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Bluetooth Controlled Car

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Abstract: The 21st century is the era in which we currently reside. Right now, the smart phone is the object that matters the most in our daily life. Android-powered smartphones are becoming more powerful and has a growing number of accessories that are beneficial for robots. This project demonstrates Bluetooth connection with a car, specific Bluetooth technology attributes, mobile and robot elements, as well as how to operate a car using a mobile device. We provide a summary of robots that may be moved forward, backward, left, or right by means of an Android app like Arduino or Bluetooth. Bluetooth has changed how people use digital gadgets at home or at work by converting cable-based ones into wireless ones. Here, we're utilising Bluetooth connection, a microcontroller interface, and an Android application. We are using Arduino software to link the Bluetooth module to the microcontroller. Commands issued from an Android device can control robot motion. We came across simple ways to develop a framework for developing an automobile with very low cost although powerful processing and sensing capabilities enabled by a mobile phone used as a control device.

Keywords: Android, Arduino, Bluetooth, Battery, Motor, Wireless, Robotic Car.

1. INTRODUCATION

This paper describes a Bluetooth-controlled Car that runs on an Android application. Our project's primary goal is to use an android application to control the vehicle. Since Bluetooth gives us more efficiency and control, it also has the advantage of allowing us to communicate with any Android device, including phones, tablets, and desktops, at any time. Physical barriers, such as walls, doors, etc., have no effect on how the automobile is driven. Bluetooth is a wireless radio technology that enables a wide range of devices to communicate and collaborate with one another. To finish the work, a programming language in embedded "C" is preloaded on the controller. Related reference papers implementing wireless control of robots have been looked at, as stated in [1–9]. However, there is still a need for an easy-to-implement, cost-effective automation solution. Here is a suggestion for such a cost-effective project.

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2. MATERIAL AND METHODS

Arduino UNO (ATMEGA 328P) and a Bluetooth module are primarily used here (HC-05). To make the system easily controllable by a mobile application, we attach the Bluetooth module to the system. Given the prevalence of eavesdropping and surveillance in modern culture, this effort is more essential. A button on an Android phone is all that is needed to drive the automobile forward, backward, left, and right. In this scenario, a Bluetooth module mounted in the car acts as the receiver and an Android phone as the transmitter. The To guide the car to move in the desired direction, such as driving forward or backward, turning left or right, or halting, an Android phone will use its built-in Bluetooth. The system's design is kept as straight forward as possible. Before creating the project, a few factors, like affordability and simplicity in design, low profile structure, etc., The term "wireless learning technology" in education refers to both the systems used in modern "networked" classrooms and various mobile technology subsets. Hence, the general phrase WLTs include using mobile devices such laptops, tablets, and portable smart phones. [10] were taken into consideration. Our design based to achieve the objective of creating a system that can offer the following features with a straightforward and user-friendly interface:

a. Create an Android app that operates as a robot remote control.
b. Build a Car that will make travelling easier.
c. In this paper, the latest Android technology is emphasized.
d. The current technologies that can be used to benefit humans include mobile, robots, and Bluetooth.
e. The Arduino UNO, a Bluetooth module, battery, and a motor driver IC make up the project's
f. The Arduino UNO board is connected to the Bluetooth module to establish a connection with the user.

The following components build up the system:
a) Arduino UNO (ATMEGA 328P)
b) Motor Driver Shield (L293D)
c) Bluetooth module (HC-05)
d) A Mobile phone
e) Li-on battery (18650)
f) Li-on battery holder
g) Arduino software (version 10.14)

The following is a description of the project's fundamental building blocks:
Arduino UNO
A microcontroller will act as the robot's brain. The robot's movement will be controlled by the microcontroller. This system will utilise an Arduino UNO microcontroller with an ATMEGA 328P microcontroller chip (Figure 1). Programming in Embedded C is used to execute a programme. a USB port, a power connector, an ICSP header, a reset button, and a ceramic resonator operating at 16 MHz.

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Fig. 1. Arduino UNO

Motor Driver Shield

This extension shield has the ability to control 4 servos, 2 DC motors, and 1 stepper motor. The shield only has to be plugged into the Uno or Mega2560 board. It is powered by two sources: the output of the control board when it is linked to a control board; and an external supply for the Motor Driver Shield and the control board when driving a large-current motor. On the shield, there is a signal LED. You can turn the shield off using the switch when it's not needed, and it won't affect how the control board operates. 6.5V to 12V is the operating voltage. Here we the Motor Driver Shield control (Figure 2) as the operating remote of this system.

