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A MINI PROJECT REPORT ON

"VOICE CONTROLLED ROBOTIC CAR"

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FOR
THE AWARD OF DEGREE IN

BACHELOR OF ENGINEERING
IN
ELECTRONICS AND COMMUNICATION ENGINEERING

SUBMITTED BY

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CERTIFICATE

This is to certify that the project work entitled "**VOICE CONTROLLED ROBOTIC CAR**" carried out by **MOHAMMED UMAR(1SJ19EC101), MAHESH S(1SJ19EC095), PETA SUKUMAR (1SJ18EC112)** are the bonafide students of S.J.C Institute of Technology in partial fulfilment for the award of the degree of **Bachelor of Engineering** in **Electronics and communication Engineering** of the **Vishweshvaraya Technological University, Belagavi** during the year **2021-22.** It is certified that all corrections or suggestions indicated for internal assessment have been incorporated and deposited to department library. The mini project report has been approved as satisfied academic requirements in respect of project work prescribed for Bachelor of Engineering.

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ABSTRACT

In this research paper, a system is being proposed, which focuses on the concept of how a robot can be controlled by the human voice. Voice control robot is just a practical example of controlling motions of a simple robot by giving daily used voice commands. In this system, an android app is used as a medium for the transmission of human commands to micro-controller. A controller can be interfaced with the Bluetooth module through the UART protocol. The speech is received by the android app and processed by the voice module.

Voice is then converted to text. The microcontroller will further process his text, which will take suitable action to regulate the robot. The objective is to design a robotic car whose basic movements such as moving forward, turning to left or right can be controlled by the human voice. The Hardware Development board used here is the AT mega Arduino board. The software part is done in Arduino IDE using Embedded C. Hardware is implemented, and software porting is done. Generally, recognition of human voice using some kind of module cost way too much.

After performing an ample amount of studies on controlling robots, we came to the conclusion that yes, there exists a simple and very efficient way to manipulate robots through our voice. This is an ergonomic approach for the ease of robotic application. Such types of robots will provide great helping hands while performing multiple tasks. The result of our studies also shows that there still exists plenty of space for further research and development

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By seeking the blessings, we submit our humble pranams at the lotus feet of his holiness **Sri Sri Sri Dr Nirmalanandanatha Mahaswamiji** and Mangalanatha Mahaswamiji.

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CHAPTER 01

1.1 INTRODUCTION

In this project, the robot basically works on human speech command. The Voice Control Robot is controlled by using voice command which is directly given by user to the robot. We can say, this is a wireless robot. The android application is installed in smartphone which works as a transmitter. The commands are given by this android application. The android application AMR Voice is use to recognize the Arduino using a Bluetooth link. The Bluetooth module (HC-05) which is connected to the Arduino.

As we know that Arduino is programmable, so we have to do the programming using C or Java Language. When the programming of Arduino is done, we connect all the connection as required for the robot. Hence we connect Android application (AMR Voice) and Bluetooth module (HC-05) using Bluetooth link. The commands are given by the AMR Voice by the user. These commands are received by Bluetooth module and Arduino perform the operation according to the given commands. The given command by the user is converted into digital form. These commands can be Left, Right, Backward, Forward or Rotation of Robot etc. The range of this robot is up to 100 meters. If we want to make this for a certain purpose the range can be increase.

This project is related to a Voice controlled car, which makes speech an important part of this project for identifying commands and delivering them to the car via a wireless system. Identification of speech is also called as “automatic speech recognition” (ASR). Wireless numerical data distribution microprocessor to microprocessor, the control of several motors using microprocessors.

Robotics is an evolving technology. There are Various approaches to build robots, and no one is sure which method or technology will be used 100 years from now. Robotics is evolving like the Darwinian evolutionary theory of survival of the fittest. It’ll be connected to the motors and other alternative components of car. When the Bluetooth app is turned on and is connected with the current system via Bluetooth, one will operate the car by giving wireless commands from the app using the functions already programmed in the app. The vehicle will motion in four directions: Forward, Backward, Right and Left.

1.2 OBJECTIVES:

- Phase 1

  We worked for two months on the objective which allows the user to control the robotic vehicle remotely by using their voice to provide instructions and commands.

- Phase 2

  In this phase we thought of an idea to help the people who are unable to drive cars physically, it took us 1 month to get a positive result.

