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Design and Development of Delivery Robot for Commercial Purpose

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Abstract

Nowadays, many robots are being used in industries, homes, military applications, disaster management, etc. worldwide. The advancements in robotics have made lives easier for humans in many aspects, and it provides a safer and more efficient. People's concerns about secure and frictionless home delivery services have grown due to the present coronavirus scenario around the world. During the tremendous strain on healthcare and hygiene, we have proposed a prototype robot that can be very useful in reducing the danger of infectious disease transmission in the product distribution system. Designing and developing a low-cost autonomous four-wheel portable drive robot prototype that can safely transport packages to a designated location utilizing a Bluetooth module and mobile application have been shown. After the robot reaches at its point of disembarkation, it waits for the customer to unlock the container. The customer will get an otp as a password to open the container and retrieve the ordered product upon delivery. This password in the form of an otp is sent to the customer with the confirmation message from the order. After completing the delivery, the robot will arrive to point of disembarkation on its own. In addition to ensuring infection safe delivery of products, our robot can be an effective technological solution that significantly reduces delivery costs.

1. Introduction

A robot is a machine, particularly one that can be programmed by a computer and can perform a complex set of activities automatically. An external control device can direct a robot, or the control can be included in the robot itself. Although some robots are meant to resemble humans, most are task-oriented machines focusing on essential utility rather than expressive aesthetics (Thiel and Block).

The delivery robot can perform any tasks and used in many industries, hospitals and disaster management. It is efficient and used in many places, and for many purposes. One of the first instances of a mechanical device built to regularly carry out a particular physical task occurred around 3000 B.C.: Egyptian water clocks used human figures to strike the hour bells. The robotics is used from the ancient times. The robots have been evolved and changed over since ancient times (Jeon and Lee Huang, Cao, and Zhu) The robots have been playing a crucial role over history. The robots have made human life more efficient and made their work easy. The robotics has been used in our daily life routine.

Delivery robot is an autonomous robot which works on its own and delivers the accessories itself to the receiver (Jeon Joseph et al. Cohen and Hopkins Jorling, Böhm, and Paluch Mende et al.). In modern era, it is used in many countries and became popular in many countries. These robots can be operated in both the ways manual and automated (Verger).

It is the most advance form of delivery. Its purpose is to reduce the traffic population and to deliver the product for the customer with safety and efficiency. It is used in many places because it is commercially very useful (Kershner). It provides safety because of the security system present iIn present situation it is very useful and maintains hygiene. In this delivery robots, these can be control to work for continuous in the form of cycle, as long as it is maintained perfectly (Figliozzi and Tipagornwong Basu et al.).

Introducing these types of automations increases the productivity advantages. In current situations like pandemic this is very useful because it provides contactless deliveries which helps in reducing the exposure of virus, it is safe and maintains the hygiene for the sender and receiver. Here the ultrasonic sensor is used to detect any obstacle (Moroz and Polkowski). The robot automatically detects and avoids itself. The design and development of a cost effective autonomous four-wheel mobile drive robot prototype have been presented that can deliver packages safely to a desired destination using Bluetooth module and mobile application (Baalbaki and Xie).

It consists of L298N DC Motor Driver shield motor which is used to run the delivery robot. It has many advantages in it (Tussyadiah, Zach, and Wang). So, it has a great scope in future in the delivery aspects. Unlike, not only used in delivery but also it very helpful in disasters times where no human can plunge into, this robot can easily enter.

2. Delivery Robot

A delivery robot is robot that delivers the packages to the customers. These robots does not need any kind of human power to work instead they can work on them. They work efficiently and fast. They are trustworthy. Delivery containers with six wheels that looks like a big (but friendly-looking!) Bugs.

You can purchase through an app with based on your location on base of what you need, just like the other delivery services. The robot moves to the vendor, like accessories etc and returns to your house.