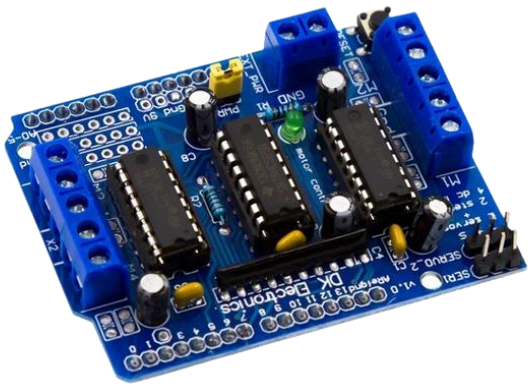

Fig. 2. Motor Driver Shield.

Bluetooth Module (HC-05)

The Bluetooth module will serve as the smartphone's interface with the Arduino. The system will make use of the Bluetooth HC-05 module, which may be used as a transmitter or receiver.. In most cases, our Bluetooth module will serve as the receiver and our smartphone will act as the transmitter (Figure 3). The Bluetooth module will be used by the Arduino to receive commands from the smartphone. A Bluetooth module called HC-05 is created for wireless communication. This module may be set up as either a master or a slave. It is utilised in several consumer applications, including wireless headsets, game controllers, wireless mice, wireless keyboards, and many more. Depending on the transmitter and receiver, environment, geographical area, and urban settings, the range can go up to 100m.

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Fig. 3. Bluetooth Module

Mobile Phone

The smartphone serves as the circuit's transmitter. It sends data to the microcontroller via the Bluetooth module. Sending the Arduino directions for moving forward, backward, left, and right is also helpful. In reality, this system's remote is a smart phone. This system's operating remote is the Bluetooth RC Controller app (Figure 4). The benefit of this project is that it keeps the Android application software elegant and simple while yet including all required built-in functionalities. What makes it special is how straightforward the design and functionality.

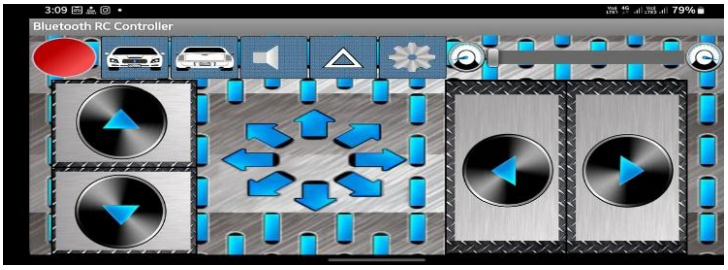

Fig. 4. Mobile Phone Application

Li-on Battery (18650)

This 1200mAh 18650 battery is authentic. A Li-ion rechargeable battery with a 1200mAh capacity is the 18650 Battery. Although it is not a regular AA or AAA battery, this one is highly helpful for devices like Car cameras, DVD players, iPods, and others that need high current either continuously or briefly.

Fig. 5. LI-on Battery

Li-on battery holder

For 3.7V, high energy, lightweight mobile electronics, industrial, and telecom applications, Keystone Electronics 18650 Battery Holders are ideal because they provide circuit protection to prevent battery damage. The 18650 battery holders are made to resist the punishment that comes with mistreatment and repeated charging cycles for 18650 Lithium-ion cell usage. To provide stability during wave soldering, the holders include snap-in PC connections, and they are clearly labelled with polarity identification to ensure appropriate alignment**.**

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Fig. 6. Li-on Battery Holder

Arduino software

microcontroller with instructions for all of the system's operations. Here, the coding is done in the C programming language. The C programming language was used to launch the project's execution code. The programming is burnt into the Arduino using burner software. With this application, we input the details and guidelines for this system's forward, backward, left, and right movements. The Bluetooth module (HC-05) on the Arduino board receives a matching signal when we press a button in an Android application. When signal data enters the Arduino, the pin that corresponds to that input is set to high. The output from that pin is now received by the motor driver component. The data bit controls how the motor driver switches; when the data bit is low, the corresponding motor driver pin is inactive; when the data bit is high, the corresponding motor driver pin is active. Programming consists of two phases. In the first setup phase, all the variables are defined. The second loop is a continuous loop where the programme runs.

