MINOR PROJECT REPORT ON

VCRV (voice controlled robotic vehicle)

submitted in partial fulfillment of the requirements
for the award of the degree of

BACHELOR OF COMPUTER APPLICATIONS (BCA)

to

Guru Gobind Singh Indraprastha University, Delhi

Under the Guidance of
Mr. Deepak Sonker
Head Of Department

Submitted by
Harshit Goyal
02017002020
BCA-V Sem

Batch: 2020-23

Department of Information, Communication & Technology

TECNIA INSTITUTE OF ADVANCED STUDIES
NAAC ACCREDITED GRADE "A" INSTITUTE
Approved by AICTE, Ministry of HRD, Govt. of India, Affiliated to G.G.S.I.P. University
& Recognized Under Sec. 2(f) of UGC Act 1956.

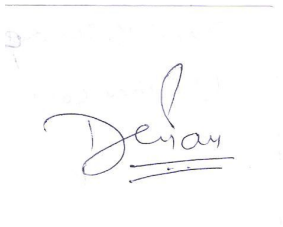
Certificate of Completion

This is to certify that the Project work entitled "**Voice Controlled Robotics Vehicle**" submitted by **Harshit Goyal** in fulfillment for the requirements of the award of Bachelor of Computer Applications Degree at Tecnia Institute of Advanced Studies, Institutional Area, Madhuban Chowk, Rohini, New Delhi is an authentic work carried out by his/her under my super vision and guidance. To the best of my knowledge, the matter embodied in the project has not been submitted to any other University/Institute for the award of any Degree.

Dr. Deepak Sonker
(HOD)
Department of Information, Communication & Technology

DECLARATION

I hereby declare that the work presented in this report entitled "**Voice Controlled Robotics Vehicle**", in fulfillment of the requirement for the award of the degree Bachelor of Computer Applications, Tecnia Institute of Advanced Studies, Rohini, New Delhi, is an authentic record of my own work carried out during my degree under the guidance of Dr. **Deepak Sonker.** The work reported in this has not been submitted by me for award of any other degree or diploma.



Harshit Goyal
02017002020
BCA 5th SEM.

To Whom It May Concern

I am Harshit Goyal Enrolment No. 02017002020 from BCA-V Semester of the Tecnia Institute of Advanced Studies, Delhi here by declares that the minor project (BCA-2022-23) entitled mine. Experts (Voice Controlled Robotics Vehicle) is an original work and the same has not to be submitted to any other institute for the award of any degree. The presentation of the minor project was made in 2022 and the suggestions as approved by the faculty were duly incorporated.

Date: **Signature of the Student**

Certified that the minor project submitted in partial fulfillment of **Information, Communication & Technology** (ICT) to be awarded by G.G.S.I.P. University, Delhi by HARSHIT GOYAL, Enrollment No. 02017002020 has been completed under my guidance and is satisfactory

Date: **Dr. Deepak Sonker**

HOD of Department

ACKNOWLEDGEMENT

I express my sincere gratitude to Mr. Deepak Sonker and for their valuable guidance and timely suggestions during the entire duration of my minor project work, without which this work would not have been possible. I would also like to convey my deep regards to all other faculty members who have bestowed their great effort and guidance at appropriate times without which it would have been very difficult on my part to finish this work. Finally, I would also like to thank my friends for their advice and for pointing out my mistakes.

HARSHIT GOYAL
02017002020
BCA 5th SEM.

ABSTRACT

The main purpose of our project is to develop a car which is capable of performing certain action according to the voice command provided by the valid user through the application installed in his/her smartphone. We call this technology as voice/speech recognition technology .while our car will be integrated with this advanced technology. While developing our project our main focus area will be voice identification and voice recognition system.

The purposed system will not be capable of recognizing the complete sentences while it will be capable of recognizing only those command which are implemented while preparing our system and is capable of performing certain action with regards to those commands .

The system will allows user to provide voice commands through a microphone inbuilt on the smartphone for controlling the action/movement of the car.

The voice command by the valid user will be delivered to the purposed system. after that with the implementation of vector Quantization (VQ) technique along with the Mel-wrapping filter bank for reducing the amplitude of the noise and also improving the signal to noise ratio, the code being inserted on the Arduino UNO (microcontroller) will start comparing the command delivered by the user with the commands being stored on the storing device on the purposed system.

The result of purposed system shows that the car is capable of performing certain action according to the 5 basic commands provided by the user; those commands are forward, turn right, turn left, reverse, stop, with the help of the code being inserted in the microcontroller. Key words: speech/voice recognition, speech/voice identification, Arduino UNO, vector quantization techniques (sq.).

CONTENTS

CHAPTER-1 INTRODUCTION TO IOT

1.1 Introduction

- The Internet of Things, or IoT, is a system of interconnected computing devices, mechanical and digital machines or objects that have unique identifiers (UIDs) and the ability to transmit data over a network without requiring human connections or human-computer interaction.

- In a nutshell, the Internet of Things is the concept of connecting any device (so long as it has an on/off switch) to the Internet and to other connected devices.

- Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

- **Internet of Things (IoT)** is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment.

- In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established.

- **IoT is network of interconnected computing devices which are embedded in everyday objects, enabling them to send and receive data.**

- In the near future, IoT will become broader and more complex in terms of scope. It will change the world in terms of
  "anytime, anyplace, anything in connectivity."

Figure 1

1.2 What are the objectives of Internet of Things (IoT)

- The goal of the Internet of Things (IoT) is to make it possible to connect and integrate the physical and digital worlds. It leads the third wave of the IT industry revolution and embodies the trend of future networking.

- IoT has a wide range of uses, such as the precise real-time sensing of our surroundings and the integration of connected intelligence into commonplace products.

- Eventually, practically anything will be able to have its own verifiable identity, be aware of its surroundings, be able to interact and exchange information, directly purchase and provide services, and maybe operate entirely on its own.

- Its main goal is to collect and analyze data from objects (devices) that were previously cut off from the majority of data processing tools. Physical objects (devices) installed at the very edge of the network, such as motors, light bulbs, generators, pumps, and relays that carry out specified duties in order to support a business process are what produce this data.

- Connecting these unconnected objects (things) and transferring their data to the cloud or Internet for analysis is the goal of the Internet of Things (IoT).

1.3 Advantage of IOT

- **Minimize human effort:** As IoT devices interact and communicate with each other, they can automate the tasks helping to improve the quality of a business's services and reducing the need for human intervention.

- **Save time:** By reducing the human effort, it saves a lot of our time. Saving time is one of the primary advantages of using the IoT platform.

- **Enhanced data collection:** Information is easily accessible, even if we are far away from our actual location, and it is updated frequently in real-time. Hence these devices can access information from anywhere at any time on any device.

- **Improved security:** If we have an interconnected system, it can assist in the smarter control of homes and cities through mobile phones. It enhances security and offers personal protection.

- **Efficient resource utilization:** We can increase resource utilization and monitor natural resources by knowing the functionality and how each device works.

- **Reduced use of other electronic equipment:** Electric devices are directly connected and can communicate with a controller computer, such as a mobile phone, resulting in efficient electricity use. Hence, there will be no unnecessary use of electrical equipment.

- **Use in traffic systems:** Asset tracking, delivery, surveillance, traffic or transportation tracking, inventory control, individual order tracking, and customer management can be more cost-effective with the right tracking system using IoT technology.

- **Useful for safety concerns:** It is helpful for safety because it senses any potential danger and warns users. For example, GM OnStar is an integrated device that identifies a car crash or accident on the road. It immediately makes a call if an accident or crash is found.

Figure 2

1.4 Disadvantage of IOT

1. **Security issues:** IoT systems are interconnected and communicate over networks. So, the system offers little control despite any security measures, and it can lead to various kinds of network attacks.

2. **Privacy concern:** The IoT system provides critical personal data in full detail without the user's active participation.

3. **Increased unemployment:** Unskilled workers or even the skilled ones are at a high risk of losing their jobs, leading to high unemployment rates. Smart surveillance cameras, robots, smart ironing systems, smart washing machines, and other facilities are replacing the humans who would earlier do these works.

4. **The complexity of the system:** The designing, developing, maintaining, and enabling the extensive technology to IoT system is quite complicated.

5. **High chances of the entire system getting corrupted:** If there is a bug in the system, it is possible that every connected device will become corrupted.

6. **Lack of international standardizations:** As there is no international standard of compatibility for IoT, it is problematic for devices from different manufacturers to communicate with each other.

7. **High dependency on the internet:** They rely heavily on the internet and cannot function effectively without it.

8. **Reduced mental and physical activity:** Overuse of the internet and technology makes people ignorant because they rely on smart devices instead of doing physical work, causing them to become lethargic and inactive.

1.5 Features of IOT

The most important features of IoT are:

1. **Connectivity: -** Connectivity refers to creating a proper connection between all IoT things and the IoT platform, it can be a server or cloud. Once connected, IoT devices need high-speed messaging between the devices and the cloud to enable reliable, secure, two-way communication.

2. **Analyzing: -** After connecting all the relevant things, it comes to real-time analyzing the data collected and use them to build effective business intelligence.

3. **Integrating: -** IoT integrating the various models to improve the user experience as well.

4. **Artificial Intelligence: -** IoT makes things smart and enhances life through the use of data.

5. **Sensing: -**The sensor devices used in IoT technologies detect and measure any change in the environment and report on their status. IoT technology brings passive networks to active networks. Without sensors, there could not hold an effective or true IoT environment.

6. **Active Engagement:** IoT makes the connected technology, product, or services to active engagement between each other.

1.6 Future scope of IOT

- We are living in a digitalized world that is full of technological advancements. One of these technological advancements is Internet of Things (IoT). The future scope of IoT is paving its way to make the world a smarter place to live in.

- It has gained a lot of popularity in lesser time. Also, the advancements in Artificial Intelligence and Machine Learning have made the automation of IoT devices easy. Basically, AI and ML programs are combined with IoT devices to give them proper automation.

- Along with wider adoption, new technologies will help make RFID more reliable and cost-effective for a larger number of applications.

- An electronic, sensor, and software-enabled network of connected physical things is known as the Internet of Things (IoT).

- These nodes, which are connected items, communicate with one another online. By 2025, there will be 22 billion linked devices worldwide. Industries like manufacturing, agriculture, healthcare, transportation, media/advertising, retail, water and waste management, power distribution, etc. can all benefit from the deployment of IoT technology.

- IoT is employed in many different applications, including smart solar panels, smart homes, smart parking, smart healthcare, smart traffic lighting, and smart water level monitoring.

- It is necessary for the industry and other contexts to achieve high production, efficiency, a safe working environment, and minimal carbon emissions. Several startups are focusing their efforts on smart manufacturing and healthcare.

Figure 3

1.7 Main components used in IoT

- **Low-power embedded systems:** Less battery consumption, high performance are the inverse factors that play a significant role during the design of electronic systems.

- **Sensors:** Sensors are the major part of any IoT applications. It is a physical device that measures and detect certain physical quantity and convert it into signal which can be provide as an input to processing or control unit for analysis purpose.

- **Control Units:** It is a unit of small computer on a single integrated circuit containing microprocessor or processing core, memory and programmable input/output devices/peripherals. It is responsible for major processing work of IoT devices and all logical operations are carried out here.

- **Cloud computing:** Data collected through IoT devices is massive and this data has to be stored on a reliable storage server. This is where cloud computing comes into play. The data is processed and learned, giving more room for us to discover where things like electrical faults/errors are within the system.

- **Availability of big data:** We know that IoT relies heavily on sensors, especially in real-time. As these electronic devices spread throughout every field, their usage is going to trigger a massive flux of big data

.

- **Networking connection:** In order to communicate, internet connectivity is a must where each physical object is represented by an IP address. However, there are only a limited number of addresses available according to the IP naming. Due to the growing number of devices, this naming system will not be feasible anymore. Therefore, researchers are looking for another alternative naming system to represent each physical object.

1.8 Characteristics of IoT

Some characteristics of Iot are:

- Massively scalable and efficient
- IP-based addressing will no longer be suitable in the upcoming future.
- An abundance of physical objects is present that do not use IP, so IoT is made possible.
- Devices typically consume less power. When not in use, they should be automatically programmed to sleep.
- A device that is connected to another device right now may not be connected in another instant of time.
- Intermittent connectivity – IoT devices aren't always connected. In order to save bandwidth and battery consumption, devices will be powered off periodically when not in use. Otherwise, connections might turn unreliable and thus prove to be inefficient.

1.9 Learning Outcomes of IoT

- HOW DO I REMOTELY TRACK, MONITOR, AND MANAGE MY ASSETS?
  Collect and analyze telemetry from connected sensors, devices and equipment for real-time monitoring, surveillance, management and remote control.

- HOW DO I BUILD A LIVING LINK TO BOTH MY PRODUCT AND USERS?
  Expand your versatile business beyond traditional product boundaries with IoT-connected smart products that recognize and respond to user needs, enable new innovative experiences, and create new revenue models.

- HOW DO I IMPROVE OPERATIONS?
  Increase operational visibility, gain insights, reduce inefficiency or waste, and control and automate processes to achieve operational benefits. Get enriched with real-time data, intelligent edge and analytics for smarter, automated and autonomous processes.

1.10 Problem Definition

We have seen in the number of cities where the light is the one of the huge energy expenses for a city.

