WWW.IJRPR.COM

International Journal of Research Publication and Reviews

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

Bluetooth Controlled Robot Vehicle

Sharad Yadav ECE[1], Rishabh[2], Vaibhav Srivastava[3], Deepak Kumar Sir[4]

1 4 Department, Raj Kumar Goel Institute of Technology, Ghaziabad UP, India
2 3 ECE Department Raj Kumar Goel Institute of Technology,Ghaziabad UP, India

ABSTRACT—

A Bluetooth controlled robot vehicle refers to a vehicle that can be fully controlled using an Android device or laptop that supports Bluetooth connectivity. In this project, the objective is to create a Bluetooth-controlled Arduino car by utilizing Bluetooth technology and programming an Arduino microprocessor. It's important to note that this device is not classified as a robot since it lacks sensors. Consequently, it can be considered a machine. The main goal of the project is to design a Bluetooth-controlled Arduino car and develop the necessary program for the Arduino microcontroller. By successfully completing this project, the intended goal is achieved. The device can be controlled using any Bluetooth-enabled smart device running the Android operating system. The utilization of Bluetooth technology allows for flexibility in the choice of the remote control device, such as mobile phones, tablets, or laptops. Additionally, physical barriers like walls or doors do not hinder the control of the car..

Keywords—Arduino Microprocessor, Bluetooth

INTRODUCTION

Background: Wireless or Bluetooth-controlled cars have been developed to simplify our daily lives by leveraging modern technology. In today's fast-paced era, it is essential to utilize advanced technology to streamline our day-to-day activities.

Unfortunately, thousands of people lose their lives due to accidents caused by human errors while driving. By enabling remote control of vehicles, we have the potential to save thousands of lives. Drones have already revolutionized remote control technology, and Bluetooth-controlled cars have the potential to bring about a similar revolution in the near future. These cars can have various applications, including low-range mobile surveillance devices, military applications that require minimal human intervention, assistive devices like wheelchairs, and home automation.

The goal is to overcome existing challenges and bring about significant and groundbreaking changes in society. Driverless cars, in particular, offer mobility to individuals who cannot drive, which greatly benefits daily commuters. Bluetooth-controlled cars are undoubtedly the gadgets of the future.

Bluetooth-controlled cars can serve as a valuable tool for individuals with physical disabilities or those who are unable to drive. These cars offer remote control capabilities and operate wirelessly, eliminating the need for close proximity. In situations where human life is at risk, such as hazardous environments, Bluetooth-controlled cars can provide a safe alternative. The main processing unit of the Bluetooth-controlled car is the Arduino UNO board, which serves as the microprocessor. The Arduino UNO board is responsible for controlling the movement of the vehicle through the motor driver that operates the wheels. The programs are compiled using the Arduino IDE and then uploaded to the board using a PC and a USB cable. By making slight modifications to the program, speed variations can be achieved. The car is built on a 4-wheel drive platform and incorporates an ultrasonic sensor to avoid obstacles and line tracer sensors. Additionally, it features an infrared remote controller for manual steering. The car is designed to be upgradable, allowing for the replacement, upgrade, and expansion of input sensors, as well as the addition of other functionalities through the use of additional modules.

LITERATURE REVIEW

Wireless control has become an essential requirement for people worldwide, and Bluetooth technology is widely used for wireless communication. A Bluetooth-controlled car is a vehicle that can be wirelessly controlled using a Bluetooth control system and Arduino. The combination of Arduino and Bluetooth enables control over various devices such as home lighting, air conditioners, and more through mobile phones. Arduino can also play a significant role in smart home systems, as it allows the conversion of digital signals into physical movements through microcontrollers. Autonomous systems are extensively used in various sectors due to their numerous benefits, including reduced risk of injury, speed, continuous operation, and reliability.

A Bluetooth-controlled car is an example of autonomous systems. It finds applications in law enforcement and military operations, where it can be used to mitigate exposure to hazards from a safe location. Police bomb squads, for instance, utilize such vehicles to defuse or detonate explosives. These vehicles are also employed in space exploration by organizations like NASA, ESA, and Roscosmos. They have collected valuable data from space, the moon, and Mars using remote-controlled vehicles. Furthermore, large companies are utilizing remote-controlled vehicles for product delivery, and many industrial facilities have their own remotely controlled transportation systems. In this project, we have connected a four-wheeler vehicle with Arduino

and a Bluetooth module. The remote device has an Android application installed that sends instructions to the vehicle. The application is connected to the module in the vehicle, which transfers the instructions to the Arduino as signals. The Arduino, with its programmed code, interprets the signals and controls the motors, enabling the car to move. While this car currently lacks advanced features, it can be enhanced by adding functionalities such as line detection, obstacle detection, and even a camera for remote viewing. The presented prototype is a basic remote-controlled car, but it can be further developed into an armed or specially capable RC car by incorporating advanced features. The aim of this project was to design an automated vehicle prototype using Arduino and controlled by Android software, capable of manual or automatic navigation. Through research and simulation experiments, it has been determined that the designed prototype can be used for cognitive development. Future users can learn to program custom paths, process logical issues, and perform complex mathematical calculations to achieve desired movements. The financial costs associated with the design are considered feasible, as the components used are relatively inexpensive, especially when produced on a large scale. It is important to note that the programming language for Arduino and the development tools are freely available, eliminating additional costs for project development.

