

Voice Controlled Home Automation System by Using Short-range Wireless Technology

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Submitted in partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science and Engineering



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SONARGAON UNIVERSITY (SU)**

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APPROVAL

The project titled “**Voice Controlled Home Automation System by Using Short-range Wireless Technology**” submitted by Md. Amir Hamza (CSE1901016166), Riddyman Biswas (CSE1901016051), Kahirul Islam (CSE1901016158) and Mst. Nushrat Jahan (CSE1901016004) to the Department of Computer Science and Engineering, Sonargaon University (SU), has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents.

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DECLARATION

We, hereby, declare that the work presented in this report is the outcome of the investigation performed by us under the supervision of **Sabrina Tasnim, Assistant Professor**, Department of Computer Science and Engineering, Sonargaon University, Dhaka, Bangladesh. We reaffirm that no part of this project has been or is being submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

Smart Home automation system is getting popular day by day because of its huge advantages, enhanced security, affordability etc. A smart home automation system allows us to automatically control our home electronic and other technology-based systems using hardware and software. In recent years with the help of mobile phones, we can easily control household devices. The user can control their connected devices in the range of Bluetooth module. We designed this system for mobile phones having android platform to automate a Bluetooth interfaced Arduino which controls a number of home appliances like lights, fans, bulbs. In the future, it can be controlled all those home devices allow us to control things like our home Wi-Fi, door locks, door bells, protection camera, ac, application, heating and cooling and other system and water pump and many more using on/off relay and servo motor and the water level and temperature on LCD display, automate room temperature with controlling fan speed and saves the electricity. In addition, we also used door lock system to secure our home. Otherwise, comparing this system with the manual fan and light on/off, this system presents more effective and reliable for water and electricity low consume.

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Finally, our deepest gratitude and love to my parents for their support, encouragement, and endless love.

LIST OF ABBREVIATIONS

AC	Alternating Current
DC	Direct Current
HTTPS	Hypertext Transfer Protocol Secure
LED	Light Emitting Diode
Rx	Receiving Data
SMPS	Switch Mode Power Supply
Tx	Transmitting Data
Wi-Fi	Wireless Fidelity

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CHAPTER 1

INTRODUCTION TO HOME AUTOMATION

1.1 Introduction

Home automation is a general term that covers a variety of technological capabilities we can install in our home. Home automation can include controlling aspects of our home remotely through a computer, phone or centralizing the control of a variety of items in our home into a single control center. The system creates the scope of connecting the non-internet enabled physical devices and machines to be connected over the internet and remotely monitored and controlled.

Home automation is the automatic control of electronic devices in your home. These devices are connected to the Internet, which allows them to be controlled remotely. With home automation, devices can trigger one another so you don't have to control them manually via an app or voice assistant. For example, you can put your lights on schedules so that they turn off when you normally go to sleep, or you can have your thermostat turn the A/C up about an hour before you return to work so you don't have to return to a stuffy house. Home automation makes life more convenient and can even save you money on heating, cooling and electricity bills. Home automation can also lead to greater safety with Internet of Things devices like security cameras and systems.

Home automation work:

Home automation is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one another via the Internet. Each device has sensors and is connected through WiFi, so you can manage them from your smartphone or tablet whether you're at home, or miles away. This allows you to turn on the lights, lock the front door, or even turn down the heat, no matter where you are.

There are three main elements of a home automation system: sensors, controllers, and actuators.

- i. Sensors can monitor changes in daylight, temperature, or motion detection. Home automation systems can then adjust those settings and more to your preferences.
- ii. Controllers refer to the devices personal computers, tablets or smartphones used to send and receive messages about the status of automated features in your home.
- iii. Actuators may be light switches, motors, or motorized valves that control the actual mechanism, or function, of a home automation system. They are programmed to be activated by a remote command from a controller.



Fig 1.1 A general home automation system.