- Disadvantages of Existing System
  - Manual Switching off/on of Lights
  - More Energy Consumption.
  - High expense.
  - More manpower.
- Advantages of the Proposed System
  - Automatic Switching of lights using rfid technology
  - Maintenance Cost Reduction.
  - Wireless Communication.
  - Energy Saving.
  - Reduction of manpower.

1.11 About The VCRV Model

In this design, an android application with a micro controller is used for the required task. The connection between the application and the robot is facilitate with Bluetooth technology. The commands issued will be relayed over through the channel and will be received by the module. The objective of voice controlled robotic vehicle (VCRV) is to listen and act on the commands of the user. Here the system requires accent training, post which the device will start understanding the commands issued; and the commands have been added by codes.

1.12 Project Aim and Objective

Our aim is to make a robot vehicle which can be controlled by the voice command of a Person. Normally these types of systems are called as Speech Controlled Automation System (SCAS). Our design is a prototype of the above mentioned system. The idea is to create a sort of
Robot which going to be driven by voice commands. The robot is remotely controlled by a
Mobile phone; there are many articles that show the communication between a robot and smart phone. Smart phone is a very good interface for remotely automating the robot. It contains many features that can be helpful.

The main motive to build a VCRV is to analyze the human voice and act according to the programmed commands. The most basic commands are backward, forward, right , left and also stop the robot. The vehicle is to be controlled wirelessly with the use of android smartphone; our intention is to make a robotic vehicle with use of advanced smartphone technology in a very simple and economic way.

1.13 Utilization Model

In current scenario vehicles are manually controlled and all are done by the person who is driving the vehicle. Every action like start and stop, applying brake, gear transmission, acceleration requires human effort. But nowadays new technologies have been developed that can be integrated with the conventional vehicles to new vehicle form. In the technology era, the space between the physical and the digital world is brought closer by the introduction of gesture concept. For all dangerous tasks, we prefer technology rather than people. Even though these robots are being controlled manually in the early stages, these can now be controlled via voice and gestures. This technology of gesture and voice recognition can be defined by the interaction between the computer and the body language of human beings. This constructs the communication link between technology and mankind. The target of this work is to upgrade the complete security to the robot and to simplify the controlling mechanism

1.14 Existing System

The current systems are robots like line follower robot, edge averting robot, DTMF robot, gesture controlled robot. These type of robots are not efficient since they require more power to run, cost is also very high. In the existing system they don’t use voice commands, making it not possible for physically handicapped people to drive.

The voice commands are interpreted via an offline server in real time. The commands are at once transmitted to the server directly by the means of a wired network. The car is built primarily on a platform based on a microcontroller.Some of the fields that can likewise be equally enhanced are the effect of the mouth-microphone range on the robotic, the overall performance (scope) of the robot and the effect of noise on the translation of speech to textual content.

In the existing system Bit Voicer Server is used, it's a database for speech processing and automation synthesis. It was designed to make voice operation possible with simple gadgets having low processing power. Microcontrollers usually do not have enough storage and computing ability to perform sophisticated speech treatment and synthesis. By doing the tough work Bit Voicer Server removes the consequences of these limitations so that the microcontroller can assign its key functionality to most of its origin sources.

Table 1: Voice command functions

Voice Command	Function
Forward	Car moves forward
Backward	Car moves backward
Right	Car moves right
Left	Car moves left
Stop	Car moves stop

The voice commands to the robotic device are dispatched via Bluetooth with the aid of an Android device. These commands are received on the robotic device by using Bluetooth module set up on it. The motor driver circuit is used to manipulate the velocity of the car. The complete circuitry is powered by the usage of a 12V rechargeable battery hooked up on the system.

Chapter 2: System/Project Requirement

2.1 Hardware Requirement

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware, a hardware requirements list is often accompanied by a hardware compatibility list (HCL), especially in case of Operating systems. An HCL lists tested, compatible, and sometimes incompatible hardware devices for a particular operating system or application.

2.1.1 Chassis

Chassis is the vehicle's main support structure, also known as the 'Frame.' It bears all the stresses on the vehicle in both static and dynamic conditions. In a vehicle, it is analogous to the skeleton of a living organism. The origin of the word Chassis lies in the French language. Whether it is a two-wheeler or a car, or a truck, every vehicle has a chassis-frame.

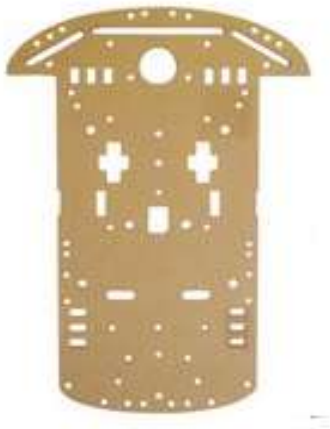


Figure 2: Chassis

2.1.2 DC Motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. 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 flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line. DC motors were the first type widely used, since they could be powered from existing directcurrent

lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel.

Figure 3: DC Motor

2.1.3 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.

This are simple devices that consist of a circular block of sturdy and hard material that is put in an axil around which the wheel revolves when a moment is imparted by torque or gravity. The wheel turning on the horizontal axil allows huge loads to be transported when it is positioned under a load-bearing platform.

Figure 4: Wheels

2.1.4 Arduino UNO

- Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the micro controller. The Arduino Uno comes with USB interface, 6 analog input pins, 14 I/O digital ports that are used to connect with external electronic circuits. Out of 14 I/O ports, 6 pins can be used for PWM output.

- It allows the designers to control and sense the external electronic devices in the real world. Since it was first debuted, the Arduino Uno has been a huge hit with electronics enthusiasts from beginner hobbyists to professional programmers. It is an open-source platform, means the boards and software are readily available and anyone can modify and optimize the boards for better functionality.

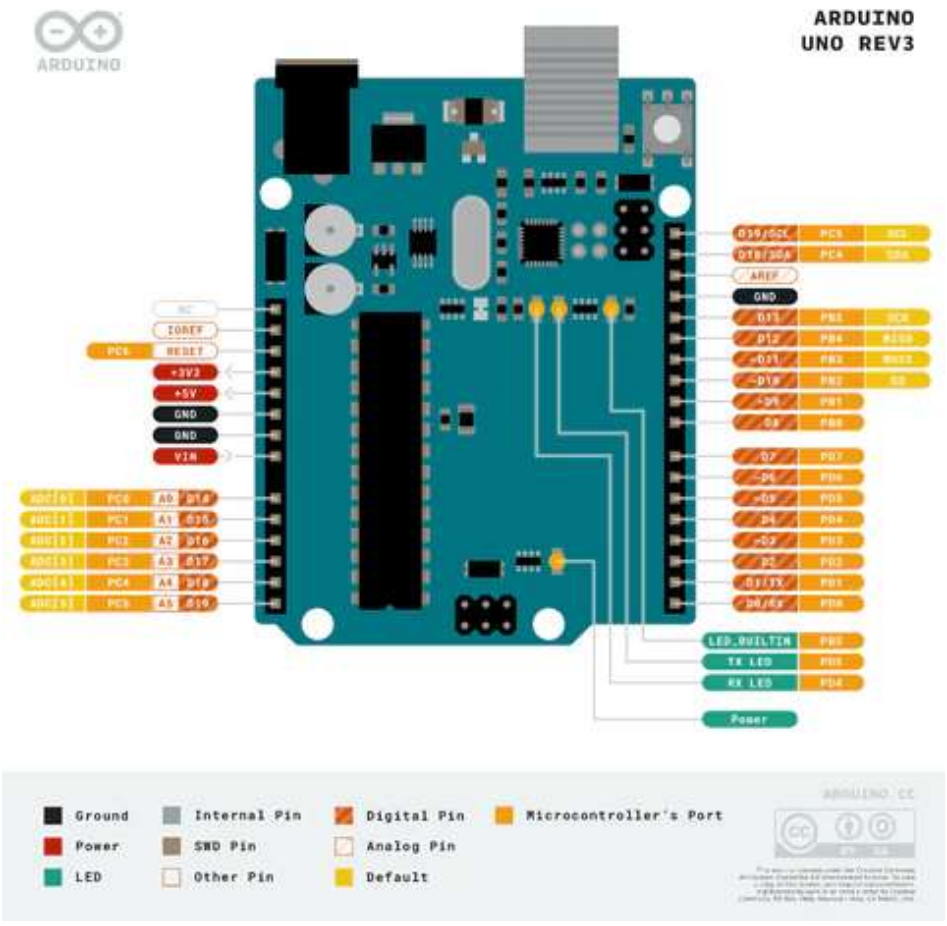
- The software used for Arduino devices is called IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language.

Figure 5: Arduino Uno

Different types of Arduino Boards:

❖ ARDUINO UNO ORIGINAL

- Arduino Uno is a microcontroller board based on the ATmega328PIt has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started with your Arduino Uno projects.

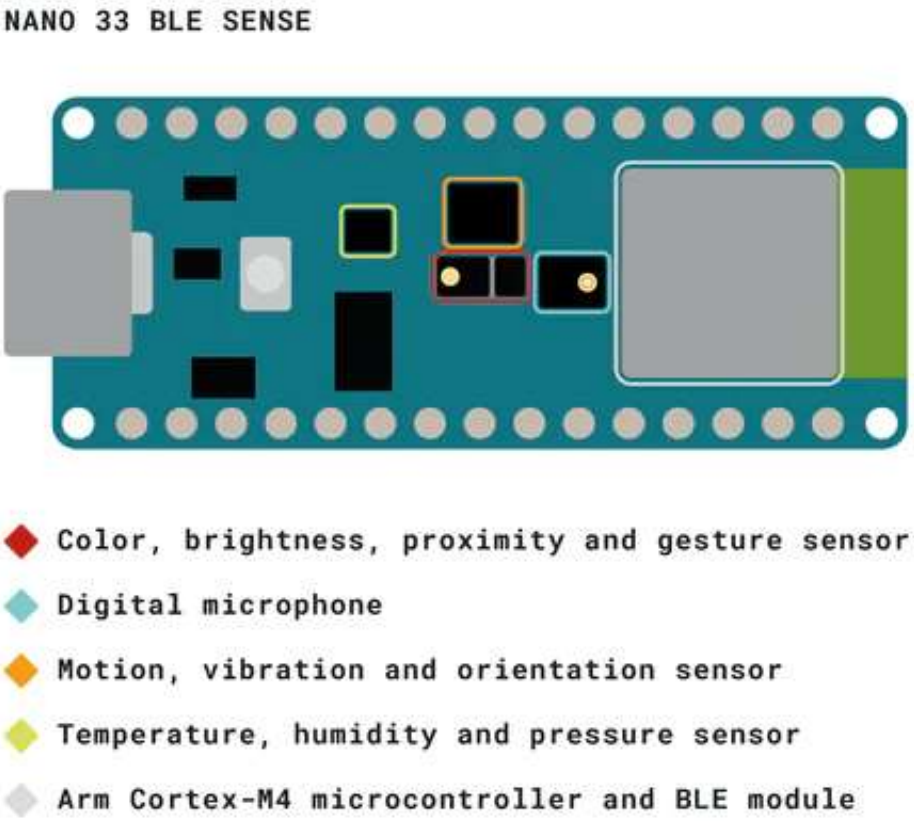


- The Arduino Uno board can be powered via a USB connection or with an external power supply. The power source is selected automatically.

- External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or a battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector.

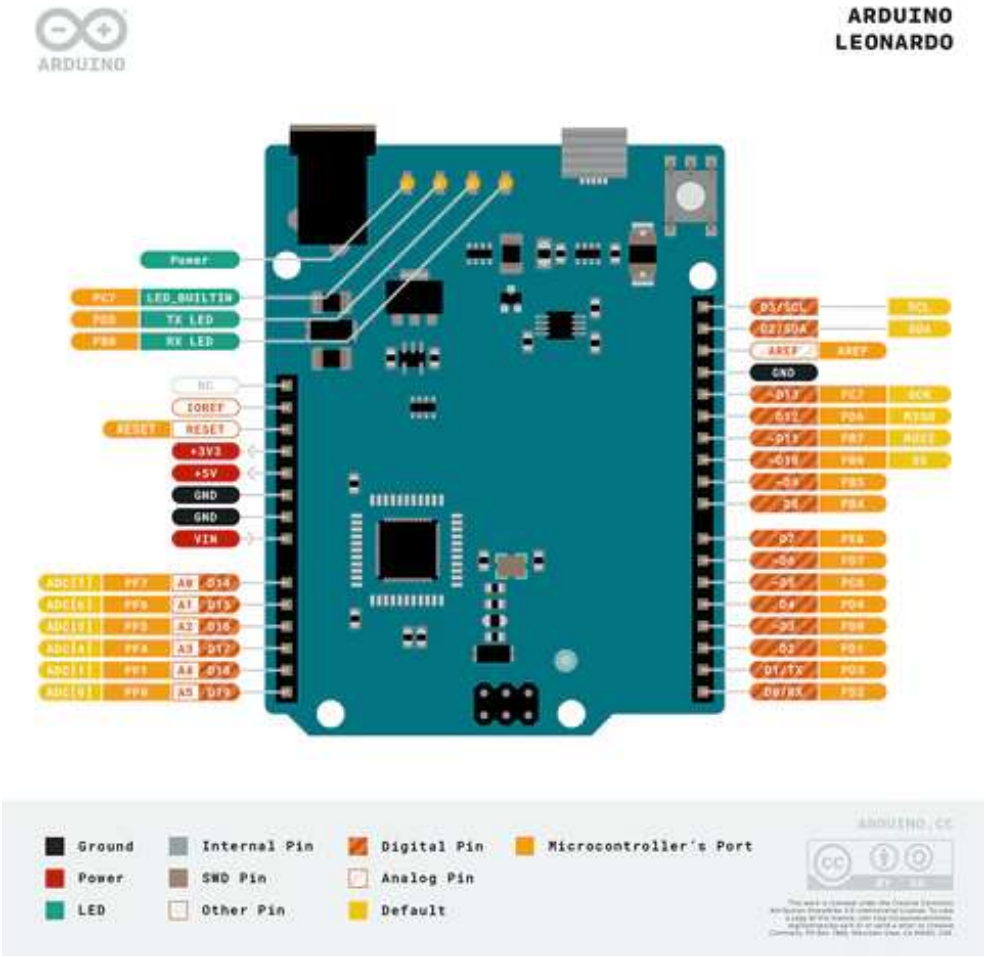
❖ ARDUINO NANO BLE SENSE WITH HEADER

- The Arduino Nano BLE sense is completely a new Arduino AI-enabled board in the smallest form factor. The Arduino Nano 33 BLE Sense is an evolution of the traditional Arduino Nano, but featuring a lot more powerful processor, the nRF52840 from Nordic Semiconductors, a 32-bit ARM Cortex - M4 CPU running at 64 MHz. & This Arduino Nano BLE sense will allow you to make larger programs than with the Arduino Uno and with a lot more variables.
- The main feature of the Arduino Nano BLE Sense board is the possibility of running Edge Computing applications (AI) on it using TinyML. You can create your machine learning models using TensorFlow Lite and upload them to your board using the Arduino IDE.