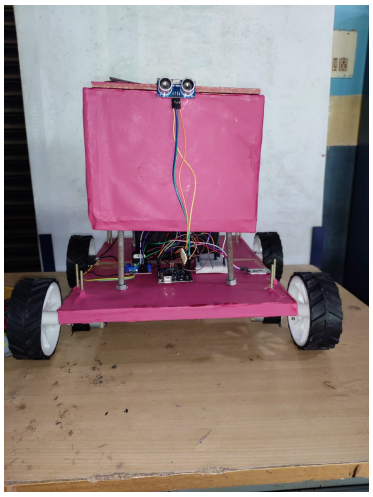

FIGURE 1. Developed Delivery Robot

Here the above figure;1 shows that a fully developed delivery robot is completed.

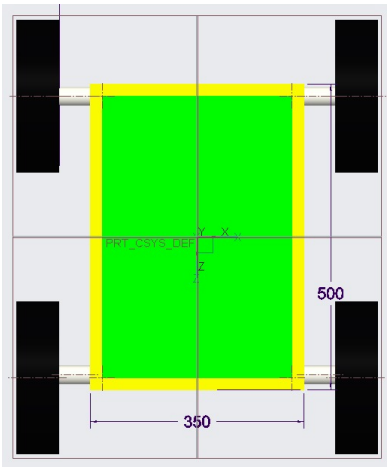

FIGURE 2. Delivery Robot (Top view)

3. Design and Modelling

3.1. Design

Solid works were used to create the designs for this project. Solid Works is a software program that allows you to create 2D and 3D diagrams and evaluate them virtually. It is one of the most widely used CAD platforms today, thanks to its user-friendly interface and easy-to-understand functionality that can be used for design creation. Compared to other leading CAD tools on the market, the learning curve is shorter. The diagrammatic designs of Fig;2 to 7

TABLE 1. Material Used in Robot

Material	Quantity
Geared Dc Motors	4
Bluetooth Module	1
Arduino Uno	2
12v Battery	1
Jumper Wires	25
L298N Motor Driver	1
Ultrasonic Sensor	1
Wheels	4
Breadboard	1
Servo Motors	1
IC7809	1
Keypad	1
Lock	1

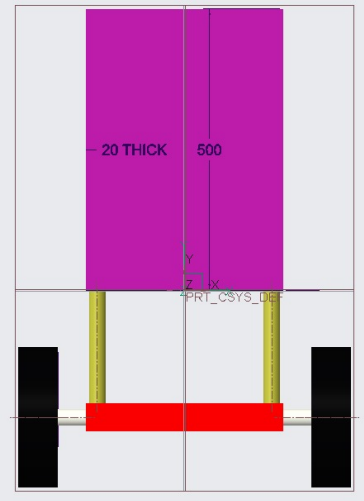

FIGURE 3. Delivery Robot (Front view)

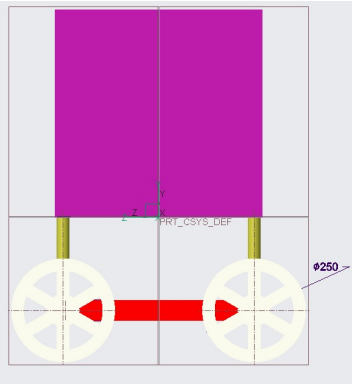

FIGURE 4. Delivery Robot (Side view)

drawn in Solid works are seen in the diagrams' front, top, and side views.

The total list of material with quantity is shown Table 1. The real model of the delivery robot is