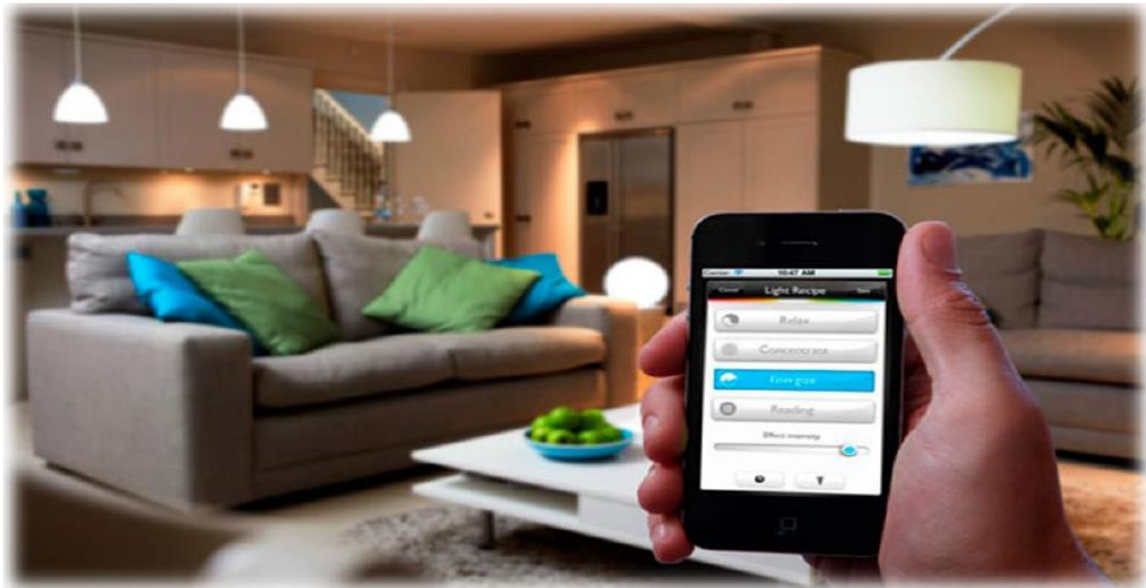


Fig 1.2: Controlling home appliances using smartphone.



Fig 1.3: Controlling home appliances using voice message.

1.2 Objectives

Android controlled Smart Home Automation can be able to control the home appliances wirelessly and efficiently.

Controlling Home Applications through Application (Voice Mode):

To create an application that incorporates the features of a voice application. Voice mode can be used to control the voice of home appliances.

Controlled by any device capable of Wi-Fi (Android, IOS, PC):

To make the home appliances easier and flexible to control, any device capable of Wi-Fi connectivity will be able to maintain the home appliances from remote.

Learn:

To learn how to use the HC-05 module for controlling Arduino via Bluetooth communication. Learn how to control LEDs using Bluetooth modules and Arduino.

Extensible platform for future enhancement:

The application has to be highly extensible, with possibility of adding extra features in the future if needed.

1.3 Scopes

This project aims are to designing a prototype that can control the home appliances wirelessly through app and gesture.

The system can be applied in the following fields.

- i. The system can be used in home, small offices to the big malls, hospital or factories.
- ii. The home/office applications can be controlled by intra-network.
- iii. For the technology and development friendly environment.
- iv. The system ensures the use of technology and making home automation. With the use of the day to day applications we can realize them for different perspective.

1.4 Necessity of Home Automation for Disabilities People

The project aim is to develop a smart home automation system for disabled peoples to make their life easier and comfortable. There are some actions we can take for different kinds of disabilities:

The first actuation is developed for disable people who does not have legs or those who are very old and cannot move themselves. Because of their disabilities they face many difficulties in their daily lives. But almost every physically challenged people can take the advantages of smart home automation. They can manage their home or work place when they are alone at home and also when they are not at home. With the help of the smart home automation technology they can overcome their difficulties.

