VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belagavi-590018

Mini Project Report

on

"Voice-Controlled Robot using Arduino"

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Under the Guidance of

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Accredited by NAAC with Grade A+
Udayapura, Kanakapura Road, Bengaluru-560082

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Department of Electronics and Communication Engineering

CERTIFICATE

This is to certify that the mini project work entitled **"Voice-Controlled Robot using Arduino"** carried out by **Aditi Jaiswal (1DT20EC003), Aditi Mitra (1DT20EC004), Damini Kashyap (1DT20EC012), Diksha Kumari (1DT20EC013),** a bonafide student of **DAYANANDA SAGAR ACADEMY OF TECHNOLOGY AND MANAGEMENT** in **Bachelor of Engineering in Electronics and Communication Engineering** of the **Visvesvaraya Technological University, Belagavi** during the year 2021-2022. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The mini project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

Signature of the Guide	Signature of the Coordinators	Signature of the HoD
Dr. Ravikumar HC	Dr.R V Manjunath	Dr.Mallikarjun P Y

External Viva

Name of the examiners	Signature with date
1	
2.	

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Yours Sincerely

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ABSTRACT

This project aims to develop a voice-controlled personal assistant robot that reduces manual efforts in day-to-day tasks. The robot is controlled through voice commands using an Android application and a microcontroller. Bluetooth technology facilitates the communication between the application and the robot. The movement of the robot is achieved using two DC servo motors connected to the microcontroller on the receiver side. The Bluetooth RF transmitter converts the commands from the application into digital signals, which are transmitted to the robot within a range of approximately 100 meters. At the receiver end, the data is decoded and fed to the microcontroller, which drives the DC motors for the necessary tasks. The voice-controlled personal assistant robot project addresses the growing demand for smart and autonomous systems that can perform tasks in various settings, such as homes, offices, and public spaces. By integrating voice control capabilities, the project offers a user-friendly and intuitive interface, enabling users to interact with the robot using natural language.

TABLE OF CONTENTS

LIST OF FIGURES AND FLOWCHART

CHAPTER 1

INTRODUCTION

In recent years, advancements in robotics and natural language processing have paved the way for innovative human-robot interaction technologies. One such breakthrough is the development of voice-controlled robots, which enable users to communicate with robots effortlessly through voice commands. This project aims to design and develop a voice-controlled robot that can perform various tasks based on user instructions, revolutionizing the way we interact with robots and expanding their potential applications. Speech signals are the most important means of communication in human beings. Almost every conversation to interact is done by means of voice signals. Sounds and various speech signals can be converted into electrical form using a microphone. Voice recognition is a technology which is used to convert the speech signals into a computer text format. This voice recognition technology can be used to control and generate speech acknowledgement using some external server. Robot voice has the ability to understand thousands of voice commands and perform required action. The voice recognition is a bit difficult task because each person has his own accent. For that, Robot voice uses Bit Voicer Server which supports 17 languages from 26 countries and regions. In this project, we have developed an assistant robot that can be operated using speech commands. The primary objective of this project is to develop a voice control system that allows the robot to execute predefined commands based on user voice input. By speaking specific commands, users can control the robot's movements, such as moving forward, turning, or stopping. This provides a more intuitive and interactive experience compared to traditional manual control.

1.1 PROBLEM STATEMENT

Develop a voice-controlled robot using Arduino to enable intuitive and hands-free interaction, thereby enhancing user experience and expanding the capabilities of robotic systems. Traditionally we used wired and wireless method for the movement of robot but in this project, we are voice commands for the moment of robot.

The main problem addressed by this project is the lack of a user-friendly and efficient voice-controlled robot that can perform various tasks. Current voice-controlled systems

often suffer from limited functionality, poor recognition accuracy, and inadequate responsiveness. These limitations hinder the practicality and usability of voice-controlled robots, limiting their potential applications in both professional and personal environments.

1.2 MOTIVATION

Human-Machine Interaction: Voice-controlled robots offer a natural and intuitive interface for human-machine interaction. By utilizing speech recognition technology, these robots can understand and respond to verbal commands, allowing users to communicate with them in a more convenient and natural manner. This improves the overall user experience and facilitates seamless integration of robots into our daily lives.

Accessibility and Inclusivity: Voice-controlled robots have the potential to benefit individuals with disabilities or limited mobility. By enabling control through voice commands, these robots can empower people who may have difficulty using traditional interfaces. This technology promotes inclusivity and allows a wider range of individuals to interact with and benefit from robotic systems.

Hands-Free Operation: Voice-controlled robots offer the advantage of hands-free operation, allowing users to perform tasks while keeping their hands free for other activities. For example, in a kitchen environment, a voice-controlled robot could receive commands to perform specific tasks without the user having to physically interact with the robot, enabling multitasking and improving workflow efficiency.

Technological Advancements: With the rapid progress in speech recognition, natural language processing, and robotics, the development of voice-controlled robots represents a significant technological advancement. By undertaking this project, researchers and engineers can contribute to the field's advancement and explore new possibilities for integrating voice control with robotic systems.

Market Demand and Potential Applications: Voice-controlled robots have the potential for various applications across industries, including home automation, healthcare, entertainment, customer service, and more. Meeting the market demand for intelligent and interactive robotic systems, particularly those with voice control capabilities, opens up opportunities for commercialization and societal impact.

Overall, the motivation behind the voice-controlled robot project lies in improving human-robot interaction, enhancing accessibility, increasing efficiency, and exploring the potential of voice control technology to revolutionize the way we interact with and benefit from robotic systems in various domains

1.3 OBJECTIVES

- To provide a more intuitive and efficient method of controlling a robot using voice commands.
- To develop a voice-controlled robot system using an Arduino board and other electronic components.
- To design and implement a speech recognition through an android application that can detect and interpret voice commands accurately.
- To program the Arduino board to receive the voice commands from the speech recognition module and translate them into robotic movements.
- To demonstrate the effectiveness of the voice-controlled robot system in controlling the movements of a physical robot.