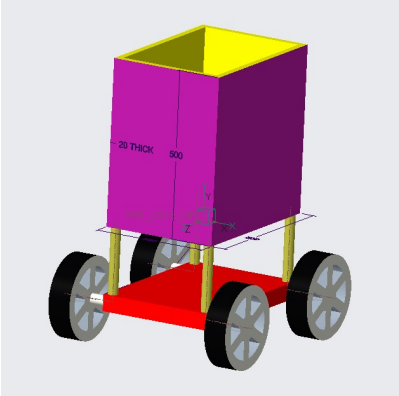

FIGURE 5. Designed Delivery Robot

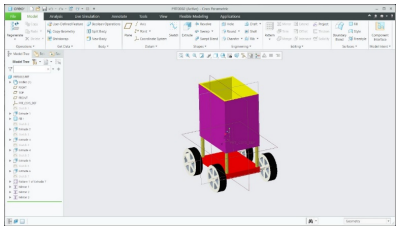

FIGURE 6. Complete Model of DelBot

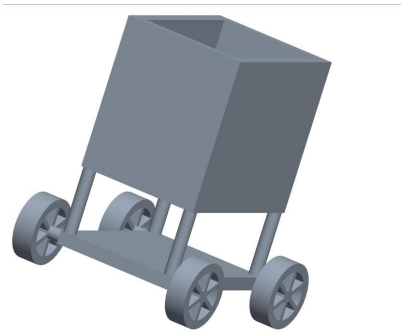

FIGURE 7. Complete View of DelBot

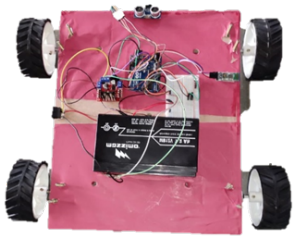

FIGURE 8. Delivery Robot Control System

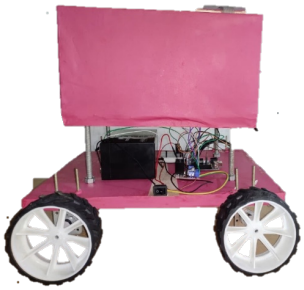

FIGURE 9. Fabricated Side view of Delivery Robot

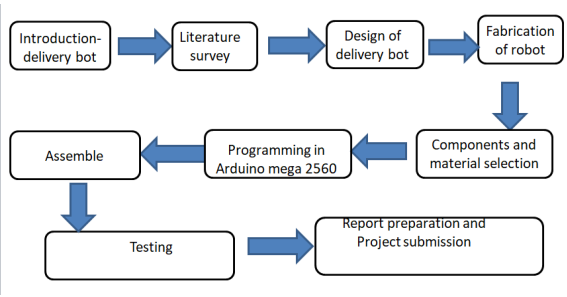

FIGURE 10. Methodology of the delivery robot

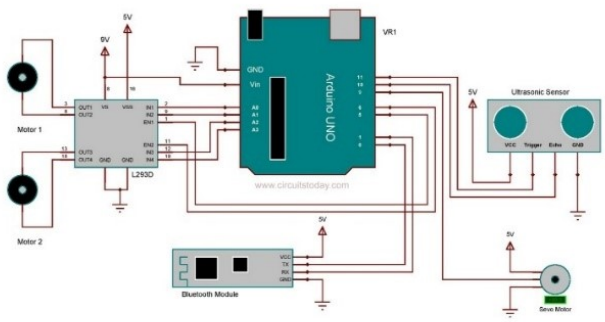

FIGURE 11. Circuit diagram of the delivery robot

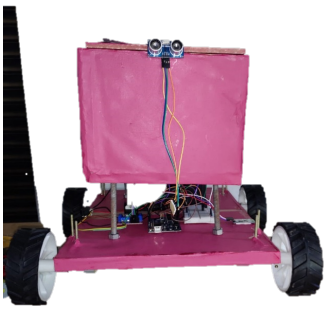

FIGURE 12. Fully Fabricated Delivery Robot

shown in the Fig;8,9&11. The Methodology of the model is shown in Fig;10. The fully fabricated delivery robot is shown in Figure 12

4. Program Used in Delivery robot

The source code of our delivery robot has been complied in C language. C language is used in delivery robot. Arduino UNO is used here. The code has been tested and verified by the complier and it is uploaded in the arduino UNO. The connections are given to arduino by the circuit diagram. After the connections given, it checked and verified by the battery whether it is working or not. After the completion of the electrical circuit the delivery robot it works, and performs tasks which is assigned to it. Here, the coding plays a crucial role in this robot. To carry out the autonomous tasks.

5. Conclusion

Designed and made sketch of 3D model with the help of AUTOCAD designing software. Purchased the required materials and components for the development of the robot. Fabricated the base material to the dimension needed for carrying the load. Manufactured the box for moving the goods load .They coded the program into the Arduino board using Arduino software for direction control and the locking system. They have connected the components to the Arduino board with the help of jumper wires. Then the wheels are attached to the board to move quickly. Transportation while supporting a load delivery robot is ready for commercialization which has potential for future business. The robot control system is designed so that in an emergency, an alert system is introduced to update the

head office. The safety locking system is well developed, and it can be poured using OTP.

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