLAM, MoveIt!
Software and Tools: ROS1, ROS2, Gazebo, Azure, AWS, Docker, Git, Google Test, SolidWorks