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Mobile Robot Prototype for Validation of Neuro-Fuzzy Navigation Controllers

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Abstract

Autonomous navigation remains a fundamental challenge in mobile robotics, particularly in dynamic environments where real-time perception and decision-making are required. While numerous studies have proposed neuro-fuzzy navigation controllers [1], most experimental validations are limited to simulation platforms, thereby restricting the assessment of real-world constraints [2]. This paper presents the design of a three-wheeled differential-drive mobile robot prototype for the real-world validation of neuro-fuzzy controllers. The platform integrates a Raspberry Pi 4 for onboard processing and an RPLIDAR sensor for environmental perception. The embedded controller builds upon our prior contributions in system modeling [3], data generation [4], and neuro-fuzzy optimization [5] to enhance computational efficiency and robustness. The robot's functional, structural, and behavioral aspects are also presented, including hardware integration and control implementation. The developed prototype enables systematic evaluation of control performance under practical operating conditions. Experimental results demonstrate the feasibility and effectiveness of the proposed approach for reactive navigation in real-world environments.

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References

- [1] Anbalagan Loganathan, Nur Syazreen Ahmad, Engineering Science and Technology International Journal, vol. 40, 2023, p.101343.
- [2] B. Hilali, M. Ramdani, A. Naji, Indonesian Journal of Electrical Engineering and Informatics, vol. 11, 2023, p. 375–388.
- [3] B. Hilali, M. Ramdani, A. Naji, LFA 2024, Éditions Cépaduès, 2024, ISBN 9782383951391.
- [4] B. Hilali, M. Ramdani, A. Naji, 14th SITA Conference, IEEE, 2023, p. 1–6.
- [5] B. Hilali, M. Ramdani, A. NAJI, International Journal of Electrical and Computer Engineering, vol. 15, no. 1, 2025, p. 1065–1078.