The second action is for blind people. For their disabilities they cannot move properly from one place to another. Smart home automation technology can reduce their difficulties. When blind people are at home they can use the voice command which is much easier and more effective for them. They can also hear the command result through Google Assistant.

1.5 Benefits of Smart Home Automation

Home automaton has been around for several years, with systems that let you control the lighting, temperature, door locks, window curtains, appliances and much more. Earlier years of automation, its considered a luxury but as smart phones and tablets become increasingly common to every household, home automation is becoming easier to use and dramatically more affordable. Here are the top 7 advantages why you should install home automation in your home.

Safety: Fully automatic security is provided in receptions, offices or banks without touching. They are turned on and off with voice messages, open or close doors, fans, lights and so on. If any accident occurs in the house like gas leakage, fire detection or thunderstorm, it will be notified to the house owner via message or email. If any accident occurs in the house like gas leakage, fire detection or thunderstorm, it will be notified to the house owner via message or email.

Convenience: Since smart home automation system works automatically, all users can take the advantage and suit an excellent convenience. For an example, if the user sets that when thunderstorm will strike, the windows will automatically be turned off and when he opens his door, light and fan will automatically turned on.

Control: With the advantages of smart home automation technology, users can see and observe what's happening inside his house at any time.

Saves Time: Since we are living in a very fast-paced environment, we don't even have time to worry about our home. With home automation, we can save time going back to our home and make sure everything is order, like if the kids close the door from school or turn on the lights when you get home.

Contributes to Economy: In simple world, you're contributing to the economy when you purchase and utilize a home automation system. You make sure that you're only using the energy and resources that are necessary while you're at home

Save Money: This is the biggest advantage of home automation. With the ability to control the light, whether dimming or turning on/off on specific time will saves homeowner a great ton of money. You can save money through household temperature, with proper automation in window shades and automated thermostat. In addition, you can save gas, by not driving back home if you forgot to turn off appliances or lock the door.

Security: The ability to lock the door through your phone is one of the greatest benefits of home automation. This will give you peace of mind knowing that the door is close and not guessing. The fact that you can be alerted each time someone enters your home also allows you to monitor who is entering your home at all times, especially when you are not there.

CHAPTER 2

LITERATURE REVIEW OF HOME AUTOMATION

2.1 Literature review

Home automation was first introduced into the global market within the 1970s, but it didn't meet the expectations of individuals and was unsuccessful. There have been various reasons associated with the failure of the house automation system. The system was neither user friendly nor cost efficient. Currently, the foremost point to be kept in mind when designing a home automation system is that it should be cost-efficient and convenient. In the past few years, significant research has been conducted within the field of Smart Homes to make the technology better for handicapped and elderly people. N. Liang have described challenges associated with Smart Homes and conducted research at the University of Erlangen, Germany, for the betterment of those populations and identified the advantages in-order to help them lead more independent lives. Home automation systems are based on wired communication such as Arduino based and raspberry pi based home automation systems. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for automation systems like Bluetooth, Wi-Fi and IOT based home automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere [7].

For the implementation of those projects, there are various sub-networks used like the Bluetooth module, Wireless LAN, RFIDs, and TCP/IP. A Bluetooth network transports the sensor data and interconnects the network. As per the placement of the occupancy recorded, the RFID system transmits data from the RFID tags. The messages are transmitted via Bluetooth using Bluetooth modules. This reduces the price, as no further hardware is required for the implementation.

With the advancements in RF Technology, like Zigbee and Bluetooth, these systems have also become popular within the market. The previous infrared systems had numerous security issues and there have been interferences between signals, making it unsecured and less popular within the market. Research continues to be occurring during this field; various systems have been proposed, but only a few of them are implemented within the market.