- Phase 3

  In this phase we developed a remote user interface which can control robotic cars via a wireless technology.

1.3 PROBLEM STATEMENT:

- People who historically have difficulties with driving, such as disabled people and older citizens, as well as very young, would be able to experience the freedom of car travel.
- Most people lack the basic driving skills, which in turn leads to accidents.
- Robotic vehicles are not hands-free and takes time for data input operations.
- Sometimes heavy traffic may cause the drive to panic, in case if the person is a beginner.

1.4 METHDOLOGY:

- The block diagram of the simple voice controlled robotic vehicle is given it consists of the smartphone that recognizes the voice commands and are being wirelessly transferred to the Bluetooth module HC05. The module at that point changes over the order to content and the series of characters are sent to the Arduino for additional handling. The Arduino microcontroller decodes the string got and correspondingly performs further capacities. The signals are sent to the motor that hence powers and drives the motors connected to it.
- On the Transmitter area, commands are given to the Mobile Application through the mic. This portable handset is associated with the moving vehicle by means of Bluetooth module. The portable application utilized, is modified so that the voice orders given to the handset are received by the mic and these simple voice orders are changed over to advanced word successions (A to D transformation). These stored sequences are than transmitted to the robotic vehicle via Bluetooth transceiver module and are sent to the transceiver controller. Android application transceiver is used to decode the received signal with the Bluetooth module.

1.5 LITERATURE SURVE

Authors: Mrumal K Pathak et.al

In this paper is to furnish amazing computational android stages with less difficult robot equipment design. This paper depicts how to control a robot utilizing portable through Bluetooth communication, a few highlights about Bluetooth innovation, segments of the versatile and robot. It presents an audit of robots constrained by smart phone by means of moving the robot upward, reverse, left and right side by the android application, for example, Arduino, Bluetooth.

Authors: Aniket R. Yeole et.al

In this paper they have structured a robot that can be controlled using an application running on an android smartphone. It sends control order by means of Bluetooth which has certain highlights like controlling the speed of the engine, detecting and sharing the data with telephone about the bearing and separation of the robot from the closest hindrance.

Authors: Ritika Pahuja, et.al

A robot is normally an electro-mechanical machine that is guided by PC and electronic programming. Numerous robots have been worked for producing reason and can be found in production lines around the globe. This paper build up the remote fastens in the android application which control the robot movement with them. What's more, in which Bluetooth communication is use to interface controller and android. Controller is interfaced to the Bluetooth module however UART convention.

CHAPTER 02

BLOCK DIAGRAM AND ITS DESCRIPTION

2.1 Shows the block diagram of the voice controlled robotic car:

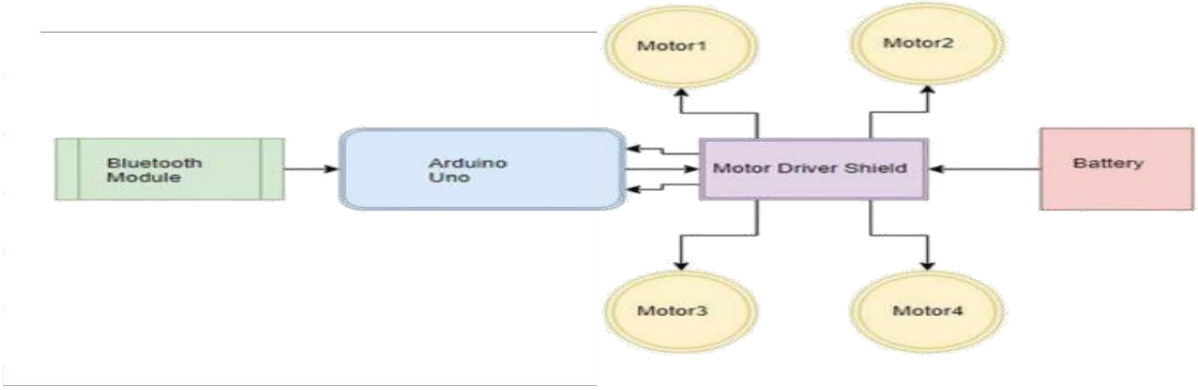

Figure1: Block diagram of Voice controlled robotic car.

