PRANAV RAJESH

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SUMMARY

Robotics & Mechanical Engineer with a multidisciplinary background spanning autonomous navigation, AI-based perception, and mechanical design. Demonstrated success in developing and deploying full-stack robotic systems — including autonomous mobile robots, vision-guided drones, and edge-AI smart parking solutions. Skilled in integrating software intelligence with real-world hardware, from designing mechanical subsystems to implementing real-time AI pipelines. Currently seeking roles in robotics, perception, embedded AI, or intelligent automation across industries such as autonomous vehicles, warehouse/logistics robotics, smart infrastructure, and industrial R&D.

EDUCATION

Master of Science in Robotics and Autonomous Systems — December 2024
Arizona State University, Tempe, AZ — CGPA: 3.3/4.0

B. Tech in Mechanical Engineering — May 2022
Vellore Institute of Technology, Chennai, India — CGPA: 3.6/4.0

TECHNICAL SKILLS

Robotics/Autonomous Systems: ROS/ROS2, SLAM, Motion Planning, Trajectory Planning
Programming: Python, C/C++, MATLAB
Computer Vision/Machine Learning (Perception): Object Detection, Object Tracking, YOLO, OpenCV, PyTorch, Numpy, Pandas
Mechanical Design & Analysis: SolidWorks, Autodesk Fusion 360, GD&T, Engineering Drawings, FEA (Ansys)

PROFESSIONAL EXPERIENCE

Research Assistant, Battery Electric and Intelligent Vehicle Lab (BELIV), ASU, AZ — January 2023 - May 2024

- Developed digital twin model of ASU Polytechnic Campus using RoadRunner and built a high-fidelity 3D model of the research autonomous vehicle in SolidWorks.
- Simulated operational safety scenarios in CARLA using NHTSA crash datasets.
- Designed and deployed an intelligent parking guidance system leveraging monocular vision, edge AI, and IoT-based real-time GPS navigation via Google APIs and MongoDB.
- Built perception modules using YOLO for vehicle detection, with multi-sensor fusion for scene understanding.

ACADEMIC PROJECTS & THESIS

Intelligent Parking Guidance System using Computer Vision, IoT and Edge Computing– MASTERS THESIS — October 2024

- Developed real-time object detection in Python using OpenCV, YOLOv5, and PyTorch, achieving 92% accuracy in dynamic conditions
- Integrated multi-camera sensor data and implemented sensor fusion, improving detection under occlusion
- Deployed system on edge device running Linux, reducing latency by 40% and enabling real-time updates via IoT
- Established a web-based interface with React, Flask, and MongoDB, enabling drivers to monitor parking availability remotely

Autonomous Mobile Robot (AMR) for Warehouse Automation — May 2024

- Programmed AMR using ROS2, implementing LiDAR-based SLAM (gmapping), *trajectory planning (A**, RRT), and real-time navigation
- Integrated and calibrated RGB-D camera, LiDAR sensor, IMU achieving 97% object detection and tracking accuracy using OpenCV

Unmanned Aerial Vehicle – Line Follower Drone — May 2023

- Created a vision-based navigation system using image processing in python for line-path detection and following in quadcopter
- Implemented *PID control* algorithm in *Simulink* to enhance flight stability, improving trajectory accuracy by 30%

6-DOF Robotic Arm Manipulator for Pick and Place Material Handling Tasks — December 2022

- Simulated a 6-DOF robotic manipulator using ROS, MoveIt, implementing inverse kinematics and PID-based motion control
- Integrated a YOLO-based vision system for real-time object recognition and actuation, achieving a 3.5s pick-and-place cycle

PUBLICATIONS

Design and Vibrational Analysis of Ceramic-Based Nose Cone — December 2022

- Designed a zirconia-based nose cone in SolidWorks for hypersonic flow conditions, reducing heat flux and drag by 75%, and performed vibrational analysis in Ansys, improving aircraft efficiency by 80% (DOI: https://doi.org/10.1007/978-981-19-7709-1_28)

Generative Design Optimization and Analysis of Connecting Rods — December 2022

- Modelled a 4-stroke engine connecting rod in *SolidWorks* with topology optimization, reduced weight by 20%, and conducted FEA in *Ansys* to evaluate stress distribution for additive manufacturing (DOI: 10.1088/1742-6596/1969/1/012022)