Methodology

TOOLS:

Chassis(Including Motors and Wheels): The main structure of the car comprises the chassis, which provides the framework and support for the vehicle. Additionally, there are four motors, one for each wheel, that enable the car to move.

Figure-01: Chassis (Including motors and wheels)

Arduino Uno: The Arduino Uno is an open-source microcontroller board that utilizes the Microchip ATmega328P microcontroller. It was developed by Arduino.cc. The board features both digital and analog input/output pins, which can be connected to various expansion boards and circuits for additional functionality and customization.

Figure-02: Arduino Uno

L293D Motor Drive H-Shield: The Motor Driver is a module for motors that allows you to control the working speed and direction of two motors simultaneously. This Motor Driver is designed and developed based on L293D IC. L293D is a 16 Pin Motor Driver IC. This is designed to provide bidirectional drive currents at voltages from 5 V to 36 V. Rotation of a motor depends on the enabled pins.

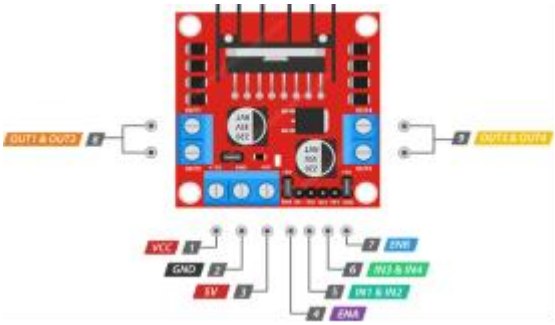


Figure-03: L293D Motor Drive H-Shield

LCD Display: I2C LCD is an easy-to-use display module, It can make the display easier. Using it can reduce the difficulty of making so that makers can focus on the core of the work. A few lines of code can achieve complex graphics and text display features

Figure-04: LCD Display

Pin Diagram & Connection:

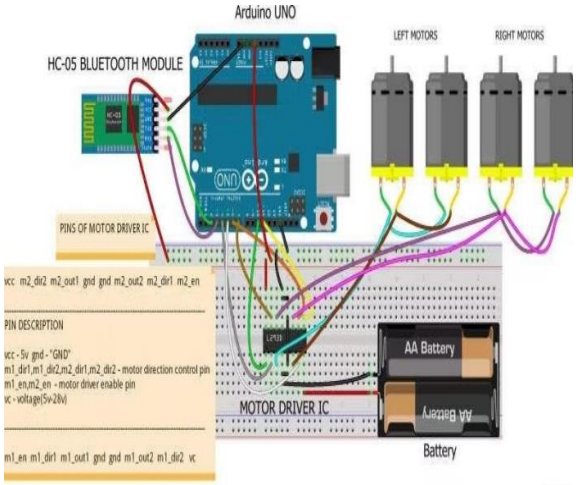
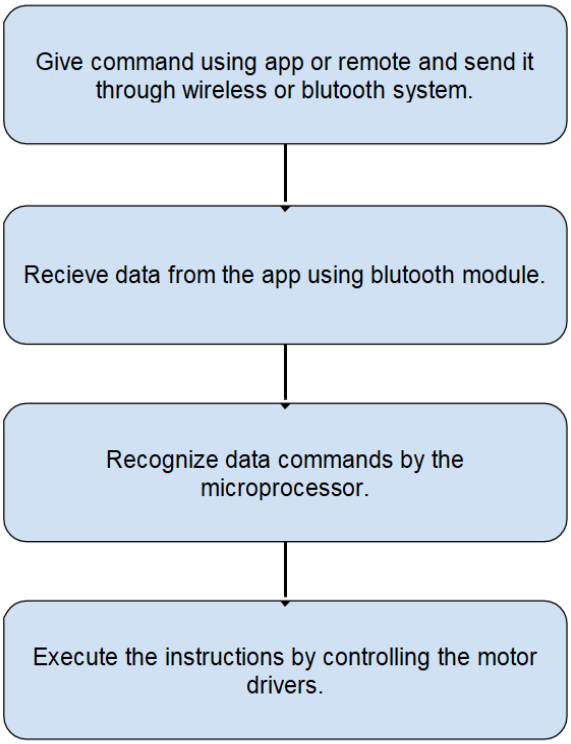


Figure-05: Pin Diagram & Connection

Flow Chart of Implementation:



RESULT

The prototype of the car is designed to utilize four DC motors, which are controlled by an H-bridge with dual output. This configuration allows for connecting the two left wheels and the two right wheels to the respective outputs of the H-bridge. The car can be controlled remotely using either a Bluetooth application or an infrared remote control. The software of the car can be enhanced by incorporating additional functionalities.