The Arduino software (Figure 7) is used to programme the

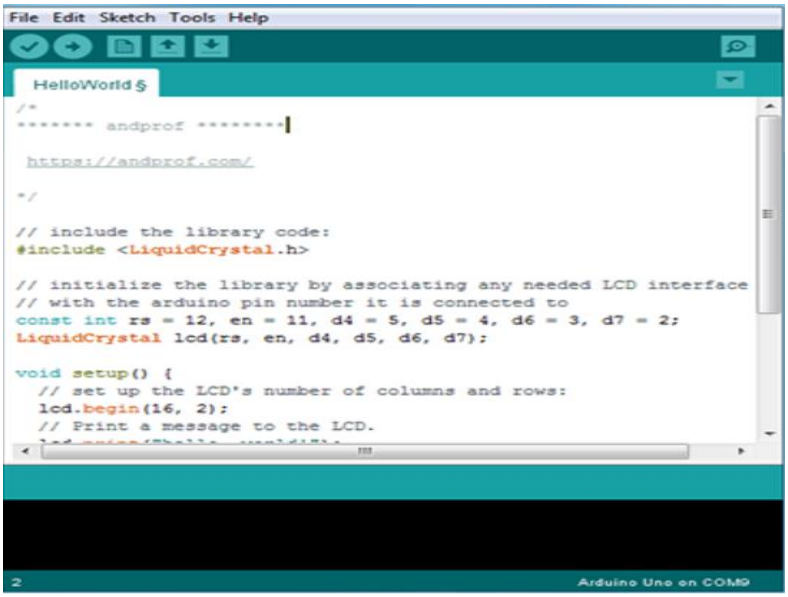

Fig. 7. Arduino software.

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3. RESULTS AND DISCUSSION

The fundamental concept is kept as straightforward as possible. Figure 8's circuit diagram of the system connectivity has been used to explain the functioning principle of the circuit. A DC power supply is required to run the system. The Bluetooth module and the microcontroller are both powered by the DC power supply. The Android smart phone's loaded application program, which was written in C, sends a signal to the Bluetooth module. Thus, the microcontroller transmits commands that, when carried out, aid in the operation of the motor driver. The android-based application software may be used to control the movement and operation of the motor. Hardware for the project includes an Arduino UNO, a Bluetooth module, and a motor driver IC. To communicate with the user, the Arduino UNO board is connected to a Bluetooth module. The board gets data for monitoring and controlling a specific motor through the Bluetooth module, which it then processes correctly. The motor driver IC, which manages the particular motor, receives the output from the Arduino after that.

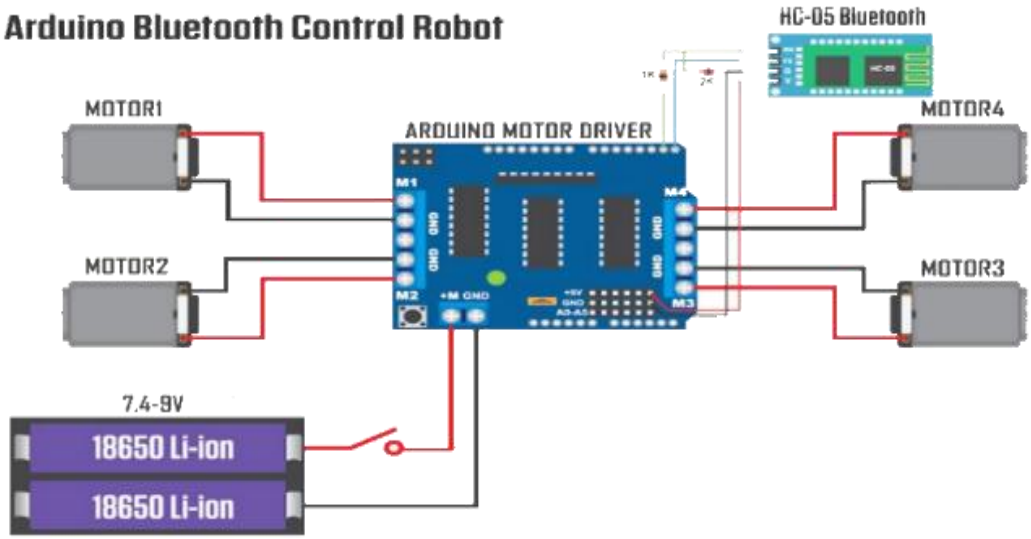

Fig. 8. Circuit diagram

Here, we first build the circuit as seen in Figure 8. The commands are then entered into the ATMEGA 328P Arduino UNO through the data connection. These instructions assist the Arduino in communicating with both the motor driver IC L293D and the Bluetooth module HC05. In this case, the Bluetooth module serves as a receiver to take instructions from the smart phone (remote or transmitter). The microcontroller then chooses how to carry out the instructions received from the smartphone. The microcontroller controls the operations of the instructions delivered. The instructions are sent by the smart phone. We can easily control the movements of the dc motor. The motors stay stopped until we give the Arduino any instructions. When a command is delivered, the motors move in accordance with the microcontroller's preloaded functions. Figure 8 depicts a summary of the Bluetooth-based smart phone control CAR project as a whole. Table 1 depicts a test case of car. (2. Paul, n.d.)