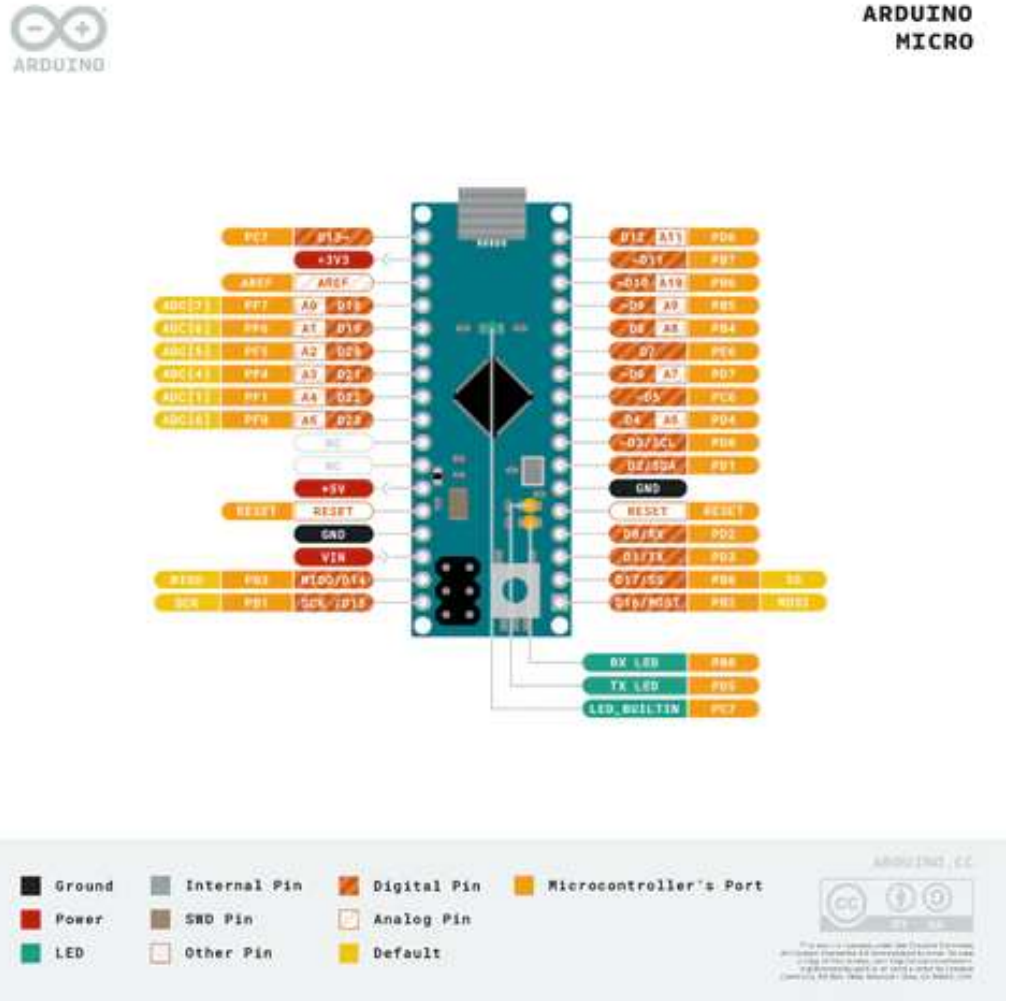
❖ ARDUINO LEONARDO WITH HEADERS

- The Arduino Leonardo is a microcontroller board based on the ATmega32u4. It has 20 digital input/output pins (of which 7 can be used as PWM outputs and 12 as analog inputs), a 16 MHz crystal oscillator, a micro USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.



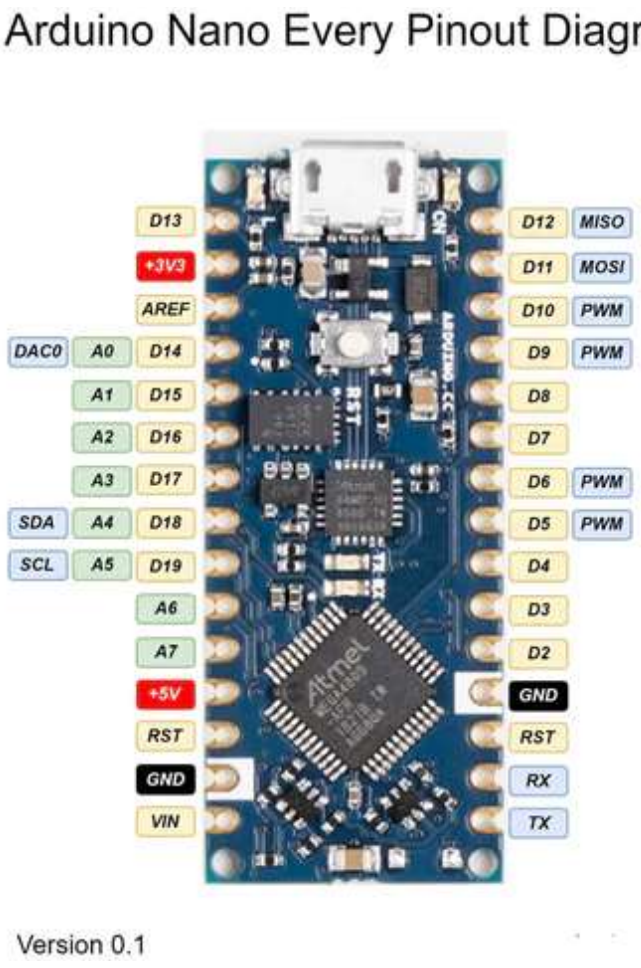
❖ ARDUINO MICRO

- The Arduino Micro was developed by Arduino in collaboration with Adafruit. The Arduino micro is a powerful development board integrated with the ATmega32U4 microcontroller. It features 20 digital input/output pins (of which 7 can be used as PWM outputs and 12 as analog inputs), a 16 MHz crystal oscillator, a micro USB connection, an ICSP header, and a reset button. The Arduino Micro contains everything needed to support the microcontroller; simply connect it to a computer with a micro USB cable to get started. It has a form factor that enables it to be easily placed on a breadboard.



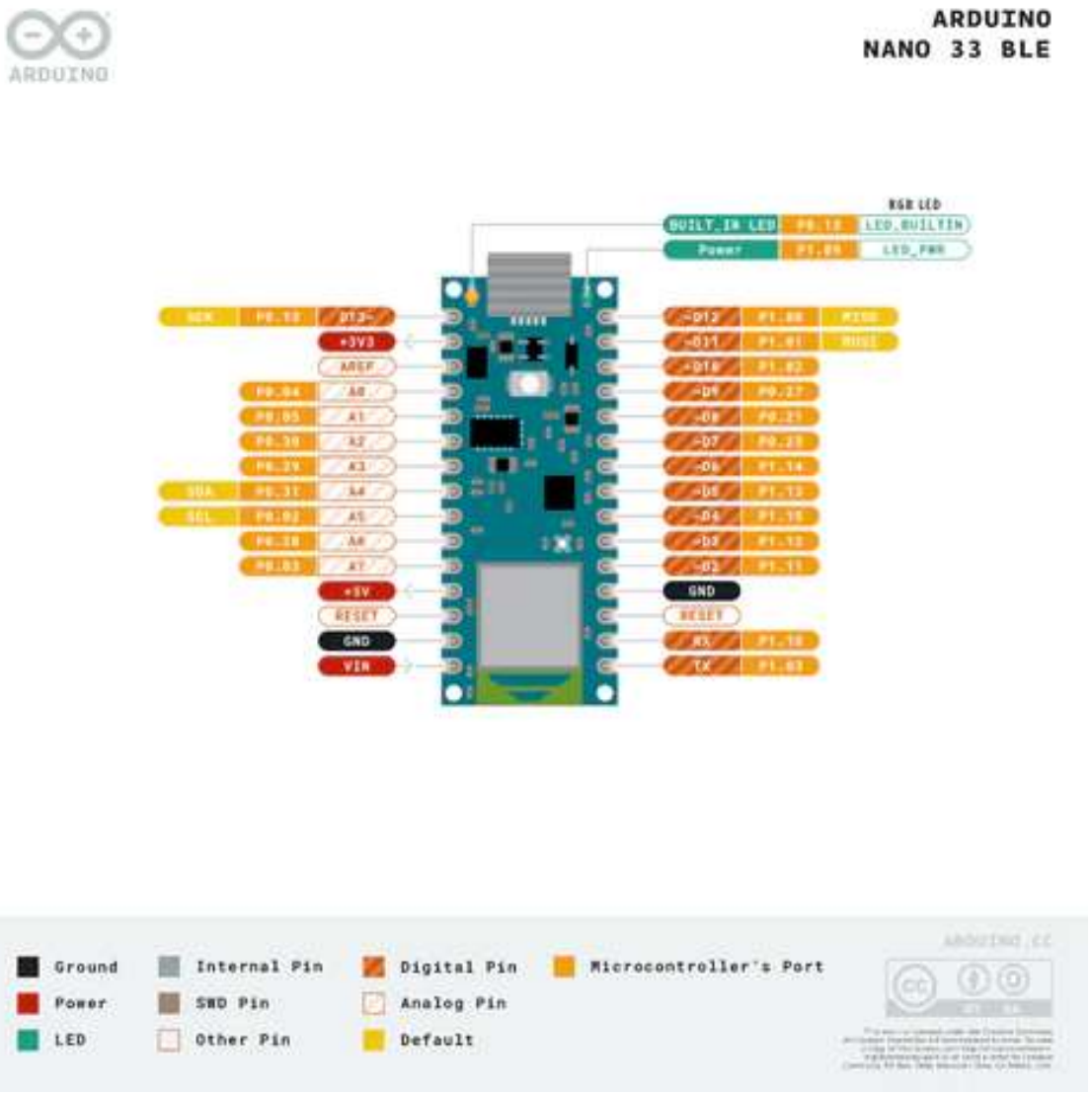
❖ ARDUINO NANO EVERY WITH HEADERS

- The Arduino Nano Every is an evolution of the traditional Arduino Nano board but features ATMega4809 which is a more powerful processor. This will allow you to make larger programs than with the Arduino Uno (it has 50% more program memory), and with a lot more variables (the RAM is 200% bigger). The Arduino Nano Every is a pin-equivalent substitute to the traditional Arduino Nano. The main differences are a better processor and a micro-USB connector.



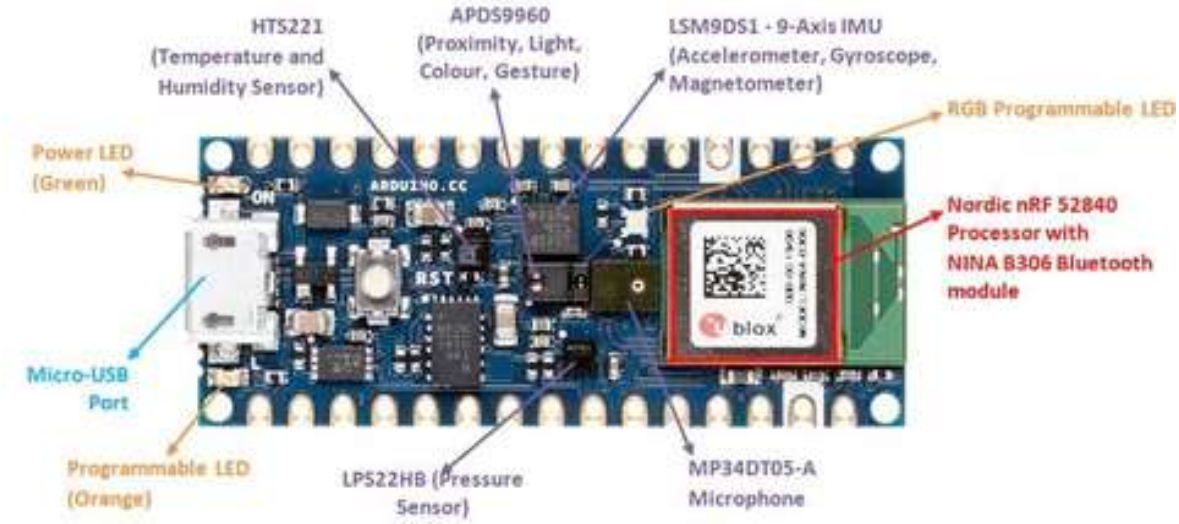
❖ ARDUINO NANO 33 BLE WITH HEADERS

- The Arduino Nano 33 BLE is an evolution of the traditional Arduino Nano, but featuring a lot more powerful processor, the nRF52840 from Nordic Semiconductors, a 32-bit ARM® Cortex™-M4 CPU running at 64 MHz. This will allow you to make larger programs than with the Arduino Uno (it has 1MB of program memory, 32 times bigger), and with a lot more variables (the RAM is 128 times bigger). The main processor includes other amazing features like Bluetooth® pairing via NFC and ultra-low power consumption modes.