Nowadays, home automation turning into very popular because of its varied edges. Computing provides us the framework to travel time period call and automation for internet of things (IoT). The work deals with discussion concerning totally different intelligent home automation systems and technologies from a varied options position. The work focusses on conception of home automation wherever observance and management operations area unit facilitating through sensible devices put in residential buildings. Home automation system and technologies through 6 of in review with central controller primarily based (Arduino or Raspberry pi), web based, email primarily based, Bluetooth based, mobile based, SMS based, Cloud based and therefore the net with performance.

CHAPTER 3

BASIC COMPONENTS AND REQUIRED SOFTWARE

3.1 Hardware components

- i. Arduino UNO
- ii. HC-05 Bluetooth Module
- iii. 4 Channel Relay Board Module
- iv. Indicator Switch
- v. DC Motor
- vi. LED Lamp
- vii. SMPS Power Supply
- viii. Wires
- ix. Fan

3.2 Software and Apps

- i. Arduino IDE
- ii. Arduino voice control
- iii. Proteus 8.10

3.3 Arduino UNO

Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

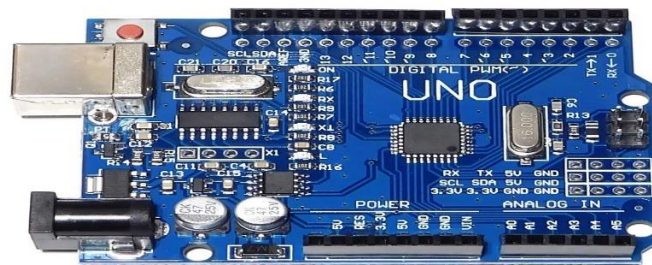


Fig 3.1: Arduino UNO

Serial Pins: These pins are also known as a UART pin. It is used for communication between the Arduino board and a computer or other devices. The transmitter pin number 1 and receiver pin number 0 is used to transmit and receive the data resp.

External Interrupt Pins: This pin of the Arduino board is used to produce the External interrupt and it is done by pin numbers 2 and 3.

PWM Pins: This pins of the board is used to convert the digital signal into an analog by varying the width of the Pulse. The pin numbers 3,5,6,9,10 and 11 are used as a PWM pin.

SPI Pins: This is the Serial Peripheral Interface pin, it is used to maintain SPI communication with the help of the SPI library. SPI pins include:

1. SS: Pin number 10 is used as a Slave Select
2. MOSI: Pin number 11 is used as a Master Out Slave In
3. MISO: Pin number 12 is used as a Master In Slave Out
4. SCK: Pin number 13 is used as a Serial Clock

LED Pin: The board has an inbuilt LED using digital pin-13. The LED glows only when the digital pin becomes high.

AREF Pin: This is an analog reference pin of the Arduino board. It is used to provide a reference voltage from an external power supply.

3.5 HC-05 Bluetooth Module

Designed to replace cable connections HC-05 uses serial communication to communicate with the electronics. Usually, it is used to connect small devices like mobile phones using a short-range wireless connection to exchange files. It uses the 2.45GHz frequency band.

HC-05 Pinout Configuration:

State: The state pin is connected to on board LED, it can be used as a feedback to check if Bluetooth is working properly.

RX – Receiver: Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth.

TX – Transmitter: Transmits Serial Data. Everything received via Bluetooth will be given out by this pin as serial data.

Ground: Ground pin of module, connect to system ground.

Vcc: Powers the module. Connect to +5V Supply voltage.



Fig 3.3: HC-05 Bluetooth Module

3.6 Relay

A relay is an electrically operated switch that may be turned on or off, letting the present undergo or not, and might be controlled with low voltages, just like the 5V provided by the Arduino pins. Controlling a relay module with the Arduino is as simple as controlling the other output as we'll see shortly.

Relay works:

- i. Relay works on the principle of electromagnetic induction.
- ii. When the electromagnetic is applied with some current, it induces a magnetic field around it.
- iii. A switch is used to apply DC current to the load.
- iv. In the relay, Copper coil and the iron core acts as electromagnet.
- v. When the coil is applied with the DC current, it starts attracting the contact. This is called energizing of relay.
- vi. When the supply is removed it retrieves back to the original position. This is called De energizing of relay.