CHAPTER 2

LITERATURE REVIEW

1)"Voice Controlled Robot Vehicle Using Arduino"

Author(s): Kantakar Sampath Kumar, Pinkesh Santhosh Reddy, Manchala Rajiv Vikram Revanth,Dr. Krishna

Publication year: 2022

Publication title: International Journal for Research in Applied Science and Engineering Technology

This project was created in such a way that voice instructions are used to control the robot. For required duties, an android application with a microcontroller is employed. Bluetooth technology facilitates the connection between the android app and the automobile. The robot is operated by the user's spoken orders or buttons on the application. The two dc servo motors attached to the microcontroller on the receiver side aid the robot's movement. The Bluetooth RF transmitter converts the commands from the application into digital signals at a range of about 100 metres to the robot. The data is deciphered by the receiver and supplied to the microcontroller, which controls the DC motors to perform the required job. The goal of a Voice Controlled Robotic Vehicle is to complete a task by listening to the user's commands. For the user to operate the robot smoothly, a prior preparation session is required. A code is used to give instructions to the controller in the same.

2)"Voice Controlled Vehicle Using MQTT Server"

Author(s): N Ayush Ubale,Pranavya M U

Publication year: 2021

Publication title: International Journal for Engineering Applied Science and Engineering Technology

The voice-controlled vehicle was created to make human work easier, since we live in an artificial intelligence-driven world where robots perform many tasks. The human voice is used to drive the vehicle. A stable android mobile application built with android studio software transmits the speech. It's essentially a Wi-Fi link. Using the mobile application, we can operate the vehicle with our voice from anywhere. The NodeMCU IoT framework is free and open source. It includes firmware for the ESP8266 Wi-Fi module, a Espressif Systems SoC, and ESP-12 module hardware. With the application that has been created, human work may become simpler. Since the vehicle will be linked to Wi-Fi, we will be able to access it from any location in our project. He or she will use the Android application to send commands or voice commands such as forward, backward, left, right, left forward, left backward, right forward, right backward, and right forward, right backward. The pins have been connected to the NodeMCU esp8266, and the code to control the car has been written. When an object or vehicle inhibits the car's movement, an ultrasonic sensor is used to stop it.

The voice is recognised and forwarded to the HiveMQ server, where it is processed. HiveMQ's MQTT broker is optimised for cloud native deployments to take advantage of cloud resources.

3)" Hand gesture recognition and voice controlled robot"

Author(s): M. Meghana, Ch. Usha Kumari, J. Sthuthi Priya, P. Mrinal, K. Abhinav Venkat Sai, S. Prashanth Reddy,K. Vikranth, T. Santosh Kumar

Publication year: August 2020

Publication title: Materials Today:

Print ISSN: 2214-7853

The main motivation to this work is that there are still no robots which have both hand gesture recognition for the people who are not able to speak and can give commands input through gestures [2–6]. For the physically challenged combined with voice recognition using simple Bluetooth module and a voice that is presenting every smart phone. This will be mainly helpful for the people who are blind industries but are also used by the disabled. The robots that are controlled either by hand gestures or and can't do work on their own and are always dependent [7]. So, this system comprises of both the hand gesture recognition feature as well as voice controlling features. This robot is designed in such a way that it can be used by the people who cannot see or hear. The main aspect of the work is to construct and update the existing protocol which is not only used in voice recognition are known for using a multi-DOF robotic hand [8,9]. Sensor is attached to any body part that has moment and thus helps in sensing the directions through which the robot has to move. The gestures given by the robot are copied in real time. In case of voice recognition, the commands are received through Google voice and the circuit sends the information to the motors. This robot is very efficient and helps the handicapped to move around independently and boosts their confidence.

4)"Voice Controlled Robotic Car Using Arduino for Smart Agriculture"

Author(s): D. SARAVANAN,R. PARTHIBAN,G.I. ARCHANAA

Publication title: International Journal of Pure and Applied Mathematics

Many researches are done mostly in agriculture only nowadays. So, it is necessary to include smart system in agriculture. The required data that is collected based on the agriculture are fully smart controlled system with the help of android watch sensing through voice-controlled processing by robotic car. In spite to reduce all these problems in increasing the yield of the crops it is helpful to implement these systems in agriculture. Though it is implemented in research level only it is not still given to the farmers as a project output to get benefitted from the resource. This is fully based on the interconnection between the farmers and with various

communication methods. It is transformation from the wired device to the wireless R.Karthikeyan and C.Jothi Kumar (2014) device.

5)"Voice Controlled Robot using Arduino"

Author(s): Shreya Nalawade

Publication year: 2016

Publication title: International Journal for Research Applied Science and Engineering Technology

This is a research study that explores the use of voice recognition technology in controlling a robot. The study aims to develop a voice-controlled robot system that uses Arduino, an open-source electronic platform, and other components to facilitate voice recognition and control. The first methodology used in the study was the system design. The authors designed a voice-controlled robot system using Arduino and other electronic components such as a Bluetooth module, motor driver, and a microphone. The system was designed to receive voice commands through the microphone, process them using the Arduino, and then send the appropriate signals to the motor driver to control the robot's movement

CHAPTER 3

Voice-Controlled Robot using Arduino

The project "Voice-Controlled Robot using Arduino" aims to develop a robotic system that can be controlled by voice commands. It utilizes Arduino, an open-source electronics platform, along with other components to create a versatile and interactive robot.

The technical content of this project typically includes the following key aspects:

1**. Hardware Setup**: The project involves connecting various hardware components such as Arduino board, motor driver, motors, sensors, and a microphone module. These components form the foundation of the voice-controlled robot.

2. **Speech Recognition**: The project incorporates a speech recognition module that captures and processes voice commands. This module may employ techniques like signal processing, pattern recognition, and machine learning algorithms to convert spoken words into electrical signals that can be understood by the robot.

3. **Arduino Programming:** The Arduino board is programmed to interpret the voice commands received from the speech recognition module. The programming code defines the robot's behavior based on different commands, enabling it to perform specific actions like moving forward, turning, stopping, or interacting with its surroundings.

4. **Motor Control:** The robot's movement is controlled through the Arduino board using motor drivers and motors. The programming code translates the voice commands into motor control signals, allowing the robot to navigate in response to the user's instructions.

5. **Sensor Integration:** Additional sensors, such as obstacle detection sensors or distance sensors, can be incorporated to enhance the robot's functionality. These sensors provide feedback to the Arduino board, enabling the robot to respond intelligently to its environment.