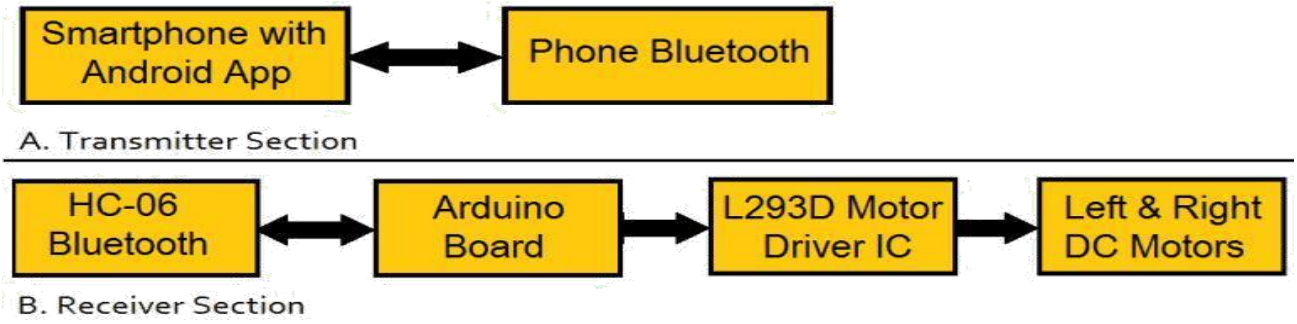

Figure 2.2. Block diagram of Transmitter and receiver section in Arduino uno.

DESCRIPTION:

The block diagram of this project is given in Fig.1. The basic block diagram of Voice control robot using Arduino given consists of an android phone that recognize the command and transmit to the Bluetooth module via Bluetooth link. The user gives the command via AMR voice and this command is transferred to the Bluetooth Device. According to the given command Arduino UNO R3 receives the instructiona and operates on it. To perform all these operations it requires 12volt of power supply.

The Arduino Wireless Voice Controlled Robot comprises of a transmitter and a beneficiary segment. The transmitter end comprises of Smartphone Bluetooth and the Android application introduced on it. Thus, the Receiver area has Arduino board as the processor, HC-05 Bluetooth Module as a remote communication module, L293D for driving engines, and a couple of DC designed as a section for moving robot.

CHAPTER 03

SOFTWARE AND HARDWARE REQUIREMENTS

3.1 SOFTWARE REQUIREMENTS:

- **Arduino IDE:**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online (3.1).

- **The Android App:**

Android smartphone with an application is the transmitter end. At first, there should combine of Bluetooth HC-05/HC-06. When matching is done, at that point it should be associated. When the application is running in the smartphone, the client's voice orders are distinguished by the phone microphone (3.2).

3.2 HARDWARE REQUIREMENTS:

- **Arduino Uno:**

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. . Its products are licensed under the GNU Lesser General Public License or the GNU General Public License.

Figure 3.1 Arduino Uno.

- **Bluetooth Module**:

HC-05 module is simple to use Bluetooth SPP (Serial Port Protocol) module, designed for clear wireless serial association setup. The HC-05 Bluetooth Module is utilized in a Master or Slave configuration, creating it a good resolution for wireless communication. The Bluetooth module at the other end receives the data and sends it to Arduino through the TX pin of the Bluetooth module (RX pin of Arduino).

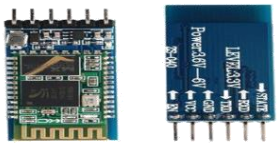

Figure 3.2 Bluetooth Module.

- **Arduino Cable:**

USB cable type A/B. Use it to connect Arduino Uno, Arduino Mega 2560, Arduino 101 or any board with the USB female A port of your computer.

Figure 3.3 Arduino Cable

- **Motor Driver Module (L293D):**

Sun Founder L293D is a monolithic integrated, high voltage, high current, 4-channel driver. Basically this means using this chip you can use DC motors and power supplies of up to 16 Volts, thats some pretty big motors and the chip can supply a maximum current of 600mA per channel, the L293D chip is also what's known as a type of H-Bridge. The H-Bridge is typically an electrical circuit that enables a voltage to be applied across a load in either direction to an output, e.g. motor.

Figure 3.4 Motor Driver Module (L293D).