❖ ARDUINO NANO BLE SENSE WITH HEADERS

- The Arduino Nano BLE sense is completely a new Arduino AI-enabled board in the smallest form factor. The Arduino Nano 33 BLE Sense is an evolution of the traditional Arduino Nano, but featuring a lot more powerful processor, the nRF52840 from Nordic Semiconductors, a 32-bit ARM Cortex -M4 CPU running at 64 MHz. This Arduino Nano BLE sense will allow you to make larger programs than with the Arduino Uno and with a lot more variables.



2.1.5 L298D Motor Driver

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 6. Shows the L298D Motor Driver.

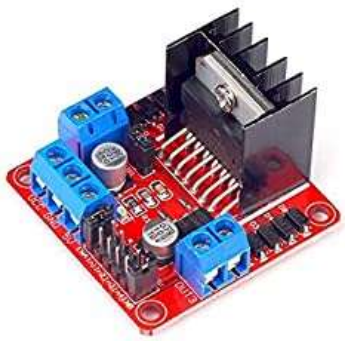


Figure 6: L289D Motor Driver

Different Types of Driving Module

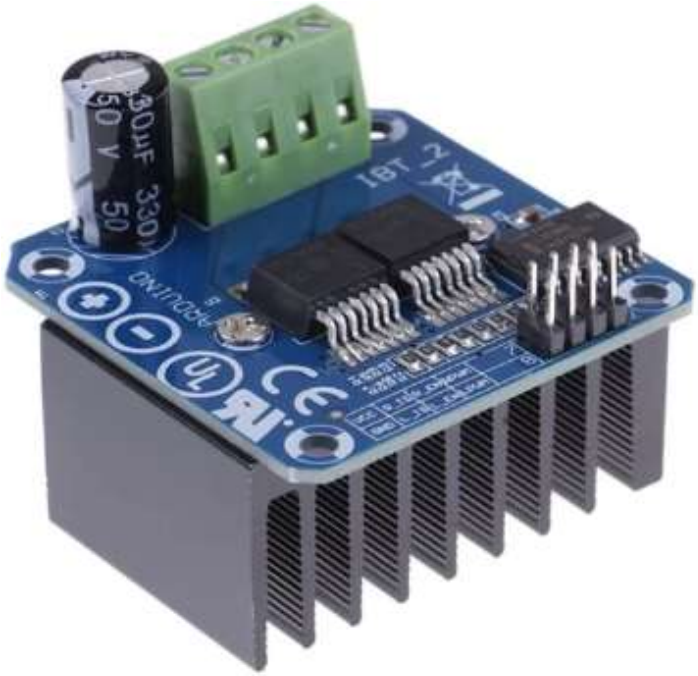
- **L293D Motor Driver IC**

  - L293D IC generally comes as a standard 16-pin DIP (dual-in-line package). This motor driver IC can simultaneously control two small motors in either direction; forward and reverse with just 4 microcontroller pins (if you do not use enable pins).
  - A motor driver is basically a current amplifier that takes a low-current signal from the microcontroller and gives out a proportionally higher current signal which can control and drive a motor. In most cases, a transistor can act as a switch and perform this task which drives the motor in a single direction.
  - Turning a motor ON and OFF requires only one switch to control a single motor in a single direction.

❖ **BTS7960B 43A H-Bridge Motor Driver**

- The Double BTS7960 43A H-Bridge High-Power Stepper Motor Driver Module is a fully integrated high current H bridge designed for motor drive applications that use the BTS7960 high current half bridge. The NovalithICTM family includes the BTS7960. This package contains one p-channel high side MOSFET and one n-channel low side MOSFET, as well as an integrated driver IC. The p-channel high side switch eliminates the need for a charge pump, reducing EMI.

- The integrated driver IC simplifies interfacing to a microcontroller by providing logic level inputs, diagnosis with current sense, slew rate adjustment, dead time generation, and protection against overtemperature, overvoltage, undervoltage, overcurrent, and short circuit. The Double BTS7960 43A H-Bridge High-Power Stepper Motor Driver Module is a low-cost solution for protected high-current PWM motor drives with small in size.



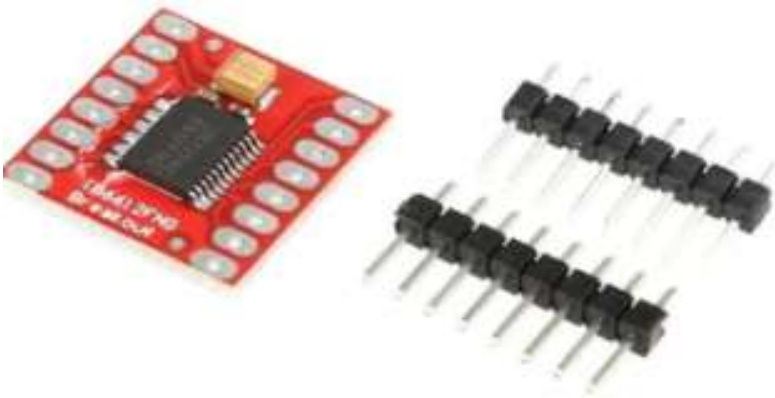
❖ **TB6612FNG Dual DC Motor Driver**

- The Motor Driver TB6612FNG Module can control up to two DC motors at 1.2A constant current (3.2A peak). The motor can be controlled by two input signals (IN1 and IN2) in one of four function modes: CW, CCW, short-brake, and stop.

- The Motor Driver TB6612FNG Module can control up to two DC motors at 1.2A constant current (3.2A peak). The motor can be controlled by two input signals (IN1 and IN2) in one of four function modes: CW, CCW, short-brake, and stop.

- The logic supply voltage (VCC) can range from 2.7 to 5.5VDC, while the motor supply (VM) has a maximum voltage of 15VDC. The maximum output current per channel is 1.2A. (or up to 3.2A for a short, single pulse).

- All components are installed on the board as shown. On both supply lines, decoupling capacitors are installed. The TB6612FNG has all of its pins broken out to two 0.1″ pitch headers, with input pins on one side and output pins on the other.



❖ **TB6600 Stepper Motor Driver**

- TB6600 Stepper Motor Driver Controller 4A is an easy-to-use professional Arduino stepper motor driver, which can control a two-phase stepper motor . It is compatible with Arduino and other microcontrollers that can output a 5V digital pulse signal. Jumper wires are used to connect the stepper motor to the Arduino.

- TB6600 Arduino stepper motor driver has a wide range of power inputs and a 9~42VDC power supply. It is able to output a 4A peak current, which is enough for most of the stepper motors. The stepper driver supports speed and direction control.

- TB6600 Stepper Motor Driver Controller 4A 9~42V TTL 16 Micro-Step CNC 1 Axis Upgraded Version of the 42/57/86 Stepper Motor segment increased to 32 segments, suitable for high subdivision applications. Suitable for step motor:57, 42, 86 Type 4 phase 2 phase (4 line 6 line 8).

2.1.6 HC05 Bluetooth module

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

Figure 7: HC05 Bluetooth module

2.1.7 Jumper Cables

- Jumper cables, booster cables or jumper leads (all three terms describe the same product), let you get a jump start of your dead car battery. The cables connect the battery of a running car to the battery of your dead (won't-start) car. Even if you have auto club or roadside service, you can be on your way in five minutes, quicker than waiting for a service vehicle

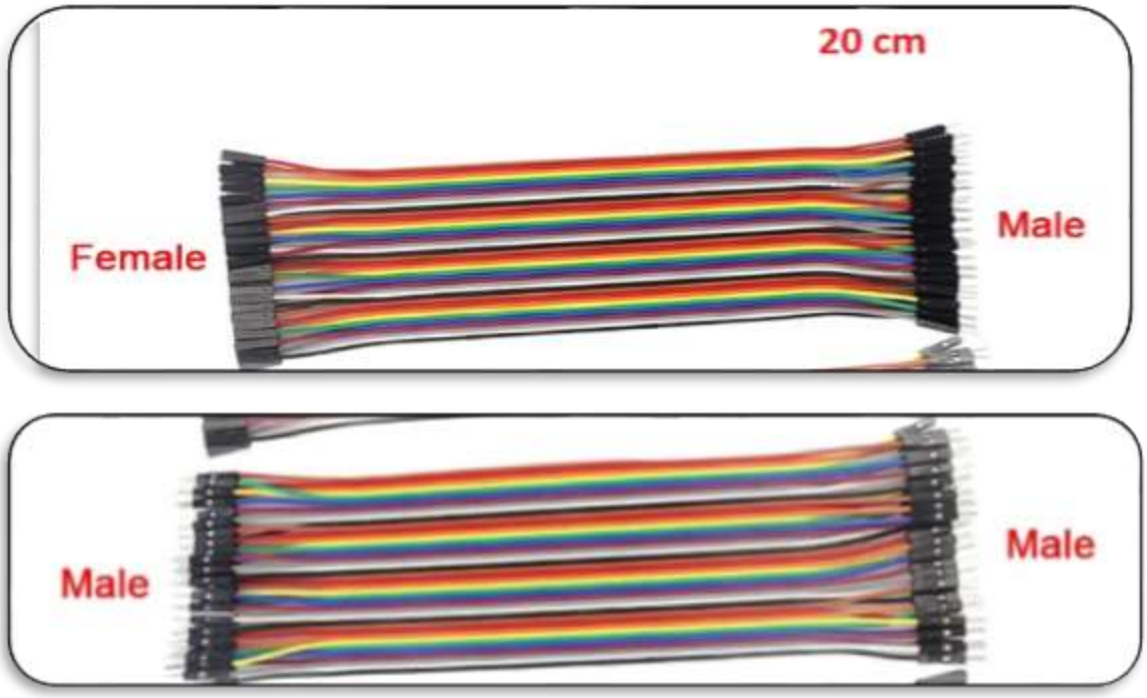
- Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with bread boards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn’t get much more basic than jumper wires.

- **Types of Jumper Wires**
  Jumper wires come in three versions:

- Male-to-male jumper
- Male-to-female jumper
- Female-to-female jumper
- And two types of head shapes: square head and round head.

- The difference between each is in the endpoint of the wire. Male ends have a pin protruding and can plug into things, while female ends do not but are also used for plugging.

- Moreover, a male connector is referred to as a plug and has a solid pin for center conduction. Meanwhile, a female connector is referred to as a jack and has a center conductor with a hole in it to accept the male pin.



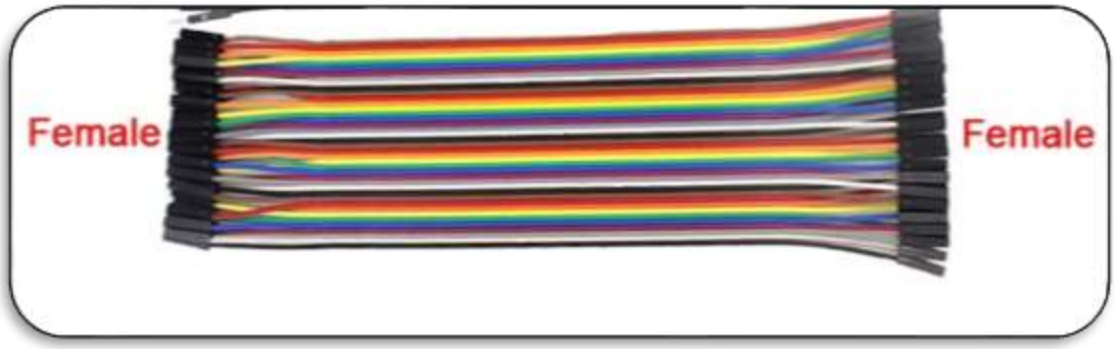


Figure 8

Figure 9

2.1.8 The Android App

Android phone with a software is the transmitter end. At first, there have to integrate of Bluetooth HC-05/HC-06. When matching is done, at that factor it have to be associated. When the software is jogging with inside the phone, the client's voice orders are prominent through the tele call smartphone microphone.

How to use Android application to control the Robot for that the steps are given below:

1) 1) Install the application "AMR Voice Control" from Google play store.

2) After installation, activate the Bluetooth of smartphone and Bluetooth module.

3) Now pair your smartphone Bluetooth with Bluetooth module HC-05 and therefore the default password for pairing is "0000" or "1234".

4) Now the appliance and robot is prepared to perform the operation.

5) Now click on the "MIC" of the appliance and provides specific command to the robot.

