Vaibhav Raheja

🕿 vaibhavvraheja@gmail.com 📞 +1 (217) 2029970 📊 linkedin.com/in/Vaibhav-Raheja/ 🤣 Portfolio 🌎 Vaibhav-Raheja

EDUCATION

University of Illinois Urbana-Champaign Master's of Engineering Autonomy and Robotics GPA: 3.66/4 Mukesh Patel School of Technology Management & Engineering Bachelor of Technology in Computer Engineering GPA: 3.66/4	Aug 2023 – Dec 2024 Champaign, USA Jul 2019 – Jun 2023 Mumbai, India
 EarthSense, Inc Robotics Engineer ∂ Developed ROS nodes for Seek thermal cameras to enable thermographic analysis of solar panels in hot spot detection. Developed and implemented a WebRTC-based remote control system for agricultural robots, enabling real- time video streaming and teleoperation capabilities using AWS Kinesis. Enhanced VESC tuning for hub motors and optimized the MPPI controller, resulting in improved motor performance and path stability. 	Aug 2024 – Present Champaign, USA
 Intelligent Motion Laboratory Robotics Research Developer Implemented advanced facial detection algorithms (FaceMesh) for robotic eye examinations, improving head pose estimation accuracy by 30%. Designed a custom camera mount for a UR5 robotic arm, enhancing eye and head tracking precision by 20% with ZED depth cameras. 	Aug 2023 – Dec 2023 Champaign, USA
 All India Institute of Medical Sciences (AIIMS) Hospital Robotics Research Assistant ICMR is the Indian equivalent of the US National Institute of health. Developed a novel robot-assisted intubation system, enhancing procedural safety and efficiency, resulting in a 30% reduction in operator dependency during critical care intubation procedures. Designed a custom catheter and mouthpiece integrated with a high-resolution camera, boosting patient safety and real-time visualization. 	Feb 2021 – May 2023 Mumbai, India

PROJECTS

Intelligent Ground Vehicle Competition (IGVC)

Python, ROS, OpenCV, PID Control, Path Planning, CAD

- Led a team as captain in an international robotics competition, developing SOCRATES 2.0 with a central drivetrain design achieving an average speed of 2.4 km/h.
- Secured 2nd and 3rd place in Cyber and Auto-Nav Challenge categories, implementing autonomous navigation with lane and object detection along with GPS Navigation, achieving over 95% navigation accuracy.

Benchmarking Control Algorithms for Unitree Go1 Robot 🖉

Python, ISAAC Sim, Reinforcement learning

- Implemented a benchmarking framework for evaluating Factory Controller and Reinforcement Learning (RL) algorithms on the Unitree Go1 robot, **improving adaptability and efficiency by 25% in varied terrains**.
- Conducted performance analysis of "Walk These Ways" RL-based control algorithm, achieving a 30% improvement in velocity tracking and robustness over factory settings in challenging outdoor environments.

Autonomous Race Car 🔗

Python, Path Planning, Vehicle Control, CARLA Simulator, PID Control

- Integrated **path planning algorithms for autonomous navigation** on a Formula 1 racetrack in the CARLA simulator, utilizing Hybrid A*, Spline Interpolation, and BFS, achieving a maximum score of 92.4 on the Shanghai track.
- **Optimized a PID controller for steering and throttle**, leading to smoother trajectory following and a 25% reduction in lateral error during high-speed cornering maneuvers.

SKILLS

Programming: Python, C++, OpenCV, PyTorch, Machine Learning (ML), Convolutional Neural Networks (CNN)

Robotics Frameworks and Tools: Robot Operating System (ROS/ROS2), Gazebo, Path Planning, Vehicle Control, Reinforcement Learning, Control Algorithms, Simultaneous Localization and Mapping (SLAM)

Tools: Autodesk Fusion 360, Computer-Aided Design (CAD), Linux, Git, Arduino, Raspberry Pi, 3D Printing

PUBLICATIONS

V. Raheja, V. Shah, M. Shetty, P. Patel, and M. Tiwari, "Multi-Disease Prediction System using Machine Learning," 2022 International Conference on Futuristic Technologies (INCOFT), Belgaum, India, 2022, pp. 1-6, doi: 10.1109/INCOFT55651.2022.10094382 & .