Relevance:

The project of creating a voice-controlled robot using Arduino holds great relevance in various domains. Here are a few examples:

1. **Home Automation**: Voice-controlled robots can serve as assistants for home automation tasks, allowing users to control various devices, such as lights, appliances, and security systems, through voice commands.

2. Education and Research: This project can be used in educational settings to introduce students to robotics, electronics, and programming concepts. It provides hands-on experience and promotes interdisciplinary learning.

3. Assistive Technology: Voice-controlled robots can be designed to assist individuals with physical disabilities or limited mobility, enabling them to interact with their environment more easily and independently.

4. Entertainment and Leisure: Creating a voice-controlled robot can be a fun project for hobbyists and enthusiasts. It offers an interactive and engaging platform for experimenting with robotics and exploring innovative ways of human-robot interaction.

Overall, this project combines elements of robotics, electronics, programming, and speech recognition to create a voice-controlled robot. It provides an opportunity to delve into emerging technologies, improve problem-solving skills, and contribute to the advancement of human-robot interaction.

CHAPTER 4

HARDWARE AND SOFTWARE REQUIREMENTS

This chapter describes the detailed specifications of the components used in the proposed methodology. An identification of improvement areas on the robot on both hardware and software. Various methods were used to gather the data, the robot was tested in its natural environment and surroundings, the user interface was tested in a qualitative interview study, field research on cleaning procedures was performed.

4.1HARDWARE REQUIREMENTS

1. Arduino Uno
2. Motor Driver-298N
3. Bluetooth Module -HC05
4. Wheels
5. Dc Motors
6. Chassis
7. Castor wheel
8. Battery
9. Male to female jumper wire

4.2 SOFTWARE REQUIREMENTS

1 Arduino IDE Software

2 Voice recognition Bluetooth App

4.1.1 ARDUINO UNO

Arduino UNO is an open-source micro controller board placed on the microchip ATmega328p micro controller and developed by Adruino.cc. The board has 6 Analog pins, 14 digital pins programmable with Arduino IDE via a Type B USB cable. It can power by external main volt battery Figure 4 Arduino UNO Board

Figure 4.1.1 Arduino UNO

Applications:

- ✧ Prototyping and DIY Projects
- ✧ Robotics
- ✧ Wearable Electronics
- ✧ Home Automation
- ✧ Data Logging and Monitoring
- ✧ Internet of Things (IoT) Projects
- ✧ Environmental Monitoring
- ✧ Automated Systems
- ✧ Art and Interactive Installations

4.1.2 MOTOR DRIVER (L298N)

The L298 Driver is a high voltage high current dual bridge driver designed to accept standard TTL Logic levels and drive inductive loads. The emitter of the lower level transistors of each bridge are connected together to the corresponding external terminal can be used for the connection of an external sensing resistor Figure 1.1.2 Shows the L298N Motor Driver.

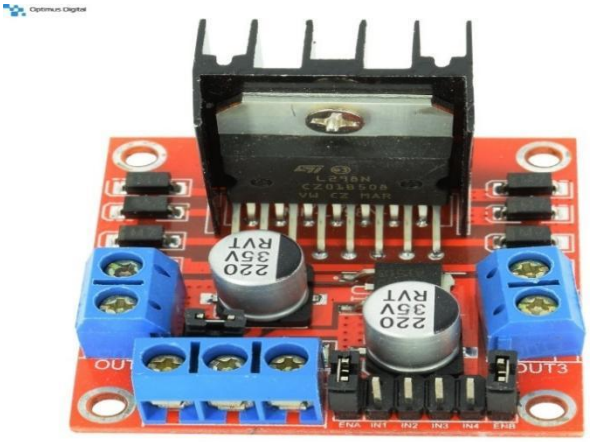


Figure 4.1.2 Motor driver(L298N)

Applications:

- ✧ Robot Control:
- ✧ Motorized Vehicles
- ✧ CNC Machines
- ✧ Home Automation
- ✧ Industrial Automation
- ✧ Educational Projects

4.1.3 BLUETOOTH MODULE(HC05)

HC05 module is a simple Bluetooth module is a simple Bluetooth serial port protocol module designed for wireless serial connection setup. It has a footprint as small as 12.7mm X 27mm. It will simplify the overall design cycle.

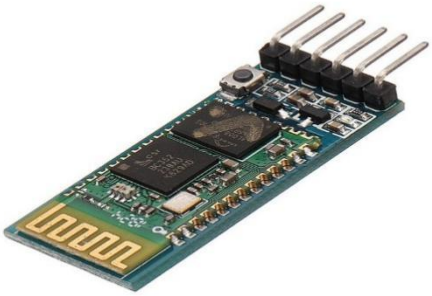


Fig 4.1.3: Bluetooth module HCO5

Applications:

1. Wireless Data Transfer
2. Bluetooth Control
3. IoT Projects
4. Wearable Devices

4.1.4 Wheels

A wheel is circular block of durable and hard material which is placed in axil about which the wheel rotates when a moment is applied by torque or gravity, thereby making one of the simple machines. When placed

under a load baring platform, the wheel turning on the horizontal axil makes it possible to transport heavy loads Figure 4.1.4. Shows the wheel of this voice control robotic vehicle. Robotic wheels play a crucial role in the mobility and functionality of robots across various fields, including industrial automation, logistics,

exploration, and domestic applications. Their design and features are tailored to meet the specific requirements of the robot and the tasks it needs to perform.

Fig 4.1.4 Wheels

4.1.5 DC MOTORS

A DC motor is a class of rotary electrical machine that converts t\direct current into mechanical energy. All types of DC motors have some kind of internal mechanism either electronic or electro mechanical, so it can change the direction of flow of current in path of motor periodically. Electric motors are broadly relegated into two different categories: DC (Direct Current) and AC (Alternating Current). Within these categories are numerous types, each offering unique faculties that suit them well for concrete applications. In most cases, regardless of type, electric motors consist of a stator (stationary field) and a rotor (the rotating field or armature) and operate through the interaction of magnetic flux and electric current to engender rotational speed and torque. DC motors are distinguished by their competency to operate from direct current. The below Figure 4.1.5 Shows the Gear Motor

Fig 4.1.5 DC Motor

4.1.6 CHASSIS

A robotic chassis refers to the physical framework or body of a robot that provides structural support and houses its components and systems. It serves as the foundation upon which other components, such as sensors, actuators, and control systems, are mounted or integrated. The design of the chassis depends on the specific requirements and application of the robot. The choice of chassis depends on factors such as the robot's intended application, environment, mobility requirements, payload capacity, and cost considerations. Robot chassis can vary greatly in size, shape, and materials used, but their primary purpose is to provide a stable and functional structure for the robot's overall operation.