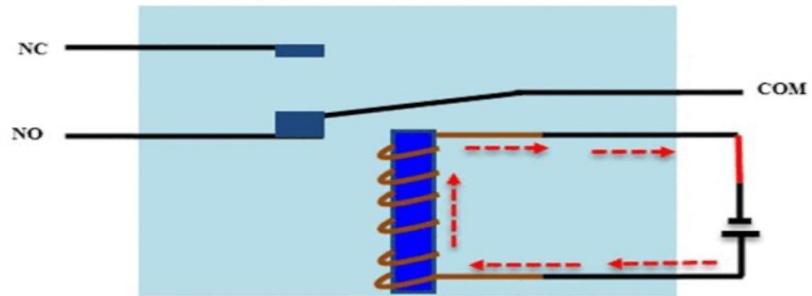


Fig 3.4: Relay



Fig 3.5: A 5v 4 channel relay module

3.7 DC Motor

The DC motor is a machine that transforms electric energy into mechanical energy in form of rotation. Its movement is produced by the physical behavior of electromagnetism. DC motors have inductors inside, which produce the magnetic field used to generate movement.

A DC motor is an electrical machine which converts electrical energy into mechanical energy. The basic working principle of the DC motor is that whenever a current carrying conductor places in the magnetic field, it experiences a mechanical force.



Fig 3.6: DC motor

3.8 SMPS Power Supply

A SMPS power supply transfers power from a source usually an AC outlet to a DC device. What sets the SMPS apart is its ability to regulate the output voltage. It can increase or decrease the output voltage to maintain a constant output regardless of changes in load.

SMPS is an electronic power supply system that makes use of a switching regulator to transfer electrical power effectively. It is a power supply unit and is usually used in computers to change the voltage to the appropriate range for the computer.



Fig 3.7: SMPS Power Supply

3.9 Arduino voice control

To make voice control by using following step:

- i. Connecting the HC-05 Bluetooth Module.
- ii. Connecting the LED's.
- iii. Supplying the power.
- iv. Get the code.
- v. Using the mobile app and get the voice message.

3.10 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 hardware to upload programs and communicate with them.

Arduino first and foremost is an open-source computer hardware and software company. The Arduino Community refers to the project and user community that designs and utilizes microcontroller-based development boards. These development boards are known as Arduino Modules, which are open-source prototyping platforms. The simplified microcontroller board comes in a variety of development board packages.



Fig 3.8: Interface of Arduino Software

CHAPTER 4

SET-UP THE SOFTWARE AND PROGRAM

4.1 Arduino IDE Setup

Firstly, we have to download Arduino IDE software from Arduino website by using any browser. Then open the file and start installation process by following step:

