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Department of Computer Science and Engineering
Faculty Publications 2025-26

Name: Chaithra P

Designation: Assistant Professor

Orchid Id : <https://orcid.org/my-orcid?orcid=0009-0002-3786-2758&justRegistered=true>

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1. Generative AI Innovations Related to AI-Generated Art, Music, Images, Virtual Influencers, Ethical Issues



2. Modelling Engineering and Data in Simulation and Computation for a Novel obstacle avoidance algorithm Enabling Efficient source-to-Goal Navigation of Mobile Robotic Vehicles using ML Techniques



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Modeling, Engineering, and Data in Simulation and Computation for a Novel Obstacle Avoidance Algorithm Enabling Efficient Source-to-Goal Navigation of Mobile Robotic Vehicles using ML techniques

Dr. Richard A. Williams^{1*}; Dr. Kirubha D.²; R. Rajkumar³; Dinesh Kumar S.⁴; Priyadarshini M.³; Indra S.³; Chaitra P.³; Sandhya H.³

¹ Associate Professor, CSE Dept., Rajarajeswari College of Engg., Bangalore, Karnataka, India

² Professor & Head, CSE Dept., Rajarajeswari College of Engg., Bangalore, Karnataka, India

³ Assistant Professor, CSE Dept., Rajarajeswari College of Engg., Bangalore

⁴ Assistant Professor, ISE Dept., Rajarajeswari College of Engg., Bangalore

Presenter / correspondence: Dr. Richard A. Williams (rrce.research.2025@gmail.com)

ABSTRACT

This project presents a comprehensive approach to the design and implementation of an innovative obstacle avoidance algorithm tailored for mobile robotic vehicles. The primary aim is to develop a robust system capable of effectively detecting and navigating around obstacles in real-time scenarios. The algorithm is constructed using MATLAB, leveraging its computational capabilities and extensive toolset for algorithm development and simulation. The methodology encompasses several key stages. Initially, sensor data acquisition is performed through various sensors integrated into the robotic platform, including but not limited to cameras, LiDAR, ultrasonic sensors, or a combination thereof. Subsequently, a systematic and multi-faceted approach is employed for obstacle detection, involving techniques such as image processing, depth perception, and sensor fusion. The detected obstacle information is then processed and integrated to generate a dynamic and adaptable avoidance strategy. This strategy accounts for the vehicle's kinematics, environmental constraints, and real-time feedback, allowing for agile and safe navigation in complex and dynamic environments. The algorithm's responsiveness is optimized through iterative testing and refinement, ensuring its reliability and efficiency in diverse scenarios. The algorithm's performance is evaluated through extensive simulation studies and practical experiments with the mobile robotic platform operating in controlled and real-world environments. Quantitative metrics, including obstacle detection accuracy, avoidance efficiency, and computational performance, are employed to assess and validate algorithm's effectiveness. Outcomes of this research contribute to the advancement of obstacle avoidance methodologies for mobile robotics, offering insights into development of adaptive and intelligent systems capable of navigating challenging terrains autonomously.

References

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