ANALYSIS OF INFRARED SENSOR IMPLEMENTATION IN LINE FOLLOWER ROBOT A LITERATURE REVIEW OF DETECTION METHODS AND CONTROL ALGORITHMS

Abstract

The development of robotics technology shows significant evolution in the implementation of infrared sensors in line follower robots that integrate advanced detection methods and sophisticated control algorithms. This research aims to comprehensively analyse the implementation of infrared sensors through a structured literature review of eight major studies in the 2021-2025 range. A library research methodology was used with thematic analysis to categorise the findings based on sensor type, control algorithm, and performance metrics. The analysis shows the transformation from a single infrared sensor to a hybrid multi-modal system that integrates computer vision, ultrasonic, and colour sensors with improved detection accuracy, reaching an error rate of 0.1-85 pixels. Diversification of control algorithms from classical PID to fuzzy logic, neural network, and Q-learning proved superior adaptability to a dynamic environment with 66.67%-100% success rate. The convergence of wireless communication technology and autonomous learning capabilities marks the transition of the line follower robot into a platform for automated guided vehicles and autonomous mobile robots. The conclusion shows that infrared sensors maintain high relevance in modern robotics when integrated with advanced computational methods, providing a foundation for the development of intelligent and adaptive navigation systems for the implementation of Industry 4.0.