6) The purposed system will perform the certain action according to the command.

7) The operator of the system will provide command to the system by the installed application on his/her smartphone.

8) Supposed the operator provides the command forward then the command will be delivered to the Bluetooth module installed on the car after that Bluetooth module will pass that command to the microcontroller and microcontroller will guide the system with regards to code being

inserted and perform the particular action as commanded. Meanwhile the purposed system will perform other action following the similar procedure.

2.1 Block Diagram

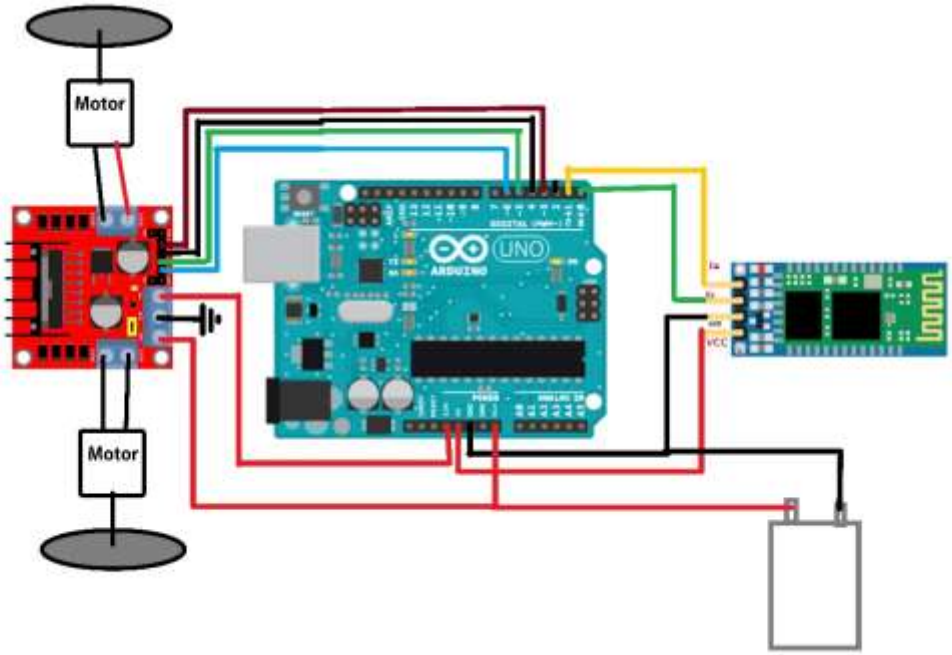


Figure 10

2.2 Software Description

Software requirements deal with defining software resource requirements and prerequisites thatneed to be installed on a computer to provide optimal functioning of an application.

These requirements or prerequisites are generally not included in the software installationpackage and need to be installed separately before the software is installed.

2.3.2 Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

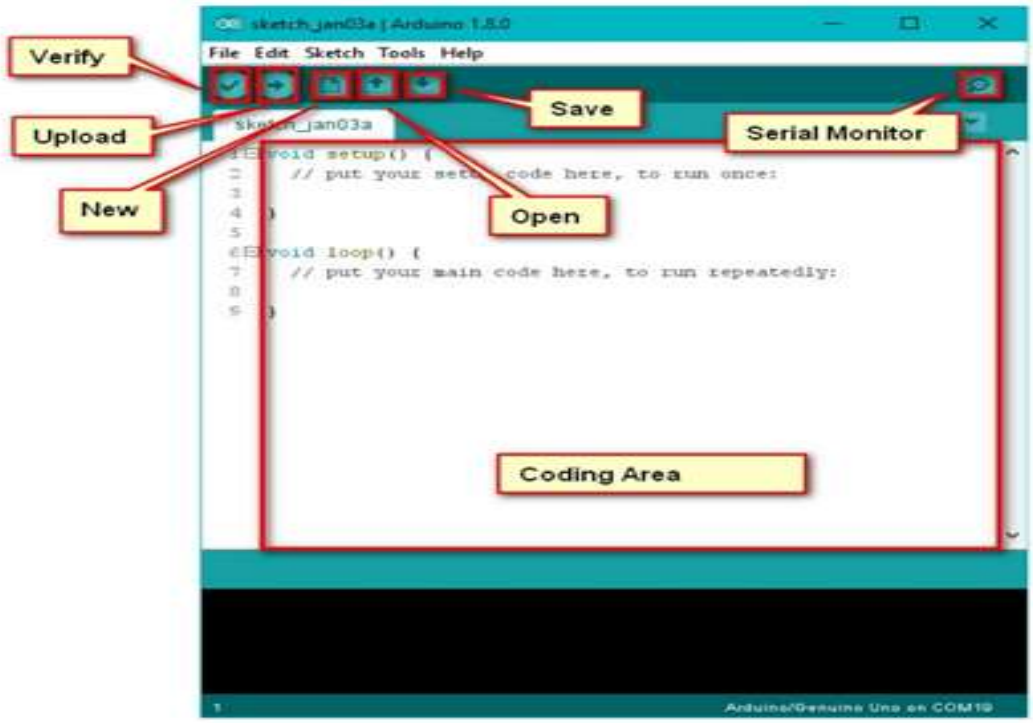


Figure 11: Arduino IDE main window

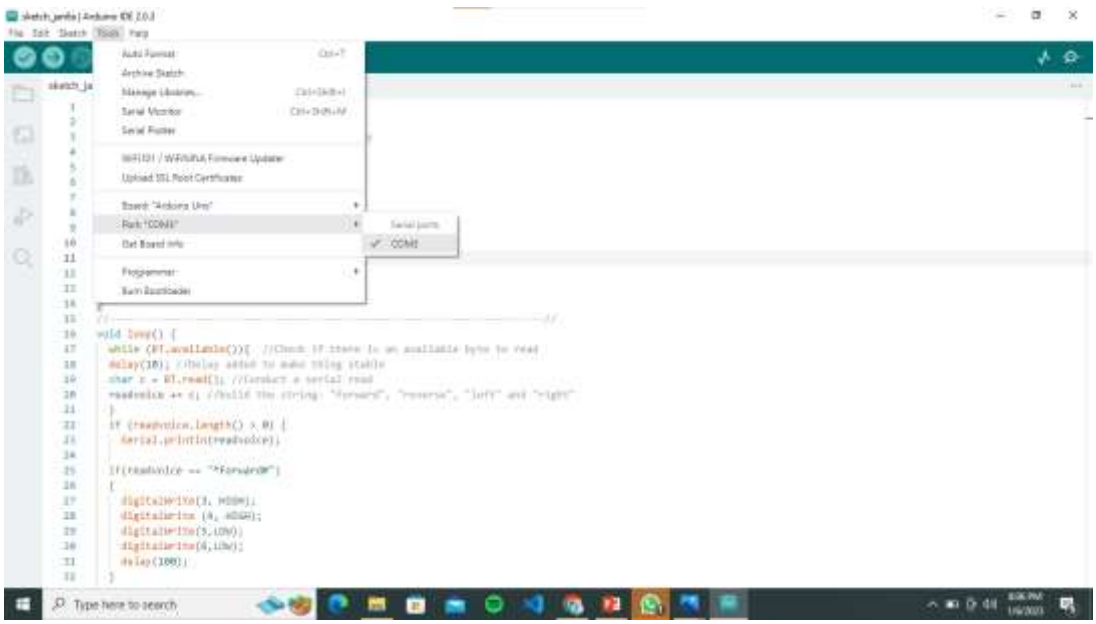


Figure 12: Port Selection

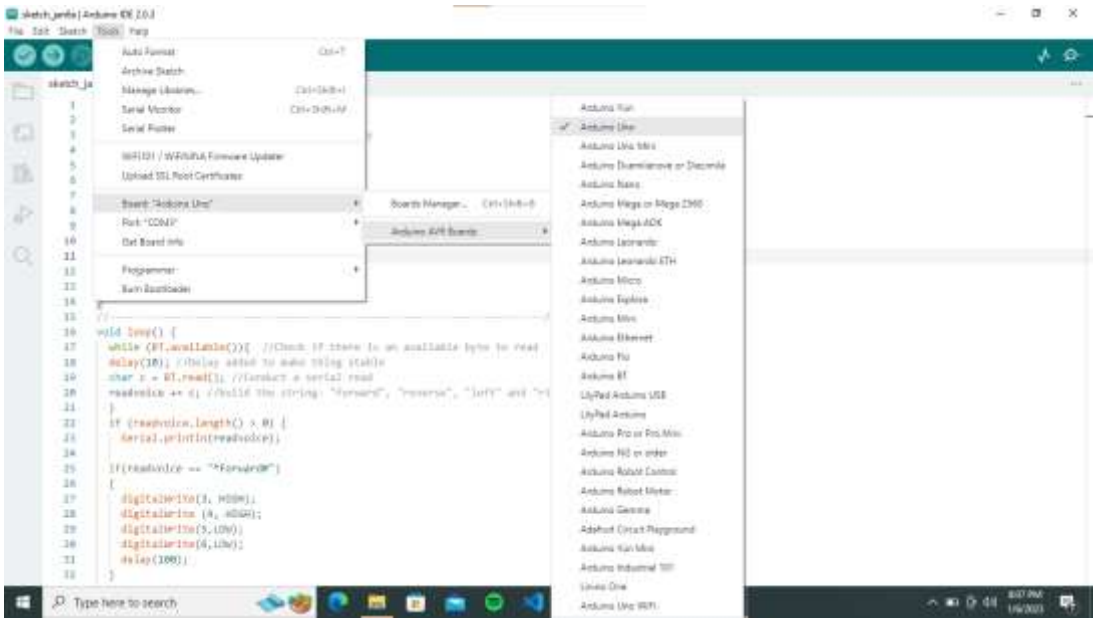


Figure 13: Board Selection

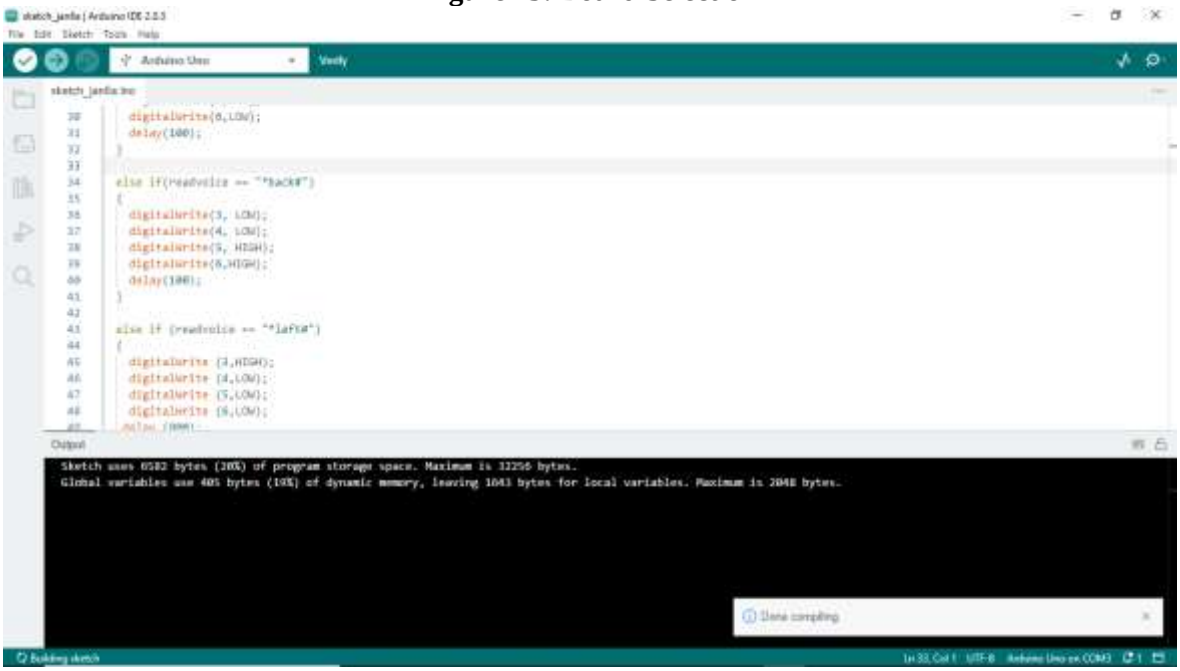


Figure 14: Compiling Project

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and linux.The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in Java. It originated from the IDE for the Processing programming language project and the Wiring project. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and provides simple one-click mechanism for compiling and loading programs to an Arduino board. A

program written with the IDE for Arduino is called a “sketch” . The main window of Arduino IDE is shown in Fig.. The Arduino Software (IDE) uses the concept of a sketchbook: a standard place to store your programs (or sketches). The sketches in your sketchbook can be opened from the File > Sketchbook menu or from the Open button on the toolbar. The first time you run the Arduino software, it will automatically create a directory for your sketchbook.

You can view or change the location of the sketchbook location from with the Preferences dialog. Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. To use a library in a sketch, select it from the Sketch > Import Library menu. This will insert one or more #include statements at the top of the sketch and compile the library with your sketch. Because libraries are uploaded to the board with your sketch, they increase the amount of space it takes up. There is a list of libraries in the reference. Some libraries are included with the Arduino software. Others can be downloaded from a variety of sources or through the Library Manager. Starting with version 1.0.5 of the IDE, you do can import a library from a zip file and use it in an open sketch.