Fig 4.1.6 Chassis

4.1.7 CASTOR WHEELS

Castor wheels, also known as caster wheels, are a type of wheel assembly commonly used in various applications to provide mobility and maneuverability. They consist of a wheel mounted on a swivel or rigid fork, which is then attached to an object or piece of furniture.

Fig 4.1.7 Castor wheels

4.1.8 BATTERY

Batteries are devices that store and release electrical energy through chemical reactions. They are widely used in various applications, from powering small electronic devices like smartphones and laptops to providing energy for electric vehicles and renewable energy systems.

Fig 4.1.8 Battery

4.1.9 MALE TO FEMALE JUMPER WIRE

Male-to-female jumper wires, also known as jumper cables or jumper leads, are commonly used in electronics and electrical prototyping.

They are used to connect components or modules with different pin configurations or genders. The male end of the jumper wire typically has pins or connectors that fit into female headers or sockets, while the female end has receptacles that accept male pins.

Fig 4.1.9: Male to female jumper wires

4.2.1 ARDUINO IDE SOFTWARE

The Arduino IDE (Integrated Development Environment) is a software platform used to write and upload code to Arduino boards. It provides a user-friendly interface for creating and editing code, compiling it into a format that can be understood by Arduino boards, and uploading the code to the boards for execution.

4.2.2 VOICE RECOGNITION BLUETOOTH APPLICATION

Android application with the help of the website MIT APP INVENTOR we developed an app and named it as VOICE_RECOGNITION. The app contains the option to connect to Bluetooth and access the Bluetooth settings of the phone. This application will recognize your voice and convert it into text and controls the movement of robot. There are 5 commands which is given to the robot through this app, LEFT, RIGHT, FRONT BACK, STOP and the robot will move accordingly.

Fig 4.2.2 Voice recognition android application

4.2.3 CODE

```
String readvoice;
int k=0;
void setup() {
Serial.begin(9600);
pinMode(2,OUTPUT);
pinMode(3,OUTPUT);
pinMode(4,OUTPUT);
pinMode(5,OUTPUT);
}
void loop() {
while (Serial.available())
{
```

```
delay(3);
char c = Serial.read();
readvoice += c;
}
if(readvoice.length()>0)
{
Serial.println(readvoice);
if(readvoice == "forward")
{
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, HIGH);
digitalWrite(5, LOW);
delay(1300);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
k=1;
}
if(readvoice == "backward")
{
digitalWrite(2, LOW);
digitalWrite(3, HIGH);
digitalWrite(4, LOW);
digitalWrite(5, HIGH);
delay(1300);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
k=2;
}
if(readvoice == "left")
{
```

```
if (k==2)
{
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
delay(1000);
digitalWrite(2, LOW);
digitalWrite(3, HIGH);
digitalWrite(4, LOW);
digitalWrite(5, HIGH);
delay(1300);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
}
else
{
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
delay(1000);
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, HIGH);
digitalWrite(5, LOW);
delay(1300);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
}
}
```

```
if(readvoice == "right")
{
if (k==2)
{
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, HIGH);
digitalWrite(5, LOW);
delay(1000);
digitalWrite(2, LOW);
digitalWrite(3, HIGH);
digitalWrite(4, LOW);
digitalWrite(5, HIGH);
delay(1300);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
}
else
{
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, HIGH);
digitalWrite(5, LOW);
delay(1000);
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, HIGH);
digitalWrite(5, LOW);
delay(1300);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
```

```
}
}

if(readvoice == "stop")
{
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
}
}
readvoice="";
}
```