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TEST CASE	INPUT DATA	EXCEPTED OUTPUT	ACTUAL OUTPUT	STATUS
Bluetooth Connectivity	Device Pairing	Connection Established	Connection Established	Pass
Forward Movement	Forward Movement Button	Forward Movement	Forward Movement	Pass
Backward Movement	Backward Movement Button	Backword Movement	Backword Movement	Pass
Right Side Movement	Right Analog Button	Right Side Movement	Right Side Movement	Pass
Left Side Movement	Left Analog Button.	Left Side Movement	Left Side Movement	Pass
Stop	Stop Button	Stops The Car	Stops The Car	Pass
360 Mode	Center Button	360 Movement	360 Movement	Pass

Table 1. Test case of Bluetooth car

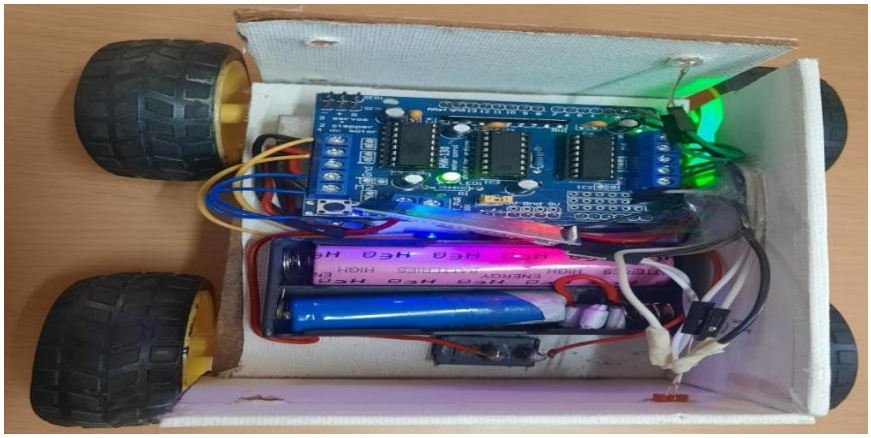

Fig 8. Bluetooth car

The Bluetooth module has a range of less than 100 metres, which we want to increase in the future. This system's primary power source is a 3.7 V DC battery and V, 200 RPM DC motors. The motors stay stopped until we give the microcontroller any instructions. When a command is delivered, the motors move in accordance with the microcontroller's preloaded functions. Figure 8 depicts a summary of the Bluetooth-based smart phone control robot project as a whole.[1]

Application of IoT based Bluetooth car

In India, there must be at least two to three employees dying every day within manholes. India has significantly improved public health and decreased death rates in recent years. As an illustration, India's infant mortality rate dropped from 66 per 1000 live births in 2000 to 28 per 1000 live births in 2019. In a similar vein, the death rate for children under five has dropped from 92 per 1000 live

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births in 2000 to 34 per 1000 live births in 2019.[18] A new IoT based cutting-edge option that can assist for the increase of the efficacy and efficiency of drainage cleaning operations in India, which will help to reduce the mortality of cleaning staff of municipal corporation. The IoT based car will be equipped with sensors, which will analyse the level of oxygen and carbon dioxide in the drainage pit. [17]. In order to monitor the drainage system's condition and make sure it is clear and unobstructed, sensors and other IoT devices are used. The employment of a vehicle fitted with sensors and cameras that can gather information on the state of the drainage system as the car goes through it is one of the fundamental elements of an IoT-based drainage cleaning system. The areas that require cleaning or repair may subsequently be identified using machine learning algorithms that analyse the data provided by the sensors. Additionally, by eliminating the need for human inspections and cleaning procedures, an IoT-based drainage cleaning system may increase safety. Operators may monitor the drainage system from a safe distance and steer clear of any dangers by employing a vehicle fitted with sensors and cameras.

4. CONCLUSION

This project is both economical and effective. The unique feature of this project derives from the fact that it is more reasonably priced than other projects and has an easy-to-use user interface. Additionally, the Bluetooth RC Controller application is easier to use. The robot can be utilized for surveillance because of its tiny size. This robot may be used by the army to locate and detonate concealed land mines with a few changes and enhancements. The robot may be employed to keep an eye out. In the future, we can attach sensors to this robot to allow it to monitor certain traits, and we can leverage the Internet of Things (IoT) to improve productivity. To include additional security elements, we may also add a Wi-fi Module.(Maity, 2017)

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