2.3.2 WINDOWS 7 and Above

- Windows 7 is a major release of the Windows NT operating system developed by Microsoft. It was released to manufacturing on July 22, 2009, and became generally available on October 22, 2009.

- It is the successor to Windows Vista, released nearly three years earlier. It remained an operating system for use on personal computers, including home and business desktops, laptops, tablet PCs and media center PCs, and itself was replaced in November 2012 by Windows 8, the name spanning more than three years of the product.

- Windows 7 was intended to be an incremental upgrade to Microsoft Windows, addressing Windows Vista's poor critical reception while maintaining hardware and software compatibility. Windows 7 continued improvements on the Windows Aero user interface with the addition of a redesigned taskbar that allows pinned applications, and new window management features.

- Windows 7 is the final version of Windows that supports processors without SSE2 or NX (although an update released in 2018 dropped support for non-SSE2 processors). Its successor, Windows 8, requires a processor with SSE2 and NX in any supported architecture.

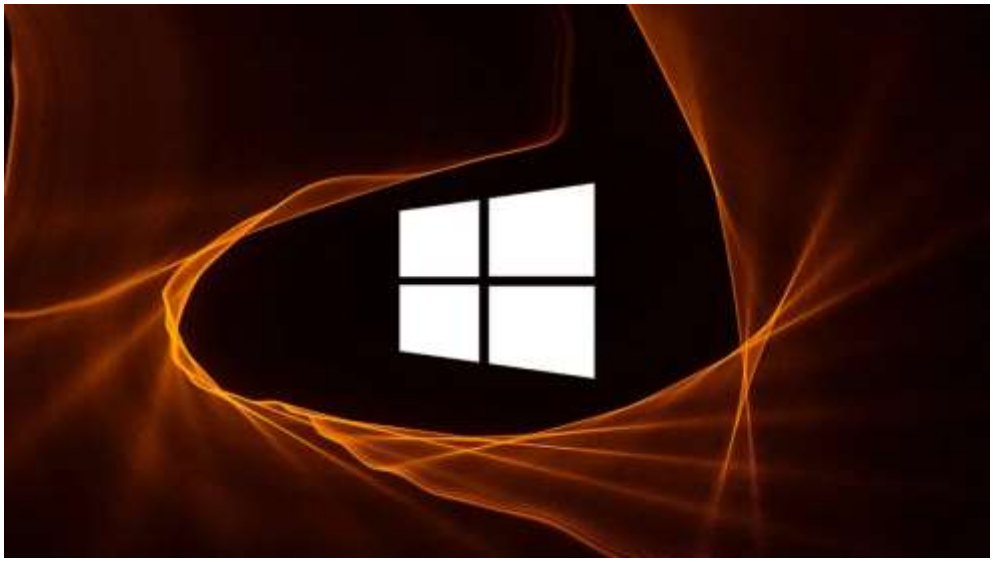


Figure 15

2.3.3 INTERNET

- The Internet (or internet) is the global system of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices.

- It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

- The origins of the Internet date back to the development of packet switching and research commissioned by the United States Department of Defense in the 1960s to enable time-sharing of computers. The primary precursor network, the ARPANET, initially served as a backbone for interconnection of regional academic and military networks in the 1970s to enable resource sharing.

Figure 16

2.3.4 Circuit Diagram

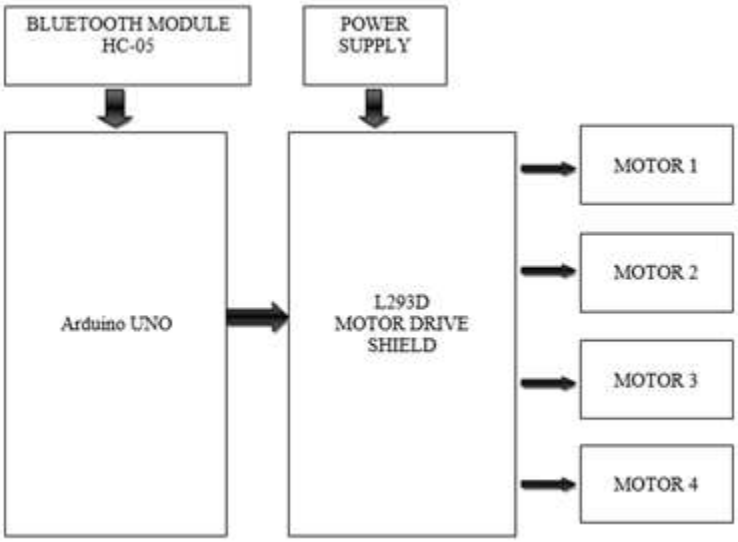


Figure 17: Circuit Diagram

CHAPTER 3 BUSINESS MODEL

A business model describes how an organization creates, delivers, and captures value, in economic, social, cultural, or other contexts. The process of business model construction and modification is also called business model innovation and forms a part of business strategy.

3.1 ER Diagram

Upon successfully pairing the device, open the app on the smart phone and press on the Bluetooth textual and emblematic pushbutton. The number of associated gadgets will now be shown. Select HC-05 from the listing to join the smart phone with HC-05 Bluetooth module on the receiver side. After successful connection, 'connected' will be displayed on the primary screen of Voice control app. Press the pushbutton with microphone image and a prompt will show up asking for voice commands.

- When it appears, voice instructions are detected via the app, which converts them into textual content and sends it to the receiver aspect wirelessly by using Bluetooth. On the receiving side, Arduino tests the text. If it is a matching string, it controls the moves of the robot in accordance to the description

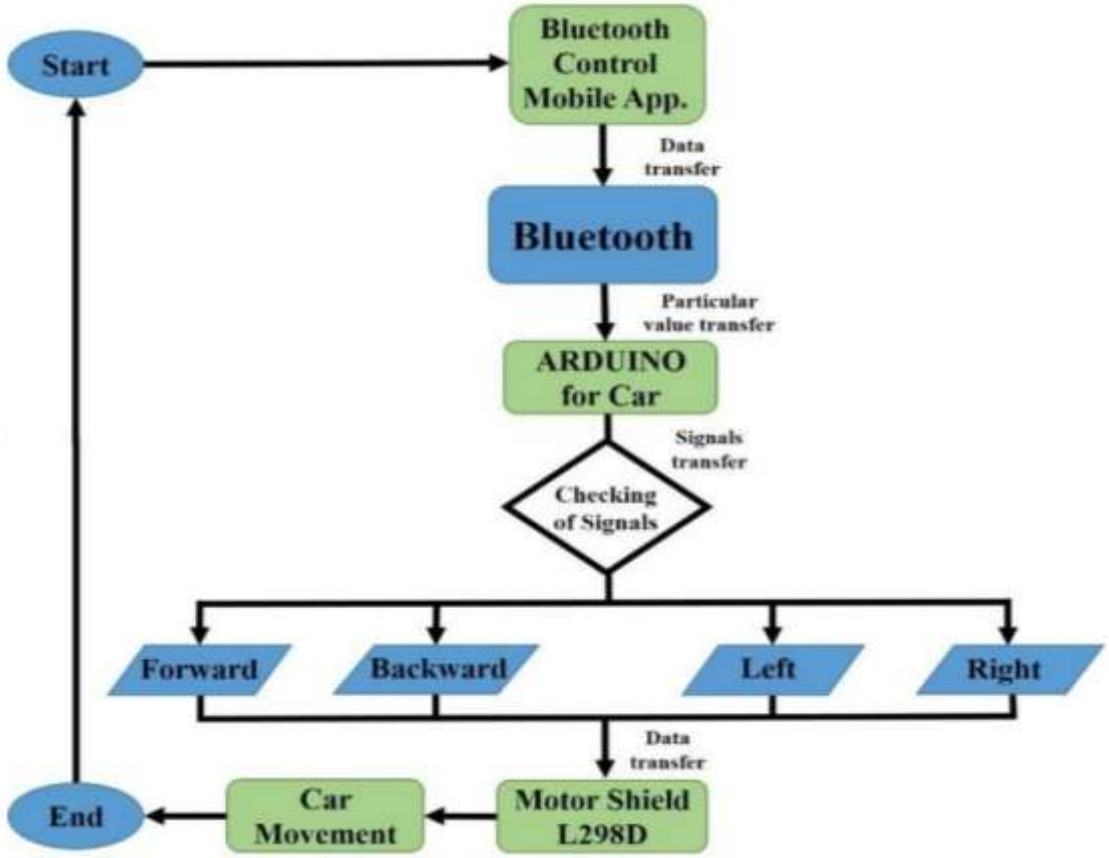


Figure 18: ER Diagram

- Various languages can be given as a voice input using Google's speech recognition technology rather than using an offline Bit Voicer server.

The following figures shows the Bluetooth connectivity to the Bluetooth module.

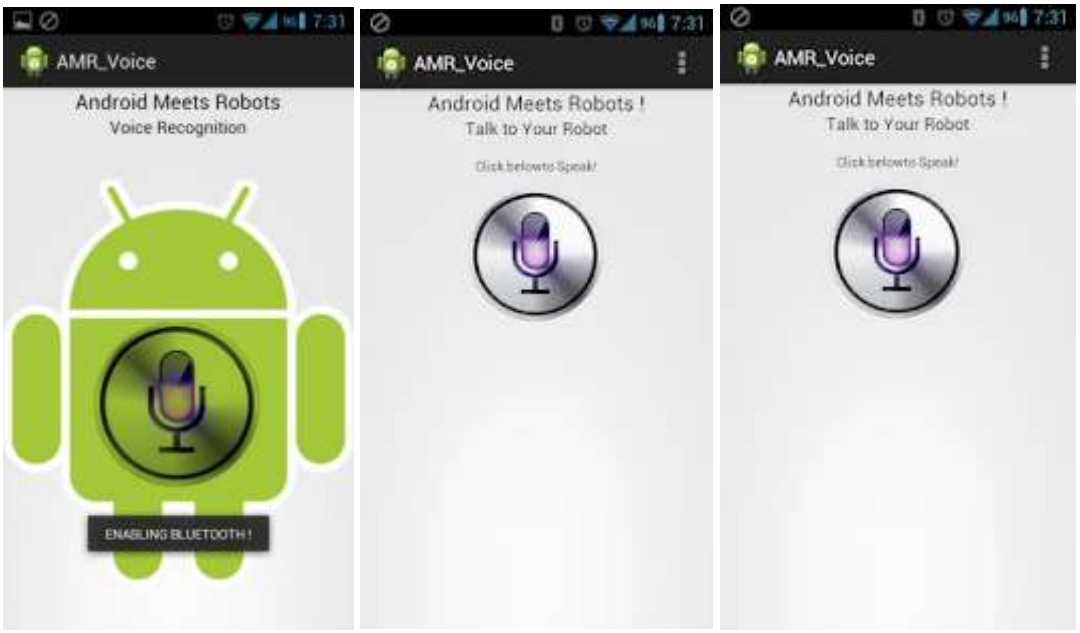


Figure 19

3.2 DFD Diagram

- **What is Data Flow Diagram?**

A data flow diagram (DFD) is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement. They are often elements of a formal methodology such as Structured Systems Analysis and Design Method (SSADM).

1. What are the different DFD levels and layers?

Levels or layers are used in DFDs to represent progressive degrees of detail about the system or process. These levels include:

- **Level 0:** Also known as a "context diagram," this is the highest level and represents a very simple, top-level view of the system being represented.
- **Level 1:** Still a relatively broad view of the system, but incorporates subprocesses and more detail.

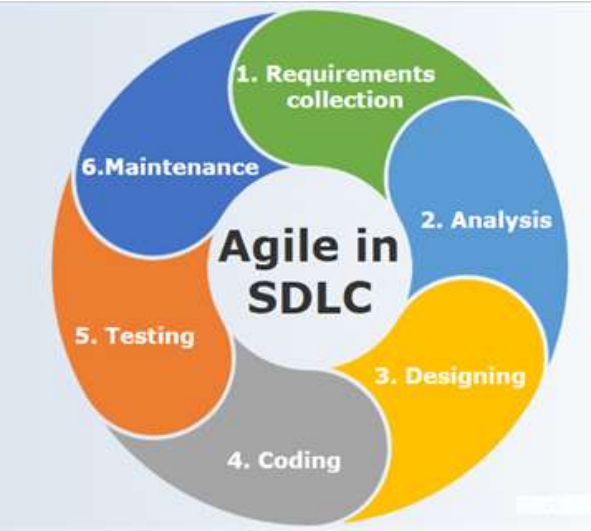
- **Level 2:** Provides even more detail and continues to break down sub processes as needed.
- **Level 3:** While this amount of detail is uncommon, complex systems can benefit from representation at this level.

3.3 SDLC Model

Agile Model - Agile methodology is a practice which promotes continues interaction of development and testing during the SDLC process of any project. In the Agile method, the entire project is divided into small incremental builds. All of these builds are provided in iterations, and each iteration lasts from one to three weeks.

Any agile software phase is characterized in a manner that addresses several key assumptions about the bulk of software projects:

1. It is difficult to think in advance which software requirements will persist and which will change. It is equally difficult to predict how user priorities will change as the project proceeds.
2. For many types of software, design and development are interleaved. That is, both activities should be performed in tandem so that design models are proven as they are created. It is difficult to think about how much design is necessary before construction is used to test the configuration.
3. Analysis, design, development, and testing are not as predictable (from a planning point of view) as we might like.



Different Types of SDLC Model:

- Waterfall Model
- Spiral Model
- V-Model
- Incremental Model
- Iterative Model

1. **Waterfall Model** - The waterfall is a universally accepted SDLC model. In this method, the whole process of software development is divided into various phases.

