WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Personal Office Assistant

G. Kirankumar[1], B. Sowjanya[2], M. Koteswaramma[3], P. Trinadh[4], G. Keerthi[5].

[1]Assistant Professor, Department of Electronics & Communication Engineering
[2]Under Graduates, Department of Electronics & Communication Engineering
[3]Under Graduates, Department of Electronics & Communication Engineering
[4]Under Graduates, Department of Electronics & Communication Engineering
[5]Under Graduates, Department of Electronics & Communication Engineering
[1,2,3,4,5]DVR & Dr HS MIC College of Technology, Kanchikacherla, Andhra Pradesh, India

ABSTRACT:

The personal office assistant is intended to take the place of a delivery person for deliveries of goods. This robot can move from a starting position to a destination point while navigating a congested environment and dodging obstacles. The robot is driven by a 4-wheel drive and remotely controlled by Bluetooth for short-range applications. IOT will be used for long-range applications. It uses ESP32 CAM to detect if any theft has occurred around the robot. Additionally, the bot features a top portion for holding goods that can only be opened by the designated receivers. Additionally, the delivery robot has a keypad installed for security purposes to prevent theft. To help the robot navigate, the control team uses a remote camera to monitor the robot's direction. Using its potent 4-wheel DC motor drive system, the bot can deliver food and items weighing up to 3 kg.

Key terms: Arduino UNO, L298N Motor Driver, and ESP 32 CAM.

1. INTRODUCTION

Robots, the so-called next generation of technology, are already a part of our daily lives in a variety of contexts, including the military, education, and other fields. A new revolution is taking place in real life as a result of the widespread use of robots, which have their own benefits such as reduced labour costs and consistent output. In other words, robots have been deeply ingrained in society, yet much work still has to be done to develop their capabilities. For instance, in a coffee shop of the future, the robot not only makes the coffee but also safely delivers it on its own. A self-driving robot that can transport meals will reduce labour costs significantly, but there are a variety of unique conditions and probable obstructions on the way to the destination; therefore, a solution is required. Robots have a hard time recognising the surrounding environment and responding as they should, yet failing to avoid barriers poses safety concerns. The failure rate can be decreased by using high-performance detection, analysis, and control systems. However, the price would be too high for industrial use. Due to this, delivery robots are still a long way from being a part of daily life.

With the economy currently thriving, we observe a significant rise in firms, whether in terms of financial comparison or structural strength. Multiple employees are frequently used for pitiful tasks like transporting documents to different departments or delivering mail or posts in order for a corporation to operate properly. So, we propose an autonomous robot that can send and receive physical objects in a variety of contexts. Robotic technology is capable of moving tiny objects across short distances but is not yet clever enough to carry commodities across cities. To build a delivery robot, an open-source platform called Donkey Car will be used. It will be powered by an Arduino board and an ESP32 camera.

2. MOTIVATION AND SCOPE

On a recent visit to a major financial centre, one thing that particularly stood out to us was the fact that, despite the company being very new and technologically sophisticated, paper was invariably the preferred method of communication. The office boy appeared to be a typical sight because the company has a large capacity and many employees to move the crucial papers and materials. Even though they were incredibly good at what they did, it felt unavoidable to contact them each time for little duties like delivering notes, shipments, or paper goods from one department to another.

Although using autonomous robots for delivery is nothing new multinational corporations like Amazon and DHL have long used such robots to handle packages in their warehouses—it seemed quite advantageous to suggest something similar, especially in the eyes of such firms and corporations. Depending on the utilisation, autonomy can be scaled to different prospects. In our project, the first thing we do is introduce a robot that can perform the above-described simple tasks. The most difficult part of the endeavour is teaching, especially training the robot to travel. The robot needed to learn how to avoid obstacles and accurately navigate to its destination, and that was our major goal. We can apply obstacle avoidance and get to our desired destination with a marginal error if we have a large data collection at our disposal.

3. PROBLEM STATEMENT

Ecommerce and product/food delivery is a necessary service in our daily life. The delivery executives are directly contact with costumers. In this pandemic situation increased the need of touch free interactions to avoid spread of infections. It is necessary to protect lives of delivery executive as well as customer. To overcome this, amazon introduced a robot called as scout. It is high cost and only for Amazon membership customers. And many countries are using drone technology. But it is very high cost and difficult control at high wind atmospheric conditions

4. METHODOLOGY

The delivery robot should start out at the origin, and after a certain product or set of documents are loaded into it, we need to start it using a Bluetooth-enabled mobile app to tell it to travel forward, backward, and left. In total, our project consists of three subsystems: the power supply, the sensor system, the control unit, and the navigation system. The power supply has a 7.4-volt battery inside, and it gives modules the necessary voltage. The control unit serves as the robot's brain, gathering information from sensor systems, assessing the environment and current direction, and giving commands to the navigation system to move in the desired direction. In this case, the robot is controlled through video monitoring.