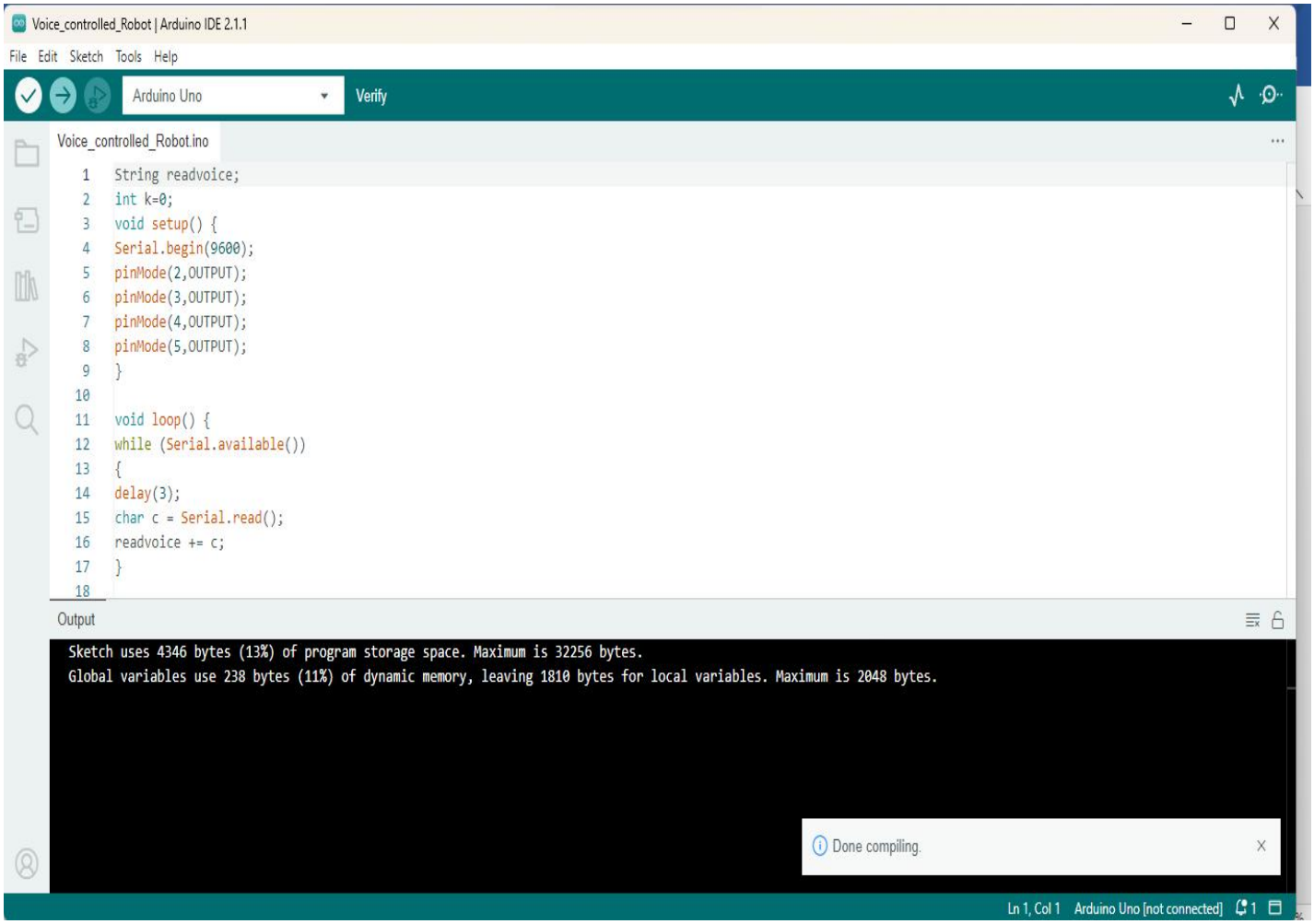
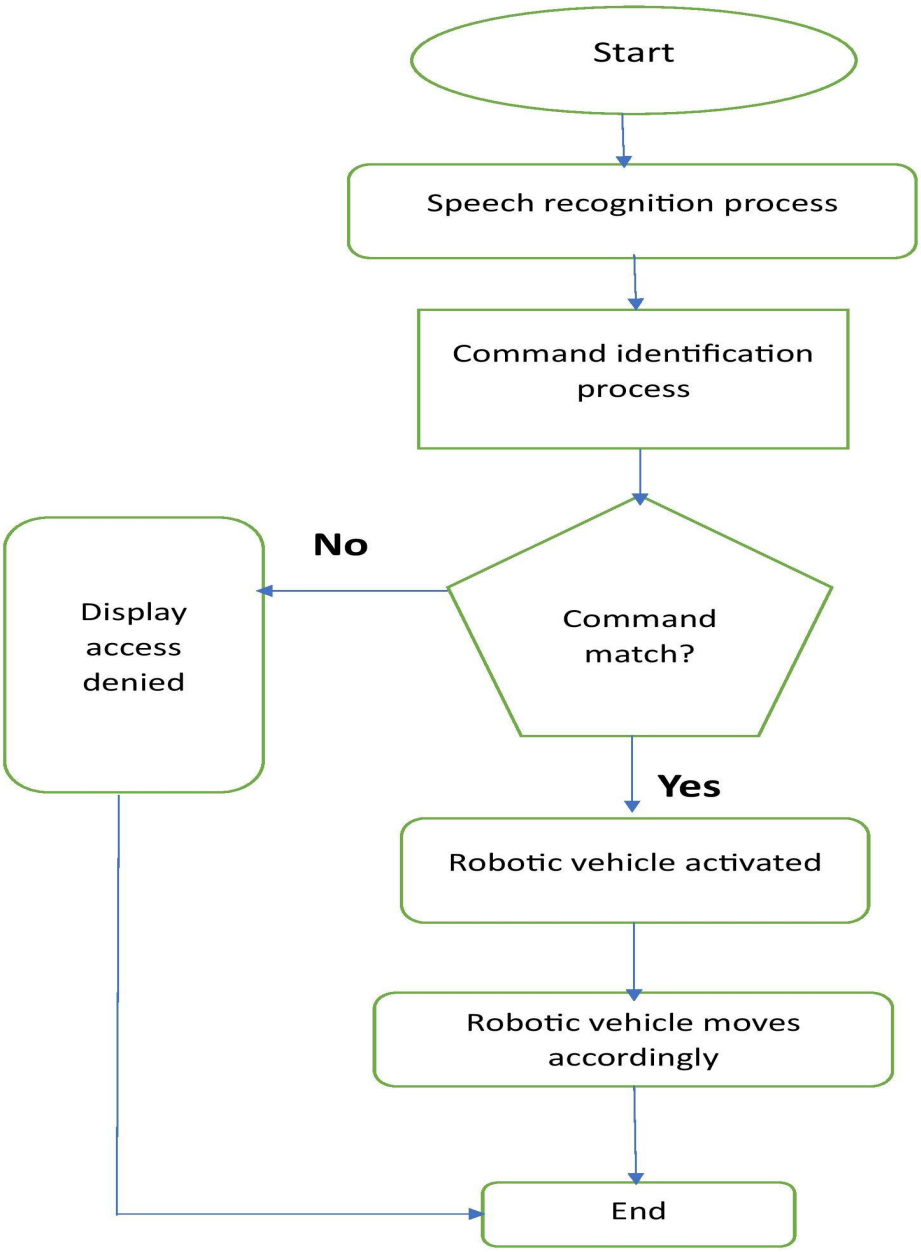


Fig 4.2.3 Code Compilation

CHAPTER 5

BLOCK DIAGRAM AND METHODOLOGY

5.1.1 EXISTING METHODOLOGY :



Flowchart 1

1. **Gather the required components**: An Arduino board (such as Arduino Uno or Arduino Mega), a motor driver module, DC motors or servo motors for robot movement, a Bluetooth or Wi-Fi module for communication, a microphone module for voice input are the necessary components for the construction.

2. **Set up the hardware**: Proper hardware connections are done (Arduino board to the motor driver module and wire the motors to the driver). Connection of Bluetooth or Wi-Fi module to the Arduino for wireless communication. Connection between the microphone module to the Arduino for voice input.

3. **Set up the Arduino IDE**: Installation of the Arduino IDE (Integrated Development Environment) on the computer and ensuring the proper configuration for the Arduino board.

4. **Writing up the code**: Coding is done in Arduino IDE to configure the input and output pins, set up the motor driver, initialize the communication module, and program the voice recognition functionality.