   The waterfall model is a continuous software development model in which development is seen as flowing steadily downwards (like a waterfall) through the steps of requirements analysis, design, implementation, testing (validation), integration, and maintenance.

2. Linear ordering of activities has some significant consequences. First, to identify the end of a phase and the beginning of the next, some certification techniques have to be employed at the end of each step. Some verification and validation usually do this mean that will ensure that the output of the stage is consistent with its input (which is the output of the previous step), and that the output of the stage is consistent with the overall requirements of the system.

3. **Spiral Model** - The spiral model is a **risk-driven process model**. This SDLC model helps the group to adopt elements of one or more process models like a waterfall, incremental, waterfall, etc. The spiral technique is a combination of rapid prototyping and concurrency in design and development activities.

   Each cycle in the spiral begins with the identification of objectives for that cycle, the different alternatives that are possible for achieving the goals, and the constraints that exist. This is the first quadrant of the cycle (upper-left quadrant).

   The next step in the cycle is to evaluate these different alternatives based on the objectives and constraints. The focus of evaluation in this step is based on the risk perception for the project.

   The next step is to develop strategies that solve uncertainties and risks. This step may involve activities such as benchmarking, simulation, and prototyping.

4. **V- Model** - In this type of SDLC model testing and the development, the step is planned in parallel. So, there are verification phases on the side and the validation phase on the other side. V-Model joins by Coding phase.

5. **Incremental Model** - The incremental model is not a separate model. It is necessarily a series of waterfall cycles. The requirements are divided into groups at the start of the project. For each group, the SDLC model is followed to develop software. The SDLC process is repeated, with each release adding more functionality until all requirements are met. In this method, each cycle act as the maintenance phase for the previous software release. Modification to the incremental model allows development cycles to overlap. After that subsequent cycle may begin before the previous cycle is complete.

6. **Iterative Model –** It is a particular implementation of a software development life cycle that focuses on an initial, simplified implementation, which then progressively gains more complexity and a broader feature set until the final system is complete. In short, iterative development is a way of breaking down the software development of a large application into smaller pieces.

CHAPTER 4: CODING & SCREENSHOT

```
#include <SoftwareSerial.h>

SoftwareSerial BT(0, 1); //TX, RX respetively
String readvoice;

void setup() {
 BT.begin(9600);
 Serial.begin(9600);
  pinMode(4, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);

}
//---------------------------------------------------------------------//
void loop() {
  while (BT.available()){  //Check if there is an available byte to read
  delay(10); //Delay added to make thing stable
  char c = BT.read(); //Conduct a serial read
  readvoice += c; //build the string- "forward", "reverse", "left" and "right"
  }
  if (readvoice.length() > 0) {
    Serial.println(readvoice);

\\FORWARD

  if(readvoice == "*forward#")
  {
    digitalWrite(3, HIGH);
    digitalWrite (4, HIGH);
    digitalWrite(5,LOW);
    digitalWrite(6,LOW);
    delay(100);
  }

\\BACK

  else if(readvoice == "*back#")
  {
    digitalWrite(3, LOW);
    digitalWrite(4, LOW);
    digitalWrite(5, HIGH);
    digitalWrite(6,HIGH);
    delay(100);
  }
```

```
\\LEFT

 else if (readvoice == "*left#")
 {
  digitalWrite (3,HIGH);
  digitalWrite (4,LOW);
  digitalWrite (5,LOW);
  digitalWrite (6,LOW);
 delay (800);
    digitalWrite(3, HIGH);
  digitalWrite (4, HIGH);
  digitalWrite(5,LOW);
  digitalWrite(6,LOW);
  delay(100);

 }

\\RIGHT

 else if ( readvoice == "*right#")
 {
  digitalWrite (3, LOW);
  digitalWrite (4, HIGH);
  digitalWrite (5, LOW);
  digitalWrite (6, LOW);
  delay (800);
     digitalWrite(3, HIGH);
   digitalWrite (4, HIGH);
   digitalWrite(5,LOW);
   digitalWrite(6,LOW);
   delay(100);
 }

\\STOP

 else if (readvoice == "*stop#")
 {
  digitalWrite (3, LOW);
  digitalWrite (4, LOW);
  digitalWrite (5, LOW);
  digitalWrite (6, LOW);
  delay (100);
 }

\\WATCH ALL DIRECTIONS

 else if (readvoice == "*keep watch in all direction#")
```

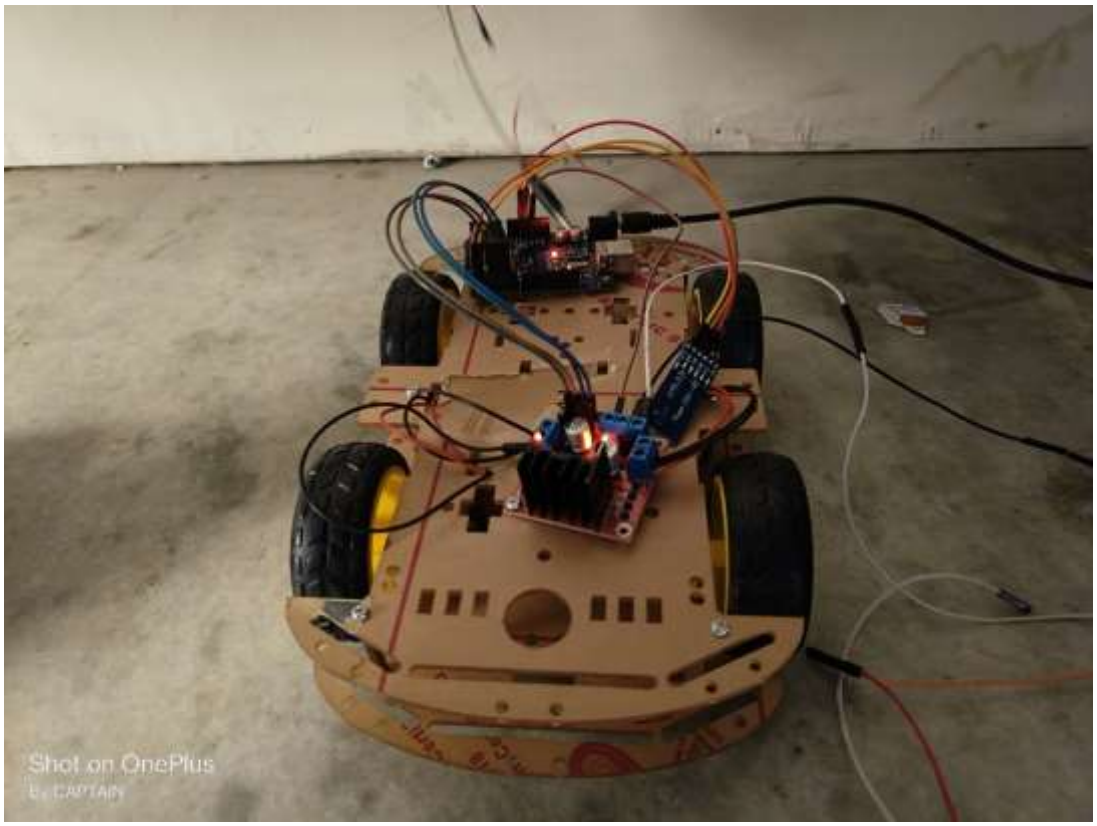
```
 {
   digitalWrite (3, HIGH);
   digitalWrite (4, LOW);
   digitalWrite (5, LOW);
   digitalWrite (6, LOW);
   delay (100);
 }

\\SHOW ME GARBA

  else if (readvoice == "*show me Garba#")
 {
 digitalWrite (3, LOW);
   digitalWrite (4, HIGH);
   digitalWrite (5, LOW);
   digitalWrite (6, LOW);
   delay (400);
      digitalWrite(3, HIGH);
    digitalWrite (4, HIGH);
    digitalWrite(5,LOW);
    digitalWrite(6,LOW);
    delay(600);
    digitalWrite (3, LOW);
   digitalWrite (4, HIGH);
   digitalWrite (5, HIGH);
   digitalWrite (6, LOW);
   delay (500);
   digitalWrite (3, HIGH);
   digitalWrite (4, LOW);
   digitalWrite (5, LOW);
   digitalWrite (6, HIGH);
   delay (500);

digitalWrite (3, LOW);
   digitalWrite (4, HIGH);
   digitalWrite (5, LOW);
   digitalWrite (6, LOW);
   delay (400);
      digitalWrite(3, HIGH);
    digitalWrite (4, HIGH);
    digitalWrite(5,LOW);
    digitalWrite(6,LOW);
    delay(600);
    digitalWrite (3, LOW);
   digitalWrite (4, HIGH);
   digitalWrite (5, HIGH);
   digitalWrite (6, LOW);
   delay (500);
```

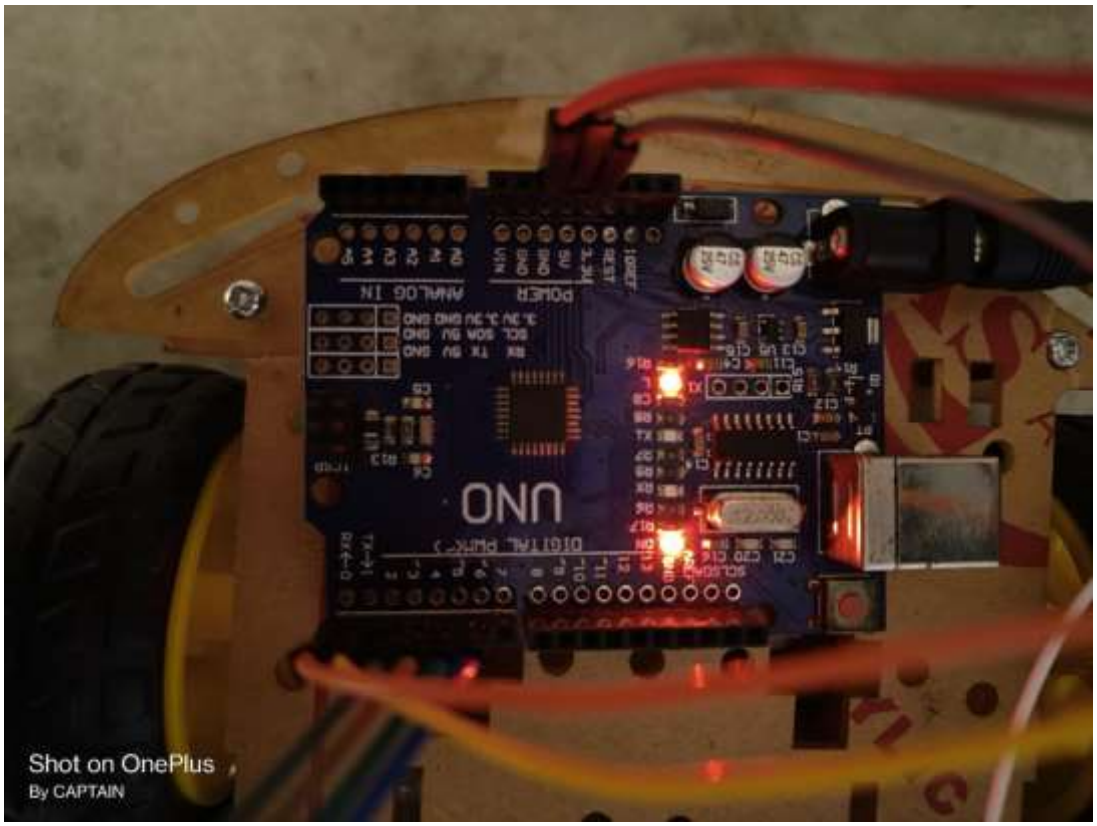
```
digitalWrite (3, HIGH);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, HIGH);
delay (500);digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, LOW);
digitalWrite (6, LOW);
delay (400);
   digitalWrite(3, HIGH);
 digitalWrite (4, HIGH);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 delay(600);
 digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, HIGH);
digitalWrite (6, LOW);
delay (500);
digitalWrite (3, HIGH);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, HIGH);
delay (500);digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, LOW);
digitalWrite (6, LOW);
delay (400);
   digitalWrite(3, HIGH);
 digitalWrite (4, HIGH);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 delay(600);
 digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, HIGH);
digitalWrite (6, LOW);
delay (500);
digitalWrite (3, HIGH);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, HIGH);
delay (500);digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, LOW);
digitalWrite (6, LOW);
delay (400);
   digitalWrite(3, HIGH);
```