- **DC MOTOR:**

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

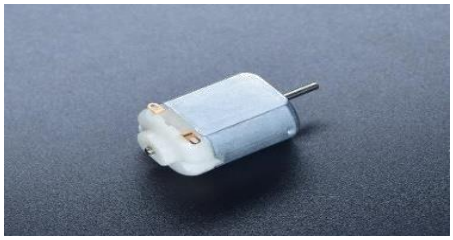

Figure 3.5 DC motor.

- **Robot chassis:**

The chassis is the structural component for the robot which contains the drivetrain and allows the robot to be mobile by using wheels, tank treads, or another method. A chassis is sometimes referred to as the robot's frame.

Figure 3.6 Robot chassis.

- **Caster Wheel:**

A caster (or castor) is an undriven wheel that is designed to be attached to the bottom of a larger object (the "vehicle") to enable that object to be moved. Casters are used in numerous applications, including shopping carts, office chairs, toy wagons, hospital beds, and material handling equipment. High capacity, heavy duty casters are used in many industrial applications, such as platform trucks, carts, assemblies, and tow lines in plants.

Figure 3.7 Caster Wheel.

- **Connecting wires:**

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.

Figure 3.8 Connecting wires

- **9V battery and connector:**

The nine-volt battery, or 9-volt battery, is a common size of battery that was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top.

Figure 3.9 9V battery and connector

CHAPTER 04

FLOW CHART

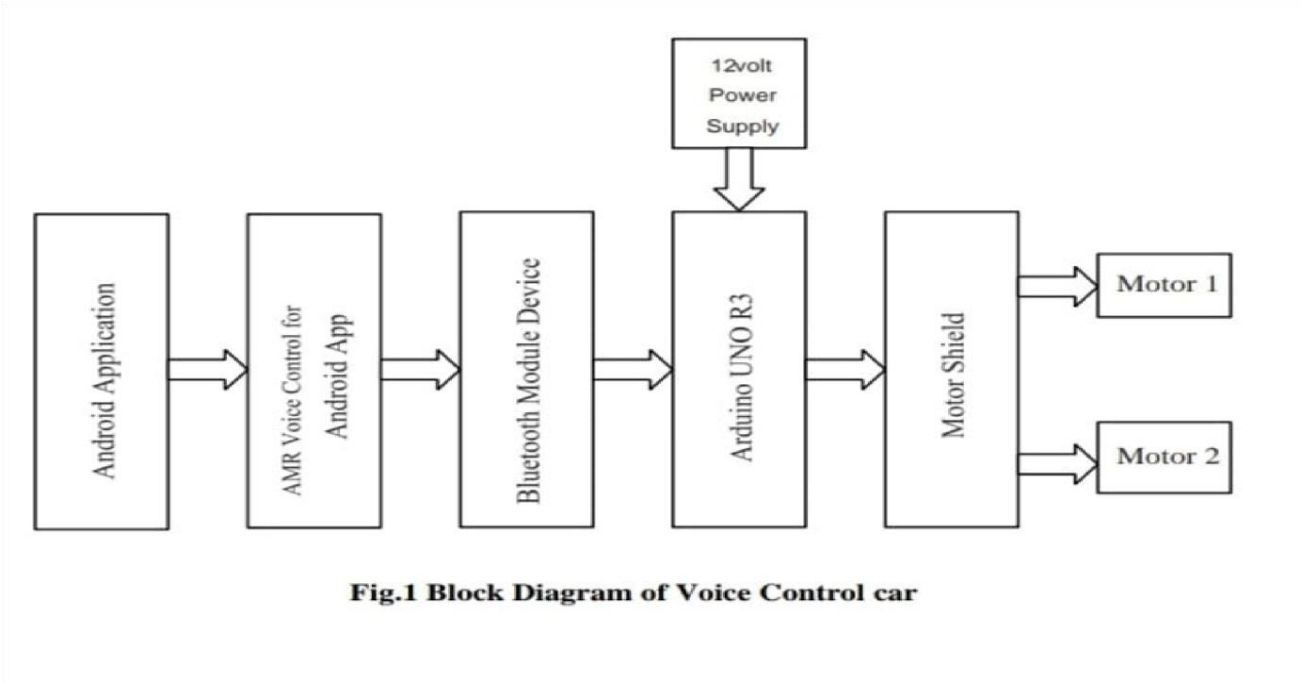

Fig.1 Block Diagram of Voice Control car

Figure 4.1 Flow chart.