One such improvement is the implementation of a better line tracking mode. When the robot encounters an object placed on the line in front of it, it will attempt to navigate around the obstacle until it detects the line again. This feature can be achieved by integrating an ultrasonic sensor into the system.

Another potential enhancement is the inclusion of a custom mode. Currently, the prototype does not support programming directly from the app. However, users can modify the code to create custom functionalities and behaviors.

CONCLUSION

This project showcases a basic prototype of a Bluetooth-controlled car that can accurately respond to user commands, allowing for precise movements such as turning left, turning right, and stopping. Further improvements can be made by incorporating different sensors like ultrasonic or infrared sensors and implementing more advanced coding techniques.

The Bluetooth control system of our car provides a range of 10-20 meters, although the actual range may vary depending on the transmission level of the receiver.

In the future, the project could be enhanced by utilizing rechargeable batteries such as Ni-Cd or Li-ion batteries, which would address the current limitations. Additionally, by integrating additional sensors and updating the code, the car could be transformed into a surveillance system or a rover, essentially turning it into a robot. These robots could operate autonomously under human supervision, reducing the need for manpower. These are just some of the potential alternatives for further improvement and updates to the project.

The Internet of Things (IoT) plays a vital role in both computer technology and our daily lives. The described model demonstrates how the Arduino programs the car's motor module, and by leveraging IoT, we can control the wheels and direct the car. IoT enables us to work with different platforms and empowers us to create various interesting modules and applications.

As we continue to face evolving challenges, it is crucial for our knowledge to expand in order to adapt to these changes. This project represents a small step towards further enhancements and achieving our goals.

REFERENCES

1. Website: https://www.washingtonpost.com/local/trafficandcommuting/driverless-cars-promise-far- greater-mobility-for-the-elderly-and-people-with-disabilities/2017/11/23/6994469c-c4a3- 11e7-84bc-5e285c7f4512_story.html Access Date: 15th May, 2022

2. Website: https://www.arduino.cc/en/Guide/Introduction Access Date: 15th May, 2022

3.Website: https://www.academia.edu/37091561/Bluetooth_Remote_Controlled_Car_using_Arduino Access Date: 17th May, 2022

4.Website: https://create.arduino.cc/projecthub/samanfern/bluetooth-controlled-car- d5d9ca?ref=similar&ref_id=382865&offset=0 Access Date: 17th May, 2022

5.Website: https://www.engpaper.net/arduino.htm Access Date: 21st May, 2022

6.Website: https://www.engineersgarage.com/arduino-l293d-motor-driver-shield-tutorial/ Access Date: 21st May, 2022

7.Website: https://en.wikipedia.org/wiki/Jump_wire Access Date: 21st May, 2022

8.Website: HC-05 Bluetooth Module Pinout, Specifications, Default Settings, Replacements & Datasheet (components101.com) Access Date: 21st May, 2022

9.Website: LCD 16X2 : Pin Configuration, Commands, Interfacing & Its Applications (watelectronics.com) Access Date: 27st May, 2022

10.Website: https://create.arduino.cc/projecthub/theSTEMpedia/4-wheel-robot-made-with- arduino-controlled-using-dabble-4650f7 Access Date: 27st May, 2022

11.Website: (4) Bluetooth Remote Controlled Car using Arduino | International Journal of Scientific Research in Science, Engineering and Technology IJSRSET - Academia.edu Access Date: 27st May, 2022

12.Website: https://www.researchgate.net/publication/355085611_Bluetooth_Car_Controlle d_Using_Arduino Access Date: 27st May, 2022

13.Wang, B.Y. (2009) Summary of IoT Technology Research. Journal of Electronic Measurement and Instrument, 12, 1-7.

14.J. Gubbi, R. Buyya, S. Marusic, M. Palaniswami, Internet of things (IoT): a vision architectural elements and future directions, Future Gener. Comput. Syst. 29 (7) (Sep. 2013) 1645–1660.

15.A. Ibrahim, D. Ibrahim, Real-time GPS-based outdoor WiFi localization system with map display, Adv. Eng. Softw. 41 (2010) 1080–1086.