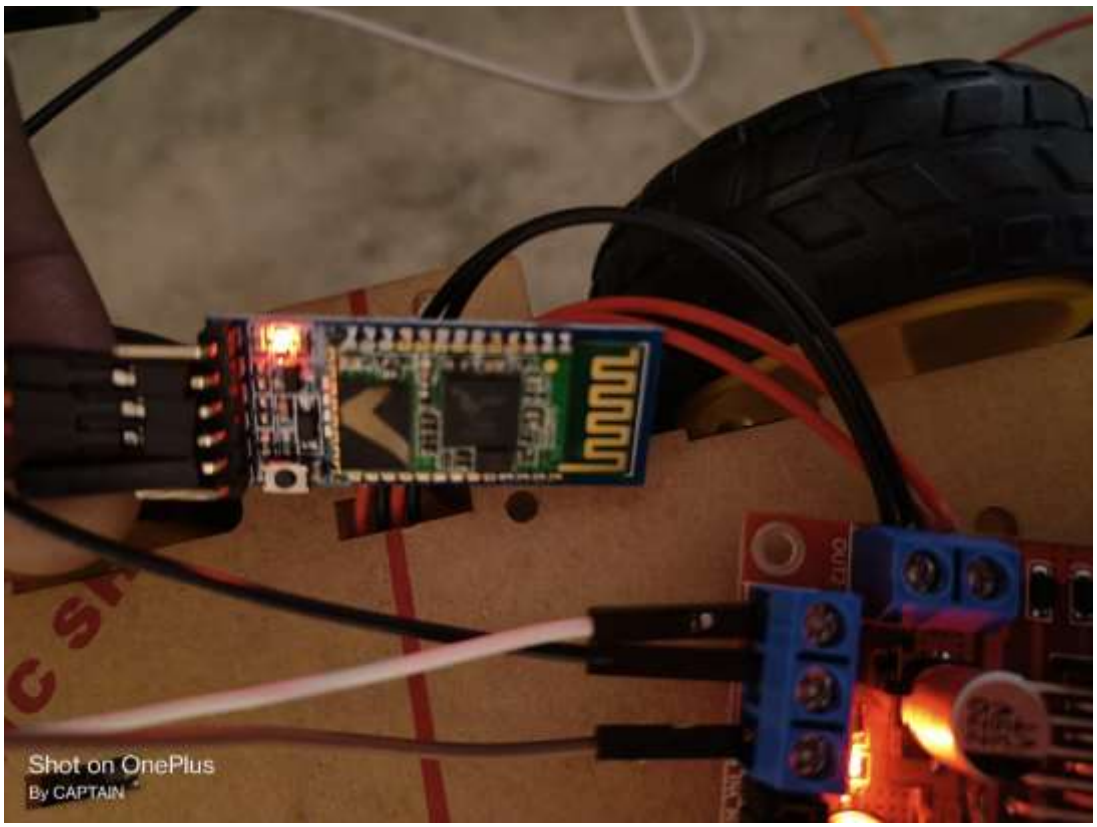
```
 digitalWrite (4, HIGH);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 delay(600);
 digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, HIGH);
digitalWrite (6, LOW);
delay (500);
digitalWrite (3, HIGH);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, HIGH);
delay (500);digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, LOW);
digitalWrite (6, LOW);
delay (400);
   digitalWrite(3, HIGH);
 digitalWrite (4, HIGH);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 delay(600);
 digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, HIGH);
digitalWrite (6, LOW);
delay (500);
digitalWrite (3, HIGH);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, HIGH);
delay (500);digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, LOW);
digitalWrite (6, LOW);
delay (400);
   digitalWrite(3, HIGH);
 digitalWrite (4, HIGH);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 delay(600);
 digitalWrite (3, LOW);
digitalWrite (4, HIGH);
digitalWrite (5, HIGH);
digitalWrite (6, LOW);
delay (500);
digitalWrite (3, HIGH);
```

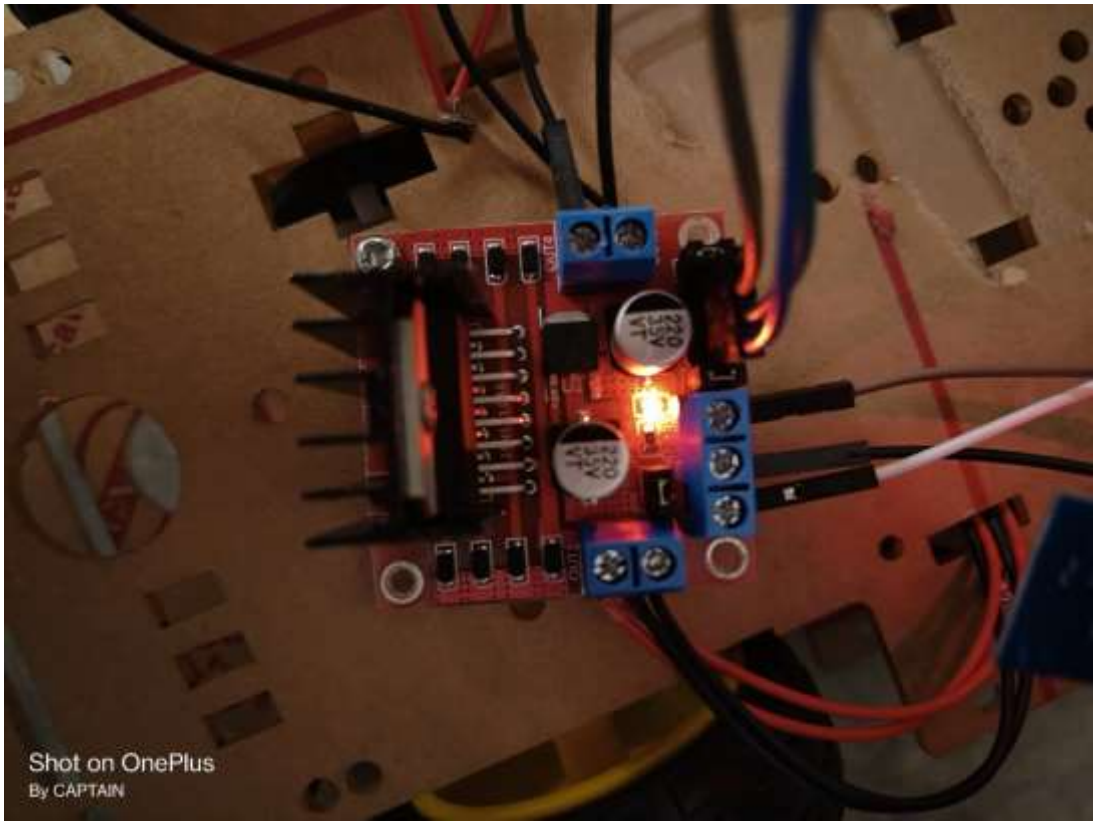
```
  digitalWrite (4, LOW);
  digitalWrite (5, LOW);
  digitalWrite (6, HIGH);
  delay (500);digitalWrite (3, LOW);
  digitalWrite (4, HIGH);
  digitalWrite (5, LOW);
  digitalWrite (6, LOW);
  delay (400);
     digitalWrite(3, HIGH);
   digitalWrite (4, HIGH);
   digitalWrite(5,LOW);
   digitalWrite(6,LOW);
   delay(600);
   digitalWrite (3, LOW);
  digitalWrite (4, HIGH);
  digitalWrite (5, HIGH);
  digitalWrite (6, LOW);
  delay (500);
  digitalWrite (3, HIGH);
  digitalWrite (4, LOW);
  digitalWrite (5, LOW);
  digitalWrite (6, HIGH);
  delay (500);
}
readvoice="";}} //Reset the variable
```

Screenshot






Shot on OnePlus
By CAPTAIN


Shot on OnePlus
By CAPTAIN

CHAPTER 5: FUTURE OF THE PROJECT

5.1 Applications

5.1.1 In chemical industries:

In chemical industry, people cannot handle the chemicals which might be having high temperature. Thus, industrial robot is a vital development towards improving the safety standards in industries. In such hazardous situations, the assistant robots can be used to hold the chemicals and carry them from one place to another without human interference. Also, there might be places in the industries where humans cannot go and work, in all such cases this robot can be controlled by the voice commands and can be directed to go and work in that place. It can also be used to carry small objects in the industry within a certain distance to reduce the time and the manual labor. Robotic assistant can also be used in manufacturing sector for different re-positioning operations.

5.1.2 In homes

People may need assistance to reduce their manual effort, which may be mostly needed in the case of physically handicapped people or the old-aged people. Robotic assistant can be used by physically challenged people or the old-aged people as it helps them to place an object from one place to another which would be difficult for them in general. These assistant robots can move around quickly and also can be controlled easily by voice commands and can be used to obtain the desired result in a quicker span of time and much easily.

5.1.3 In hospitals:

This assistant can be used extensively in the hospitals where it can be used in surgical operations. Robotic arm has been used in various surgeries across hospitals. Furthermore, if it can be guided by the voice commands and carry out the specified task, efficiency can be increased thus also causing the human labor to reduce.

5.2 PROPOSED SYSTEM

In this proposed device we perform a variety of research on control style variants for robots. It shows that it’s feasible to study to successfully manipulate actual world objects with solely voice (human voice) as a control mechanism. The reason of this lookup is to provide simple robotic hardware architecture so that this shape can focal point on Bluetooth connection infrastructure. It is also beneficial for academic robotics due to the fact human beings can construct their personal robots with low cost.

When the app is operating in the system, a microphone on the mobile is used to identify user voice commands. Commands are interpreted and the program utilizes Google's speech-recognition software to translate voice to text within the app. The text will then be sent with the aid of Bluetooth to the receiver part.

The microcontroller Arduino UNO has 32kB of ISP flash memory, 2kB of RAM and 1kB of EEPROM. The panel incorporates serial communication connectivity with UART, SPI and I2C. The MCU will operate at 16MHz clock speed.

The digital Arduino I / O pins 3, 4, 5 and 6 are programmed as output pins in this design. For serial communication with the Bluetooth unit, pins 0 and 1 of Arduino are used. Text obtained with the aid of Bluetooth is forwarded to Arduino UNO microcontroller panel by the usage of UART serial conversation protocol. Table 1displays the voice commands used to monitor the robots and their functions.

CHAPTER 6: CONCLUSION

Voice control for a home assistant robot is developed in this paper. The voice commands are processed in real-time, using an offline server. The speech signal commands are directly communicated to the server over a wired network. The personal assistant robot is developed on a microcontroller based platform and can be aware of its current location. Performance evaluation is carried out with encouraging results of the initial experiments. Possible improvements are also discussed towards potential applications in home, hospitals, car systems and industries. The effect of the distance between the mouth and microphone on the robot, the performance of the robot, and effect of noise on the speech to text conversion are some of the areas that can be further explored. The accent of the speaker does not affect the operation of the robot as the voice commands are processed using a cloud server which functions irrespective of the accent of the speaker. Using renewable source of energy for the functioning of the robot would not only improve upon the cost of the robot but would also prove to be eco-friendly. Solar cells can be a possible source of energy that can be used. The robotic assistant developed has potential applications ranging from chemical industries to comfortable scenario inside homes. This paper should be helpful in showcasing a server based application in developing a voice-controlled robotic assistant.

The project \"Voice Controlled Robotic Vehicle\" has numerous uses both now and in the future. In the future, improvements can be added to the project to make it more effective. The project has a wide range of applications, including military, home security, rescue missions, industry, and medical support. Using the given resources, we were able to create a rudimentary model of a voice-controlled robotic car. Because this project is simple to implement, this robot is advantageous to human life. The Voice Control Robot is beneficial for monitoring and assisting disabled persons. It is simple to use because it operates with basic voice commands. It is effective in locations where humans are unable to reach. This robot is modest in size. This robot can be used to spy on people. It has the potential to be utilized for surveillance. For security purposes, we can incorporate a web cam into this robot. The voice recognition software is accurate and sensitive to background noise, allowing it to distinguish a voice command.

References

[1] M. Meghana et al, 2020, Hand gesture recognition and voice-controlled robot, Materials Today: Proceedings, 2214-7853.

[2] Bhanu chandu, Kirupa Ganapathy, 2020, Voice Controlled Human Assistence Robot, International Conference on Advanced Computing & Communication Systems (ICACCS), 978-1- 7281-5197-7/20.

[3] P. Mahesh Reddy, Suram Pavan Kalyan Reddy, G R Sai Karthik, Priya B.K,2020, Intuitive Voice Controlled Robot for Obstacle, Smoke and Fire Detection for Physically Challenged People, International Conference on Trends in Electronics and Informatics (ICOEI), ISBN: 978-1-7281- 5518-0.

[4] Ms. M. Ramjan Begum, Mr. S. Chandramouli, Mr. T. Gowtham, 2020, Design And Development Of Dual Axis Control Robot For Writing Robot Through Speech Recognition, International Research Journal of Modernization in Engineering Technology and Science, e- ISSN: 2582-5208.

[5] Linda John et al,2020, Voice Control Human Assistance Robot, National Conference on Technical Advancements for Social Upliftment, Proceedings of the 2 and VNC; VNC-2020;

[6] Anurag Mishra, Pooja Makula, Akshay Kumar, Krit karan, and V.K. Mittal, 2015, A voicecontrolled personal assistant robot, International Conference on Industrial Instrumentation and Control (ICIC).

[7] Dyah Ayu Anggreini Tuasikal, Hanif Fakhrurroja, Carmadi Machbub, 2018, Voice Activation Using Speaker Recognition for Control.

[8] A Voice-Controlled Personal Robot AssistantAnurag Mishra, Pooja Makula, Akshay Kumar, Krit Karan and V.K. Mittal, IIIT, Chittoor, A.P., India.

[9] lawrence rabiner and biing hwang juang fundamentals of speech recognition prentice hall new jersey 1993

[10]p chopra and h dange voice controlled robot department of electronics engineering kj somaiya college of engineering vidyavihar mumbai 2007

[11] k kannan1 dr j selvakumar2 arduino based voice controlled robot ijett volume 02 issue 01 march 2015 pp49

[12] nelson rai1 deepak rasaily2 tashi rapden wangchuk3 manoj gurung4 rit kr khawas5 bluetooth remote controlled car using arduino ijett volume-33 number 8- march 2016 page 381