Design and Development of Smart Warehouse Robot Prototype

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Abstract:_Efficient warehouse management depends heavily on accurate and reliable automation systems for inventory handling. This research paper presents a prototype of a smart warehouse robot designed to fulfil the objective of efficiently picking and placing boxes by utilising a colour-sensing system for identifying the correct placement in racks. The robot employs a lifting mechanism inspired by forklifts, consisting of a 12V DC motor, a rack and pinion, and a slider bar. The robot also features an obstacle avoidance system using an ultrasonic sensor and a buzzer, while navigation is done through two IR sensors. The colour-sensing system is done with the help of a TCS 3200 colour sensor and helps the robot to identify the colour codes on the boxes to determine their correct placement in the racks. The system is controlled by an Arduino Uno and uses five DC 12V motors, two L293D motor drivers, a TCS 3200 colour sensor, an ultrasonic sensor, a buzzer, and a rack and pinion with a slider bar for the lifting mechanism. The robot's performance was tested in a simulated warehouse environment, demonstrating accurate and efficient performance in picking and placing boxes. This research offers valuable insights into the development of smart warehouse robots, promoting sustainable warehouse management practices and enhancing overall efficiency._

Keywords:TCS Color Sensor,IR Sensor, 12V DC Motors, Arduino UNO, L293D Motor Driver.

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