PRADHEEP KUMAR RAGHAVAN

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PROFESSIONAL SUMMARY:

Technology-driven professional with over three years of experience in mechatronic systems and software development. Currently pursuing a Master's in Robotic Systems, specializing in Artificial Intelligence and System Simulation. Skilled in developing innovative solutions by integrating software and engineering expertise, and actively seeking opportunities to contribute to advanced technology projects.

EDUCATION AND TRAINING:

ROBOTIC SYSTEMS ENGINEERING, M.Sc., - 2.1 – RWTH Aachen University **Oct 2021 – Present**

- Main Subjects: Robotics, Machine Learning, Robotic Simulations, Computer Vision, Reinforcement Learning

MECHATRONICS ENGINEERING, B.E., - First Class with Distinction – Anna University, India **Jul 2015 – May 2019**

- Main subjects: Mechatronic System Design, Embedded Systems, Industrial Automation, Control Systems, Project Management, Machines and Mechanisms

EXPERIENCES:

STUDENT ASSISTANT – Man Machine Interaction Institute **Jan 2024 – Sept 2024**

- 3D point cloud processing and fusion of multi-lidar data with PCL and Open3d
- Fusion of data from different lidars and sensors and integration of SLAM and pose estimation algorithms to create accurate 3D maps in dynamic environments using ROS, RVIZ and other packages
- Analyse the potential cases of stereo camera integration and evaluate their effectiveness for improved data collection and fusion capability.

STUDENT ASSISTANT – WZL RWTH Aachen **Nov 2022 – Aug 2023**

- Developing ergonomic and intuitive GUIs to optimize robot-assisted biomedical drilling systems.
- Integration of sensors and Real time measurement and processing of process variables in Biomedical processes (Development of USB, Ethernet and MQTT messages for communication and control of machines and sensors).
- Design and implementation of Machine Learning models for Temperature prediction in Biomedical drilling process
- Creation of new software modules for expansion and visualization of explainable AI methods for quality optimization of industrial process.

HIL ENGINEER – ZF WABCO, India **July 2019 – July 2021**

- Analysing customer requirements, creating test specifications, and ensuring traceability between requirements and test specifications using configuration management and version control tools.
- Reviewing and utilizing requirements and design documents to develop Hardware-in-the-Loop (HIL) tests, automating their implementation in Python, and reducing pipeline time by 75%.
- Reporting, testing, and resolving issues in software functionalities to ensure optimal performance.

SKILLS AND COMPETENCIES:

- Programming – Python, C++, Linux, Git
- Machine Learning - PyTorch, TensorFlow, OpenAI gymnasium, Stable baseline (RL)
- Robotic Software- ROS, Gazebo, Rviz, Docker
- Computer vision and graphics: Open-CV, Open3D, Unreal Engine, OpenGL (basic)
- Control Engineering – PID control, Kalman filtering
- Electronics – Microcontroller Programming, MATLAB/Simulink, NI LabVIEW
- Automotive – Dspace, CANalyzer, CANape, UDS Diagnostics, PTC Integrity

ACADEMIC AND RELATED PROJECTS:

3D Scene Reconstruction with NeRF

- Developed and implemented a Neural Radiance Field (NeRF) model using advanced sampling and rendering techniques to produce high-quality 3D models from sequences of 2D images.
- Applied machine learning algorithms for efficient 3D scene reconstruction and visualization, enabling precise and detailed representations.

Path-Planner for a Smart Shopping Cart

- Implemented an Artificial Potential Field (APF) in MATLAB to navigate the cart to target positions while adapting to environments with static and dynamic obstacles.
- Integrated localization and mapping techniques to ensure smooth and efficient path planning.

Lane Detection and Vehicle Detection & Tracking

- Designed an advanced lane detection algorithm and a vehicle detection and tracking pipeline using OpenCV, HOG (Histogram of Oriented Gradients), and SVM (Support Vector Machines).
- Re-implemented the pipeline using a Deep Neural Network in TensorFlow for enhanced accuracy and robustness.

Automatic sorting system for tomatoes

- Performed an image processing technique in MATLAB using ROI and SIFT algorithms to detect fresh tomatoes
- Construction of a sample sorting converting for separating fresh and old tomatoes using the developed algorithm

VOLUNTEERING:

- Space Team Aachen, Rover Software Development (2023)
  - Analysis and Selection of Sensors for Rover Project
  - Development of Rover Software Architecture.
- Prometheans Offroad Racing team, TCE, Madurai (2016-2018)
  - Construction of an offroad Vehicle and perform suspension design and analysis
- Joint Secretary, Department of Mechatronics Engineering, TCE, Madurai (2017-19)
  - Organized Techutsav 2k18, a national level technical symposium with about 35 volunteers from Mechatronics Department and also workshops and events for students on technical topics
  - Provide guidance and information on academic opportunities and competitive exams to students

LANGUAGE PROFICIENCY:

- English – Professional working proficiency
- German – Independent usage Proficiency (B1+)