5. HARDWARE

In this robot, the Arduino serves as the project's central processing unit. We use the Arduino to move the robot and control it using a programme for its DC motors, servo motors, and keypad module system. The keypad is used for the robot's password-based security system, and the servo motor opens and closes the door. An Esp32 camera is used for security. The Arduino Integrated Development Environment, also known as Arduino Software (IDE), is a piece of software that must first be installed. It includes a text editor for writing code, a message area, a text console, a toolbar with buttons for basic operations, and a number of menus. To upload programmes and communicate with hardware, it connects to both.

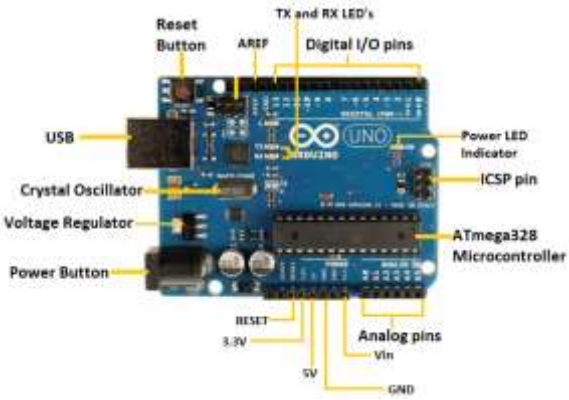

Fig 5.1 Arduino UNO

HC-05 BLUETOOTH MODULE

It already has a slave Bluetooth device configuration. Its operation becomes obvious to the user once it has been linked with a master Bluetooth device, such as a computer, smartphone, or tablet. The Bluetooth module in this robot is linked to a smartphone through Arduino. We've connected our smart phone so you may use it to program the robot's commands and control it.

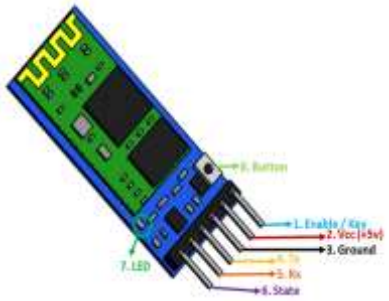

Fig 5.2 HC-05 Bluetooth module

ESP-32 CAMERA:-

An integrated video camera and microSD card slot are both features of the fully functional microcontroller known as the ESP32-CAM. It is practical for IOT devices that need a camera with sophisticated features like image and video tracking and recognition because it is affordable and simple to use. We use the ESP32-CAM for video tracking in this robot, and if an obstruction is seen, we may reorient the robot in that direction. Installing the Fing app and then looking for the IP address of the device that the Bluetooth module is linked to are both necessary steps in order to watch the video. Watching the footage will help us guide the robot to its target.

Fig 5.3 ESP32-CAM

DC MOTORS: -

Our delivery robot has two motors that it uses to control its speed and direction. These DC motors are essential to our project's ability to move from one location to another with the use of wheels. Using a Bluetooth SPP manager programme for which we have already developed Arduino code, we must instruct the DC motor.

Fig 5.4 DC Motor

L298N MOTOR DRIVER: -

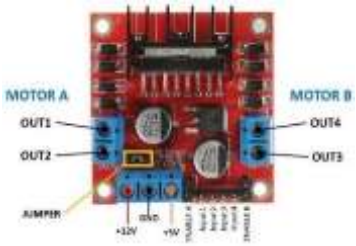

Fig 5.5 L298N Motor Driver

Dual-bridge motor drivers like the L298N enable simultaneous speed and direction control of two DC motors. The module can run DC motors with peak currents of up to 2A and voltages ranging from 5 to 3V. This motor driver drives the DC motors on the robot. Based on L293D IC, this motor driver was built. A 16pin motor driver IC is called L293D. The purpose of this is to deliver bidirectional drive currents.

SERVO MOTOR: -

The robot uses servo motor to open and close the upper section of the robot to keep the items in the box and take them out of the box after the robot reaches the destination. the motor can be controlled from 0° to 180° in the process opening and closing the door of upper section of the robot

Fig 5.6 Servo motor

4X4 KEYPAD MODULE: -

We use keypad module for the security of the package in the robot, we have given a password in Arduino IDE software which we need to enter to open the door only when the entered password is correct it is mainly used to protect the product from the theft

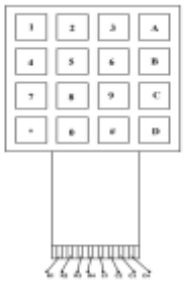

Fig 5.6 Keypad module

6. RESULTS

Our final product had a sleek wooden box and steel rods for extra stability. It also featured wireless video streaming using ESP32-Cam and the robot can be controlled using the instructions given by the user through Bluetooth SPP manager app.