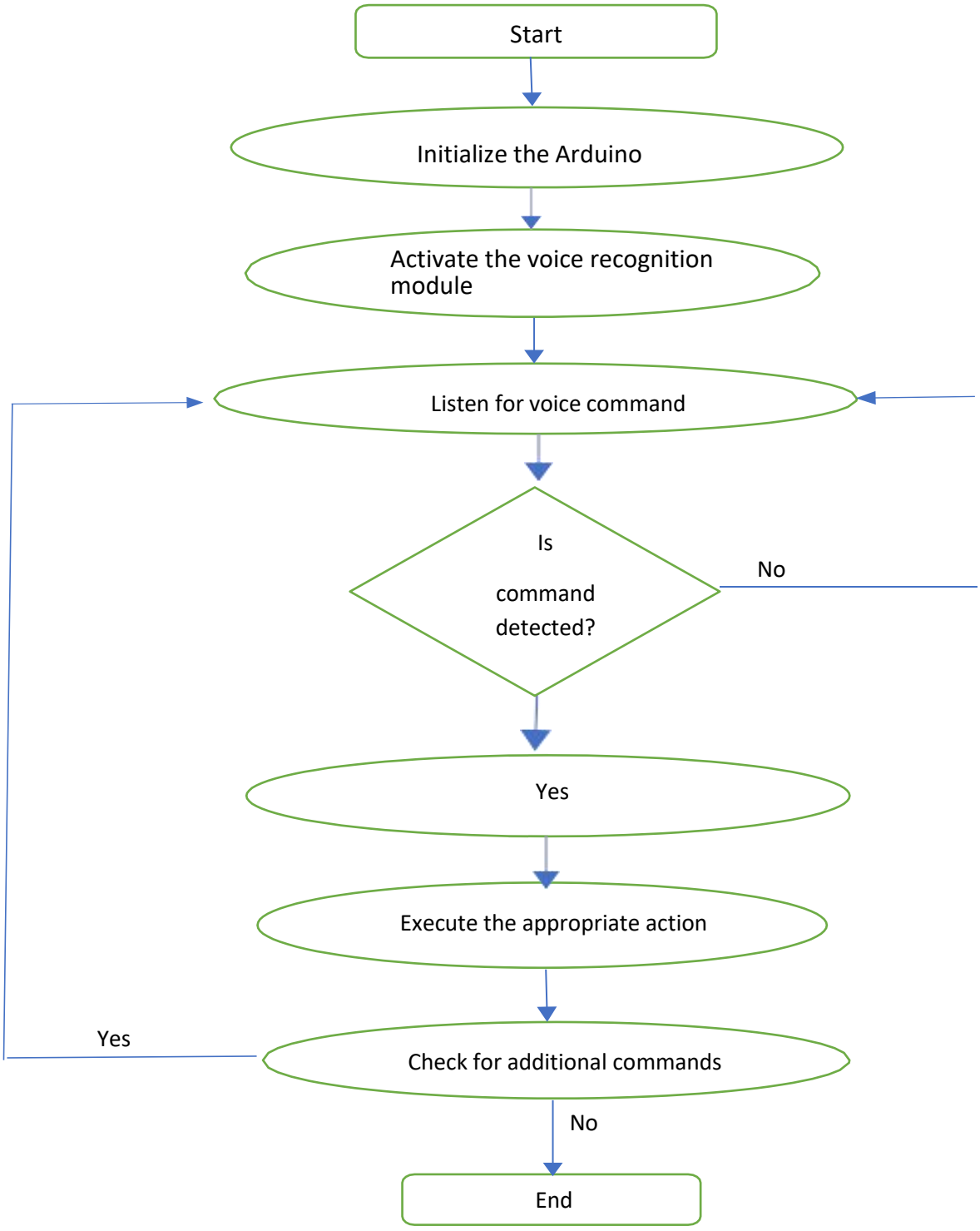
5. **Program voice commands**: A set of voice commands that the robot will recognize is defined. For each command, the corresponding action the robot should take, such as moving forward, turning, or stopping. Arduino is programmed to detect and interpret these voice commands.

6. **Implementation of control logic**: Code to interpret the recognized voice commands and control the robot is written accordingly.

7. **Upload the code**: Connect the Arduino board to your computer via USB, select the correct board and port in the Arduino IDE, and upload the code to the Arduino.

8. **Test and debug**: Power on the robot and test the voice control functionality. Speak the predefined voice commands and check if the robot responds correctly. Debug any issues or errors in the code if necessary.

5.1.2 PROPOSED METHODOLOGY:



Flowchart 2

1. **Define the Robot's Purpose**: Determining the specific tasks or actions the robot would perform. This will help to design the hardware and software accordingly.

2. **Select the Arduino Board**: Choosing an appropriate Arduino board based on the project requirements. Here, Arduino Uno is used due to their flexibility and ease of use.

3. **Gather the required components**: An Arduino board (such as Arduino Uno or Arduino Mega), a motor driver module, DC motors or servo motors for robot movement, a Bluetooth or Wi-Fi module for communication, a microphone module for voice input are the necessary components for the construction.

4. **Building of Robot's Mechanical Structure**: Construction of the physical body of the robot is done. Design and assembly of the robot's chassis, wheels, and any other mechanical parts required for its movement and functionality.

5. **Connect and Control Motors**: Connection of the motors to the Arduino board using appropriate motor drivers to control the direction. The motor drivers enable the Arduino to provide the necessary power and control signals to the motors

6. **Designing of the user interface and graphical programming**: A user interface design for android app is designed. (Voice bot application) for controlling the movement of robot.

7. **Implementation of Voice Recognition**: A microphone is integrated or a dedicated speech recognition module to capture voice commands. Graphical programming for recognizing the voice input and displaying it using HC05 Bluetooth is done. Code is written to interpret the recognized voice commands.

8. **Write Arduino Code**: Arduino code is developed using AcceleroControl_Robot/Arduino 1.6.10 software.