Algorithm:

- Start
- Establish Bluetooth connectivity between Android Application and the Bluetooth module on the robot.
- Check whether the device is connected.
- If connected, give the pre-defined instructions/commands to the micro-phone of the mobile handset.
- The voice commands should be trained to the Easy VR module.
- Then the stored voice commands are represented in the form of binary numbers such as move forward – 001, move backward – 010 etc.
- These binary values are transmitted via Bluetooth module which is a transceiver.
- The transmitted binary values are then received by another Bluetooth module which is present on the receiver side.
- Microcontroller will take those binary values and performs action (servo motors) according to the binary values.
- If failed to connect at step 3 than again go to step2.
- Stop

CHAPTER 05

RESULTS AND DISSCUSION

Through our Design and implementation of our proposed system, we are able to achieve the following as results:

- Robot is controlled through voice commands given by the user who is operating the project.
- These voice command needs to be given through an android app which is installed on the users android mobile.
- Speech recognition is done within the android app and then a respective command is sent to the voice-controlled robot vehicle.
- Microcontroller fitted on the Vehicle decodes these commands and gives an appropriate command to the motors connected to the vehicle.
- Voice controlled car is working and all the functions are followed by the bot

CHAPTER 06

APPLICATIONS AND ADVANTAGES

6.1 APPLICATIONS:

- This can be used by the people who are handicapped.

  People who are physically handicapped will be able to control the vehicle through their voice. Except for the cases where the person is dumb.

- By commanding the robot, we can send it to places where humans can't reach, like highly toxic areas or any bio hazardous places etc.
- For military purpose.

  Places like war zones, uneven surfaces or any other situations, it's difficult to spot the enemy base, then this vehicle comes in handy to spot them.

- For agriculture purposes.

  By standing in a particular place, we can communicate with the robot and complete the fertilization of the entire farming land.

- To carry small object from one place to other.

6.2 ADVANTAGES:

- The Robot is small in size, therefore less space required.
- We can access the robot vehicle from the distance of meters as we are using Wi-Fi for the connection between robot and the server PC.
- As we are using cameras which is attach to the robot, it will be able to capture images as well as record videos which can be used for security.
- Low power consumption.
- Reduce accidents done by improper driving of people and also available for elderly and disabled people.
- The robot is useful in places where humans find difficult to reach but human voice reach. Such as in fire situations, in highly toxic areas.
- The robot can be used for monitoring or investigation.
- The voice controlled robotic car can be easily driven by unskilled driver by the help of voice commands along with an android application in smart phone.

CHAPTER 07

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION:

The proposed framework of our project shows that how a robot can be control utilizing Bluetooth. The voice controlling orders are effectively transmitted through Bluetooth innovation and the desired activities effectively happen. This task lessens human endeavours at spots or circumstances where human intercessions are troublesome. Such frameworks can be brought into utilization at spots, for example, businesses, military and guard, investigate purposes, and so forth.

The voice-controlled robot is an easy programmable (software) project. This project operated on human voice command with android application. The implementation of this project is easy, so this robot is beneficial for human life. The Voice Control Robot is useful for disable people and monitoring purpose. It works on simple voice command, so it is easy to use. It is useful for those areas where humans can't reach. We can implement Image processing in this robot, so that we can detect the color of the object or targeted system. The size of this robot is small, so we can use this robot for spying purpose. It can be used for surveillance. We can implement web cam in this robot for security purpose. The voice recognition software has an accuracy of 76% for identify a voice command and it is also highly sensitive to the surrounding noise.

7.2 FUTURE SCOPE:

- This task work has been limited to short range Bluetooth module. Utilizing a long-range modules and other availability gadgets will bring about network with the robot for significant distances.
- Picture preparing can be executed in the robot to distinguish the shading and the items.
- A warm camera can be introduced to detect the warmth produced by bodies valuable in military purposes to distinguish foes on the lines.
- Programmed Targeting System can be executed in the robot for following the objective.
- Further upgrade in venture can be utilized for home security and military purposes where the orders can be given to robot without chance by expanding the range and by introducing cameras.
- The robot is valuable in places where people discover hard to reach however human voice comes to. For example, in fire circumstances, in profoundly poisonous zones.
- It is the one of the significant phase of Humanoid robots.
- Discourse and voice acknowledgment security frameworks.
- The robot can be used for monitoring or investigation.

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