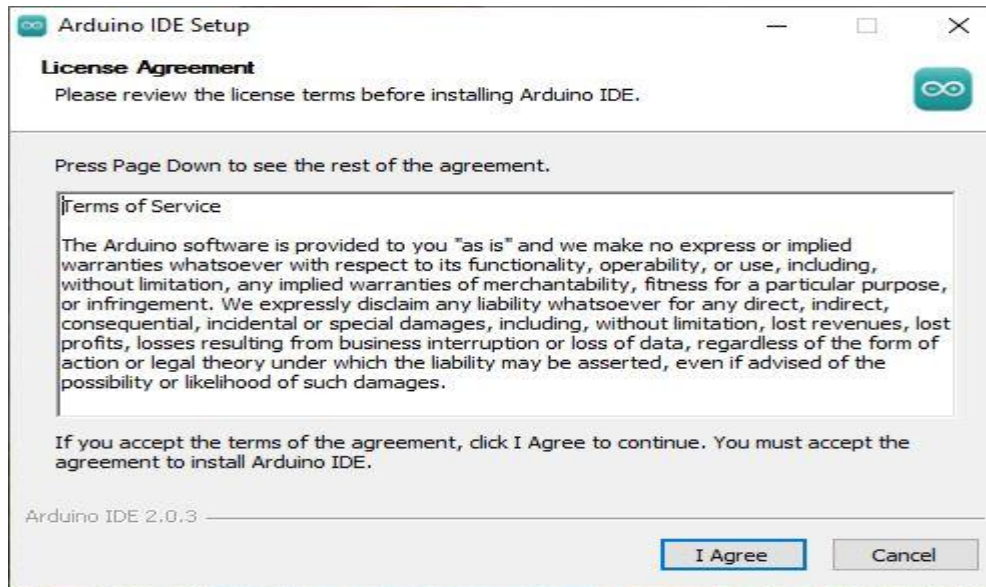


Fig 4.1: Step-1

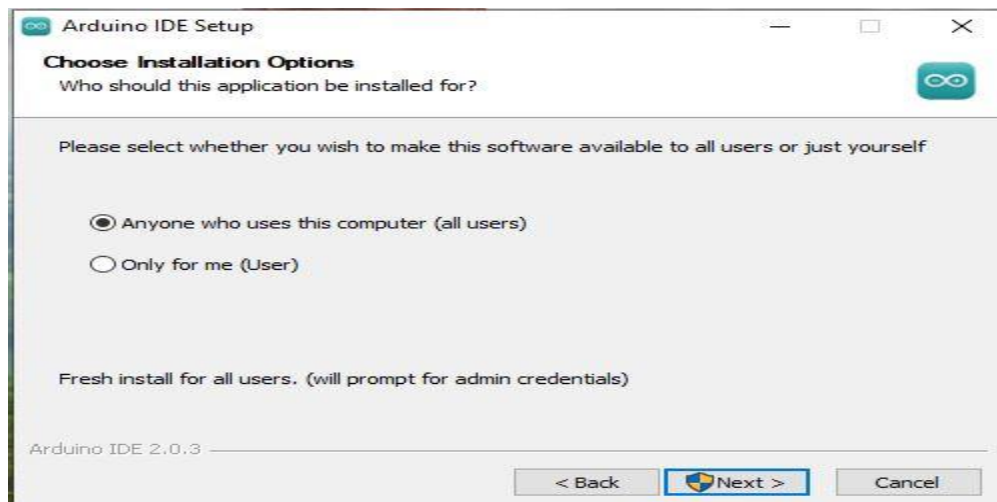


Fig 4.2: Step-2

We can install to any drive. For this you have to go to browse option and select drive and install.