Command	Function
forward	The robot moves in the forward direction
back	The robot moves in the backward direction
left	The robot moves left
right	The robot moves right
stops	The robot stops

Table I: Working Table

5.2 BLOCK DIAGRAM

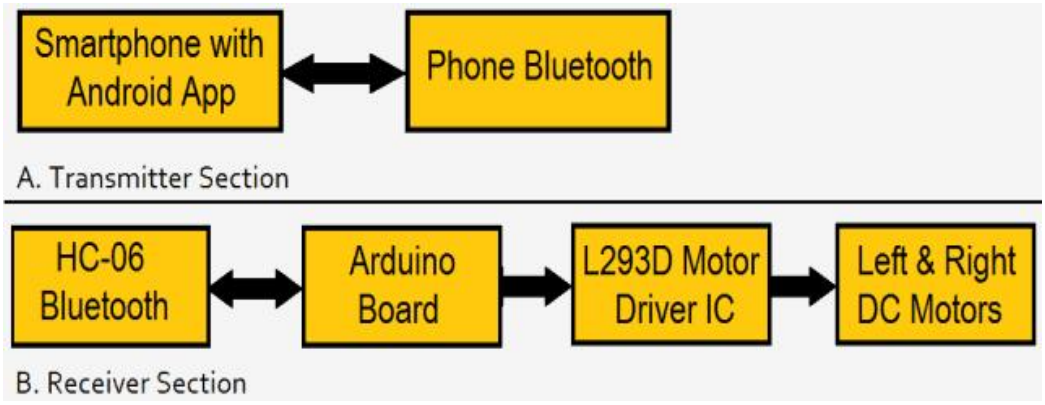


Fig 5.2 Block Diagram of proposed methodology

CHAPTER 6

RESULTS AND DISCUSSION

The robot is be able to accurately recognize and interpret voice commands given by the user. It uses technologies such as speech recognition algorithms or pre-trained machine learning models to convert speech into actionable commands.

Once the voice commands are recognized, the robot execute the corresponding actions. For example, if the user says " forward," the robot should interpret the command and initiate the required movements accordingly.

The robot's motor and motion control systems respond to the voice commands appropriately. This involves motors, motor driver, Bluetooth module to control the robot's movement in different directions.

Our fundamental arrangement is to build up some kind of menu driven control for our robotic vehicle, wherever the menu goes to be voice driven. What we are going to deal with the robot using following voice commands. Robot which can do basic tasks:

- Forward
- Backward
- Left
- Right
- Stop

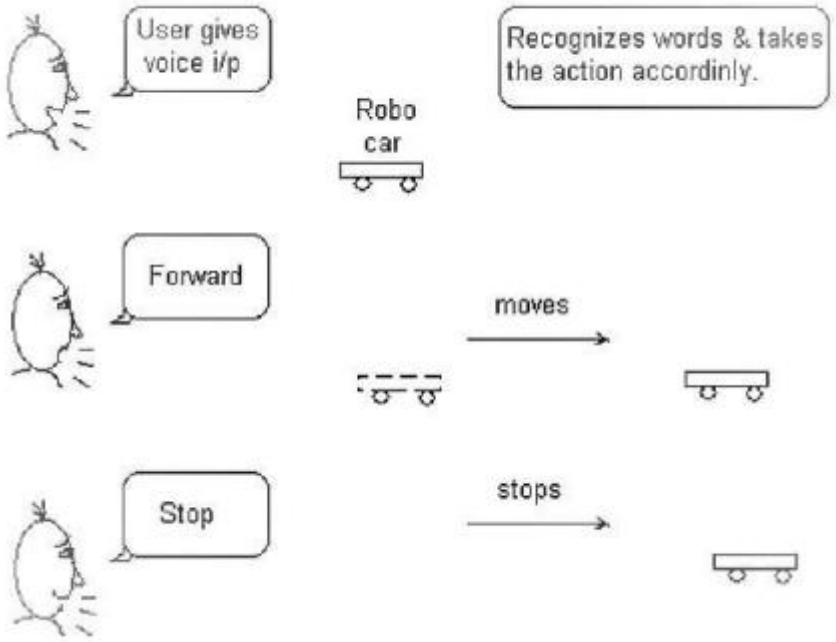


Fig 6.1 Task Implement

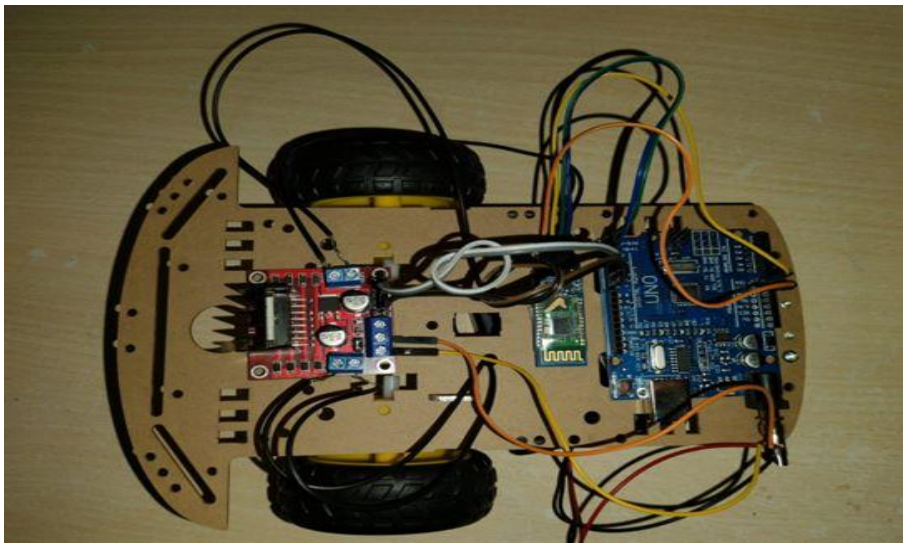


Fig 6.2 Voice Controlled Robot

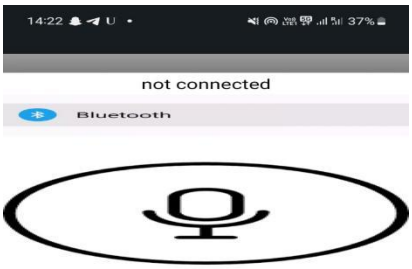


Fig. 6.3 App UI (Not Connected)

