Vaibhav Raheja

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WORK EXPERIENCE

EarthSense, Inc Aug 2024 – Present
Robotics Integration Engineer / Project Lead Champaign, USA

- **Led Solarbot project team of 8+ engineers as Project Lead** and Hardware DRI, coordinating sensor integration architecture and cross-functional alignment between engineering, operations, and customers
- Developed safety-critical **motion control features in C++ for TerraSentia robot** controller, including direction change safety system, rear-wheel drive mode for precision docking, and configurable motor parameters (9 merged PRs)
- **Integrated multi-sensor perception stack** (Hesai LiDAR, PTZ cameras, thermal imaging) using ROS2 with Docker-based deployment pipeline
- **Directed field deployments across 2 solar farm sites**, troubleshooting hardware failures and validating sensor performance in extreme conditions (43-46°C)

Intelligent Motion Laboratory Aug 2023 – Dec 2023
Robotics Research Developer Champaign, USA

- Developed a vision-based head pose estimation system for robotic eye examinations using MediaPipe FaceMesh and ZED depth cameras on the UR5 arm

All India Institute of Medical Sciences (AIIMS) Hospital Feb 2021 – May 2023
Robotics Research Developer - NMIMS Mumbai, India

- Developed a robot-assisted intubation system on the xArm5 platform with integrated camera feedback and manual teleoperation control
- Designed custom catheter tooling with integrated camera mount for real-time airway visualization

EDUCATION

University of Illinois Urbana-Champaign Aug 2023 – Dec 2024
Master's of Engineering **Autonomy and Robotics** Champaign, USA

Mukesh Patel School of Technology Management & Engineering Jul 2019 – Jun 2023
Bachelor of Technology in **Computer Engineering** Mumbai, India

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 .

PROJECTS

Benchmarking Control Algorithms for Unitree Go1 Robot
Python, ISAAC Sim, Reinforcement learning

- Implemented benchmarking framework to evaluate factory controller vs. RL-based locomotion algorithms on Unitree Go1 quadruped in ISAAC Sim
- Deployed and tested "Walk These Ways" RL controller on physical Go1 robot across varied terrain (grass, gravel, inclines)
- Compared velocity tracking, stability, and terrain adaptability between RL and model-based control approaches

Intelligent Ground Vehicle Competition (IGVC)
Python, ROS, OpenCV, PID Control, Path Planning, CAD

- Led team to 2nd and 3rd place finishes in Cyber and Auto-Nav challenges with an autonomous ground vehicle featuring end-to-end path planning and obstacle avoidance
- Implemented a multi-sensor perception pipeline (cameras, GPS, IMU) with lane detection, object avoidance, and GPS waypoint navigation, achieving 90% navigation accuracy
- Designed and fabricated robot chassis with integrated sensor mounts using CAD and 3D printing, implementing low-level motor control via Arduino/Raspberry Pi

GRAIC Autonomous Racing
Python, Hybrid A, Path Planning, PD Control, Vehicle Dynamics

- Implemented a Hybrid A* path planning algorithm for autonomous racing, accounting for vehicle kinematics, turning radius constraints, and non-holonomic dynamics for real-time trajectory generation
- Developed PD controller for steering and velocity control, achieving 40.8% improvement over baseline on Shanghai circuit with dynamic obstacle avoidance scenarios
- Compared three path planning algorithms (Hybrid A*, Dynamic Programming, Spline Interpolation) to optimize racing line and lap time performance

SKILLS

Programming: Python, C++, ROS/ROS2, OpenCV, PyTorch, Machine Learning (ML), CNNs

Robotics & Perception:: LiDAR Integration (Hesai), Multi-Sensor Fusion, Camera Calibration, Path Planning, Motion Planning, Control Algorithms, Reinforcement Learning, Gazebo, SLAM, Docker

Tools: Linux, Git, Fusion 360, CAD, Arduino, Raspberry Pi, 3D Printing