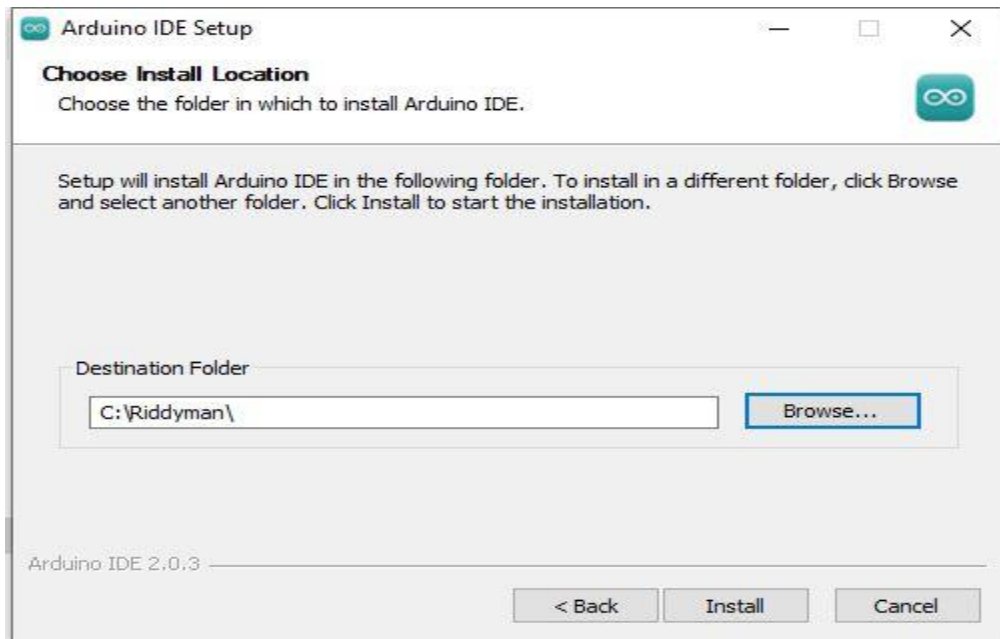


Fig 4.3: Step-3

It will take some time to install. You have to wait until it is installed. Once the installation is complete, you can proceed to the next step.

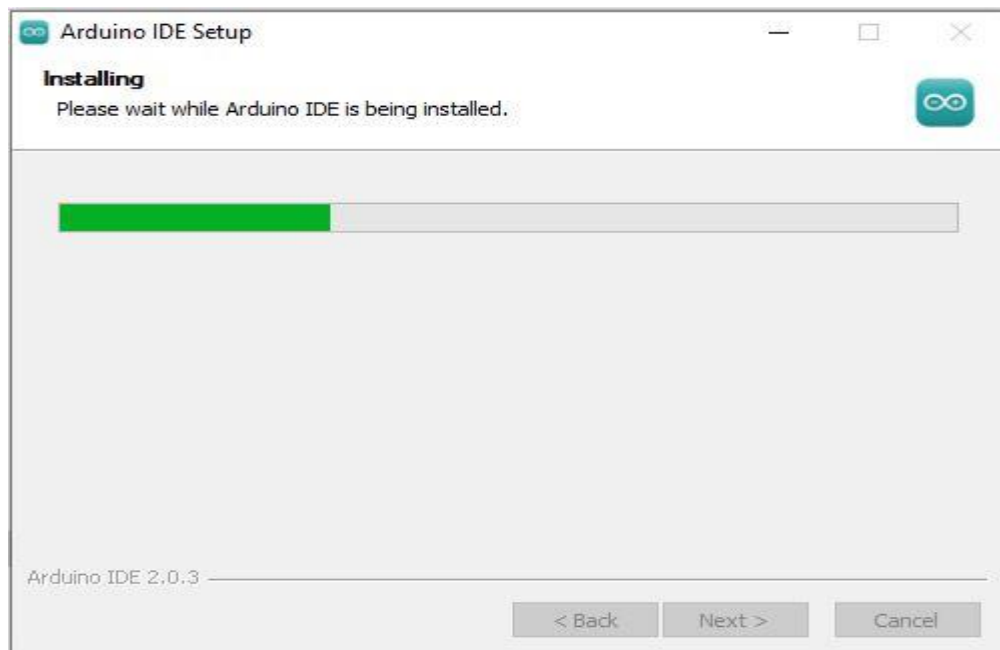


Fig 4.4: Step-4

When the installation is complete, the following interface will appear. Then you can work on the next step.

