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A wireless sensor network based autonomous logistic trolley system for factory automation

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Abstract

This paper presents the low cost autonomous logistic trolley for factory automation. Automation can be defined as the technology by which a process or procedure is performed without human assistance. Factory automation has automated the factory manufacturing process without human interaction. It will increase the efficiency of the manufacturing process, make the process highly accurate and because of less man power it will increase the revenue margin of the factory. The system primarily consists of a *Arduino Uno* board, *ultrasound sensors*, *infrared proximity sensors*, *Bluetooth modules*, *DC motors*, and *Servo motors.* This system mainly includes obstacle detection, line tracking, Bluetooth request transferring technologies and motion control technologies. This trolley is called up by a production desk of the factory if materials are needed, by sending a request. Trolley automatically deliveres the material to that exact production desk using its infrared sensors that are placed at both left and right sides of the vehicle. This can be used to identify each production line. This proposed autonomous trolley was experimented in different methods. It showed very accurate and successful results. This kind of autonomous trolley provides a wide range of benefits to a manufacturing process in a factory. This autonomous logistic trolley is low cost, less complicated and will increase efficiency of the manufacturing process of a factory.

Keywords: Arduino, Automation, Robotics, Wireless sensor network

Introduction

This low cost autonomous logistic trolley is specifically useful for factory automation. This trolley can be used to deliver production material inside the factory. This system is based on *Arduino Uno board*. In addition to that, *Ultrasound sensors, IR proximity sensors, Bluetooth modules, DC motors*, and *Servo motors* are also used for this system. This system mainly includes *Obstacle detection*, *Line tracking*, *Bluetooth request transferring* technologies and *motion control* technologies. Most factories use automation robots or tools for their factories. Production systems in the future will have to be able to adapt speedily to changing market needs (Telschig & Knapp, 2017). Wireless factory automation has been receiving much interest in recent years due to its advantages of low cost and high flexibility over the traditional wired networks (Ashraf et al., 2016). Factories can derive the maximum benefit of having autonomous robots or tools. Increasing accuracy, efficiency of production, and minimum man power wastage are some of the advantages of having this kind of system. The presence of wireless technologies in industrial communication systems has steadily increased over the past decade. Machine builders see the main advantages of wireless with increased flexibility. e.g. by establishing communication to hardly accessible or moving devices. In addition, wireless technologies offer the potential to decrease installation and maintenance costs. e.g. by replacing highly stressed, costly, and error prone connectors like slip rings or sliding contacts (Bauer