Fig 6.4 Connect to bluetooth

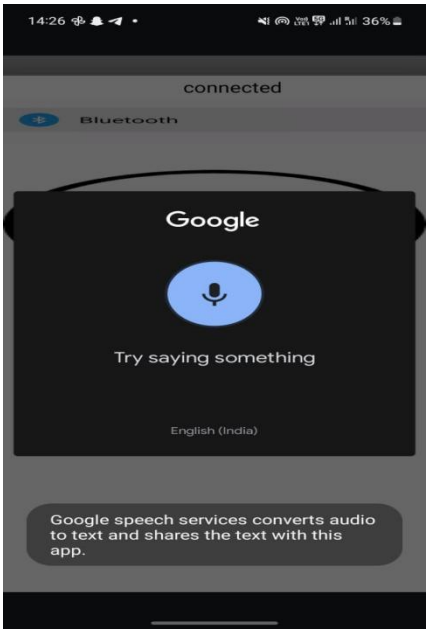


Fig. 6.5 App UI (Connected)

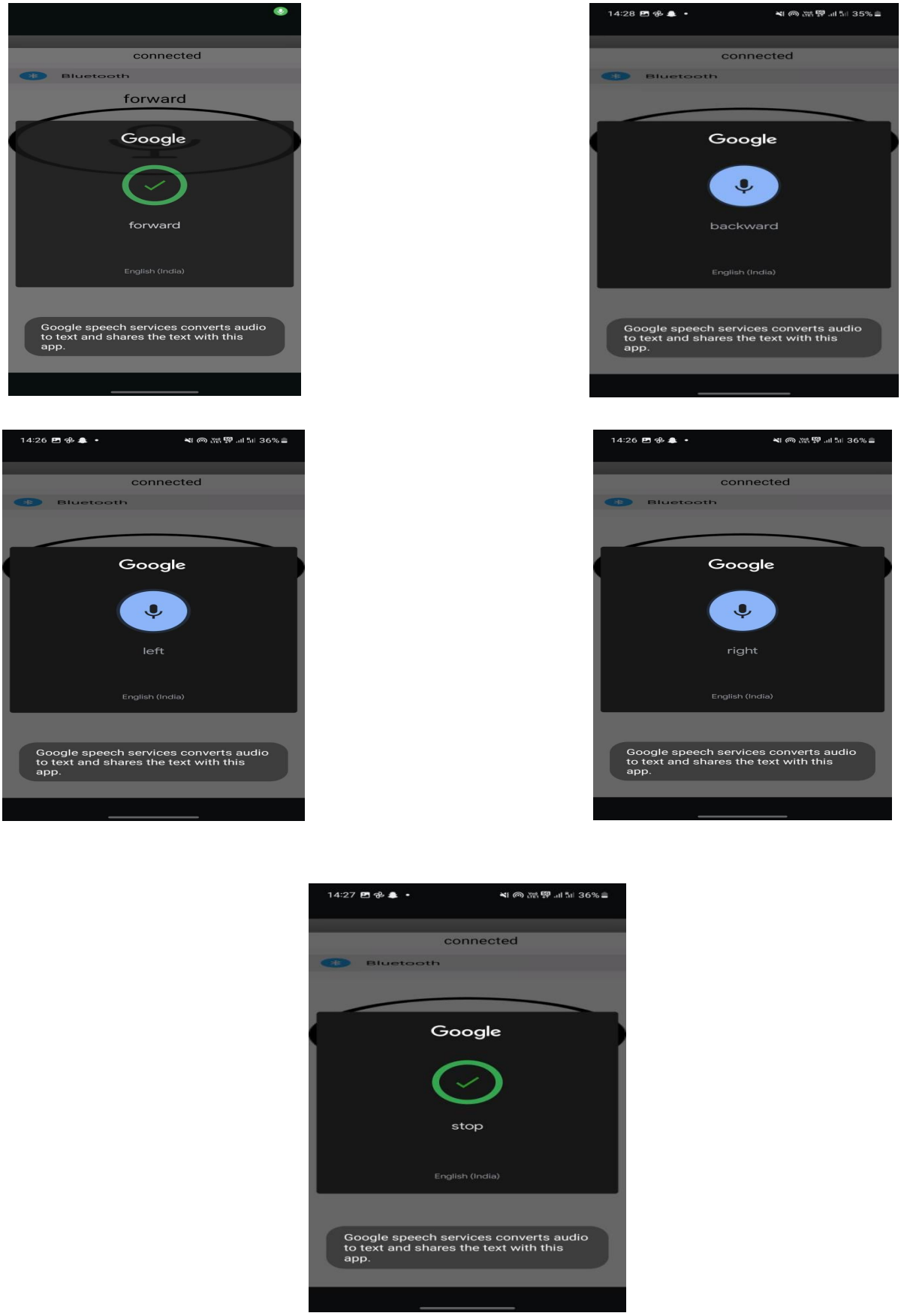


Fig. 6.6 Execution

6.1 APPLICATIONS AND SOCIAL RELEVANCE

1. Healthcare: Voice-controlled robots can be used in healthcare settings to assist people with disabilities or mobility impairments. They can help with tasks such as fetching and carrying items, opening and closing doors, and navigating around obstacles.

2. Education: Voice-controlled robots can be used in educational settings to teach programming, robotics, and electronics to students. They can provide a fun and interactive way for students to learn about these subjects.
3. Industrial automation: Voice-controlled robots can be used in industrial settings to perform tasks such as moving materials, assembly, and quality control. They can be used in manufacturing plants, warehouses, and other industrial settings to improve efficiency and productivity.

4. Home automation: Voice-controlled robots can be used in home automation systems to control appliances, lights, and other devices. They can be programmed to respond to voice commands to turn

Overall, the applications of voice-controlled robots using Arduino are vast and varied, and they have the potential to revolutionize the way we live and work.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

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.

FUTURE SCOPE

Future work will be designing this system with low cost so that in rural area also agriculture will be easier. And making the system to work on long distance so that the famer can access the system at far distance also. Such a system is more useful in many environmental monitoring and processing. The purpose of such robotic system is to help people with motor disable in controlling different widgets in daily life using mobile phone. Proposed idea should be expanded to control any device with Bluetooth module. In future we use a secured wireless channel using encryption and decryption. Consider larger bandwidth system should be on board because video streaming service desired. Some of these applications that can be built for controlling Speech Assisted technologies, home appliances, Speech to text translation, robotics movements, and much more. In future industries, home auto machine, agriculture is also developed by robotics. To reduce the labor efficiency, work efficiency, to reduce the working time to increase the productivity.

In future implement of our project as follows: It will contain following components:
- Mount with camera on robot.
- Using WIFI device for long distance connection.

Department

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