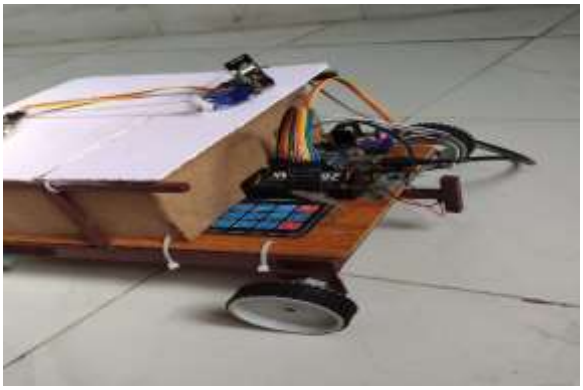

Fig 6 Prototype

7. ADVANTAGES, LIMITATIONS AND APPLICATIONS

Advantages

Using our invention, we can eliminate the need for a delivery person because the robot is capable of transporting items from one location to another. This will help save money over time because using this option for delivery will be less expensive in the long run for a business. Additionally, it can aid in the reduction of manpower, which in turn helps to save time, energy, and the issue of a person's availability at times of necessity. The robot doesn't need wires or magnetic tape to function because it contains built-in sensors and cameras. The robot can dynamically develop effective pathways from Point A to Point B within a facility rather than following predetermined routes. This increases flexibility by allowing them to avoid obstructions.

Limitations

Firstly, the robot can't be used for delivery over long distances. Secondly, video surveillance depends on the Internet connection if the internet connection is low we cannot make a decision to move the direction to reach the destination. Thirdly, Password based authentication is less secure than fingerprint and face recognition. Fourthly, they need to be monitored by human to keep an eye on them and navigate the robot if the person who is assigned to navigate the robot is not attentive then the robot may not reach the destination.

Applications

- In a workplace or office, comprising of various departments working together and the need to transport physical documents from one station to the other,
- Transporting something as a letter or small parcel from one your letter box outside to you in the house.
- In an environment such as a hospital where biohazard samples requiring minimal human contact need to be transported
- Warehouse delivery robot.
- Elderly assistance

8. CONCLUSION

Overall, all individual modules worked well, and we successfully integrated them together. The robot can monitor and control through video surveillance and mobile app. In the future scope we are going to use fingerprint module rather than keypad for the high security reasons**.** In the future, we are going to modify the navigation system, such as lowering the turning speed or using a step motor instead. In this way, the robot should be able to find the correct direction and stop instantly. When navigating in straight line, the robot should also check the direction continuously to ensure that the direction is correct. Instead of fixing it in the front, we are going to swing it continuously to detect the surroundings. A camera and a more powerful microcontroller can be used to add additional features such as mapping and image recognition.

REFERENCES

[1]"DonkeyCar",Docs.donkeycar.com,2016.[Online].Avail:https://docs.donkeycar/.

[2] A. Courses et al., "OpenCV", Opencv.org, 2020. [Onlinme].Available:https://opencv.org/.

[3]"TensorFlow",TensorFlow,2020.[Online].Available:https://www.tensorflow.org/.

[4] A satan, "Bluetooth-based indoornavigation mobilesystem,"201819thInternationalCarpathianControl conference(ICCC),Szilvasvarad,2018,pp.332-337.

[5] M. Zaafir Barahim, M. Razvi Doomun and N. Joomun,"Low-basedApplication,"20072rdIEEE/IFIPInternationalConferenceinCentralAsiaOnInternet, Tashkent,2007

[6]Kim YJ, inventor; Samsung Electyronics Co Ltd, assignee.12Ccommunicationsystemandmethodenablingbi-directionalcommunications.UnitedStatespatentapplicationUS11/028,319.2005Jul28.

[7] P. Liang, Y. L.Chang and S. Hackwood, "Adaptive self-calibrationofvision-basedrobotsystems,"inIEEETransactionon Systems,Man,andCybernetics,vol. 19,n0,2,pp.811-824,July-Aug. 1989.

[8] Jain, Aditya Kumar. "Working model of Self-driving carusingConvolutionalNeuralNetwork,RasperryPiandArduino."2018SecondinternationalConferenceonElectronics.CommunicationandAerospaceTechnology(ICECA).IEEE.2018.

[9]Geron,Aurelien.HandsonmachinelearningwithScikit-Learn, Keras, and TensorFlow: Concepts, toolsandtechniquestobuidintelligentsystem.O'ReillyMedia,2019.

[10] M. Currey, "Arduino with HC-05 Bluetooth Module inSlaveModelMartynCurrey:,Martyncurrey.com,2020.[Online]. Available:https://www.martyncurrey.com/Arduino-with-hc-05-bluetooth-module-in-slave-mode/.[Accessed:24-Oct-2020].

[11]KasparSakmann,"BehavioralCloning—makeacardrive like yourself", medium Available at:https://medium.com/@Ksakmann/behavioral-cloning-make-a-car-drive-like-yourself-dc6021152713(2016)