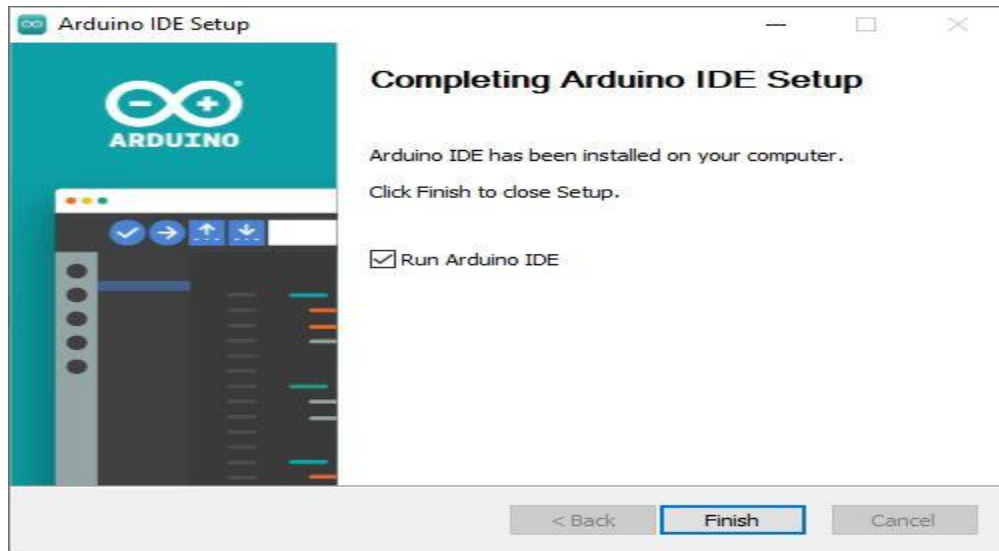


Fig 4.5: Step-5

After completing installation then you have to open the software.

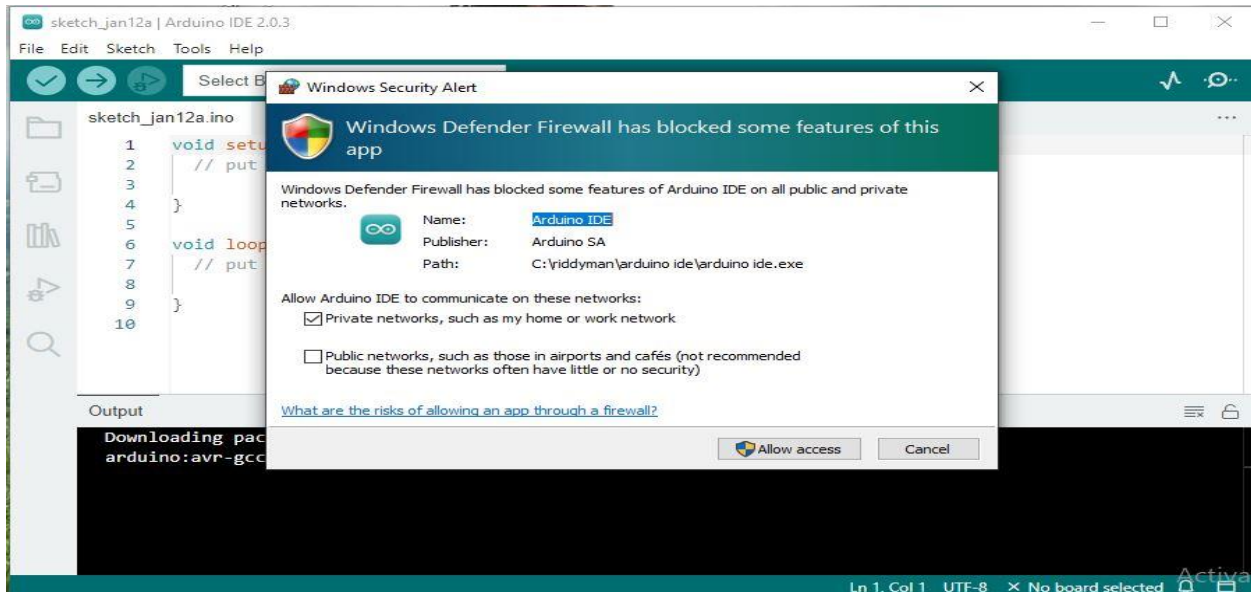


Fig 4.6: Step-6

This is the Arduino IDE once it's been opened. It opens into a blank sketch where you can start programming immediately. First, we should configure the board and port settings to allow us to upload code. Connect your Arduino board to the PC via the USB cable.

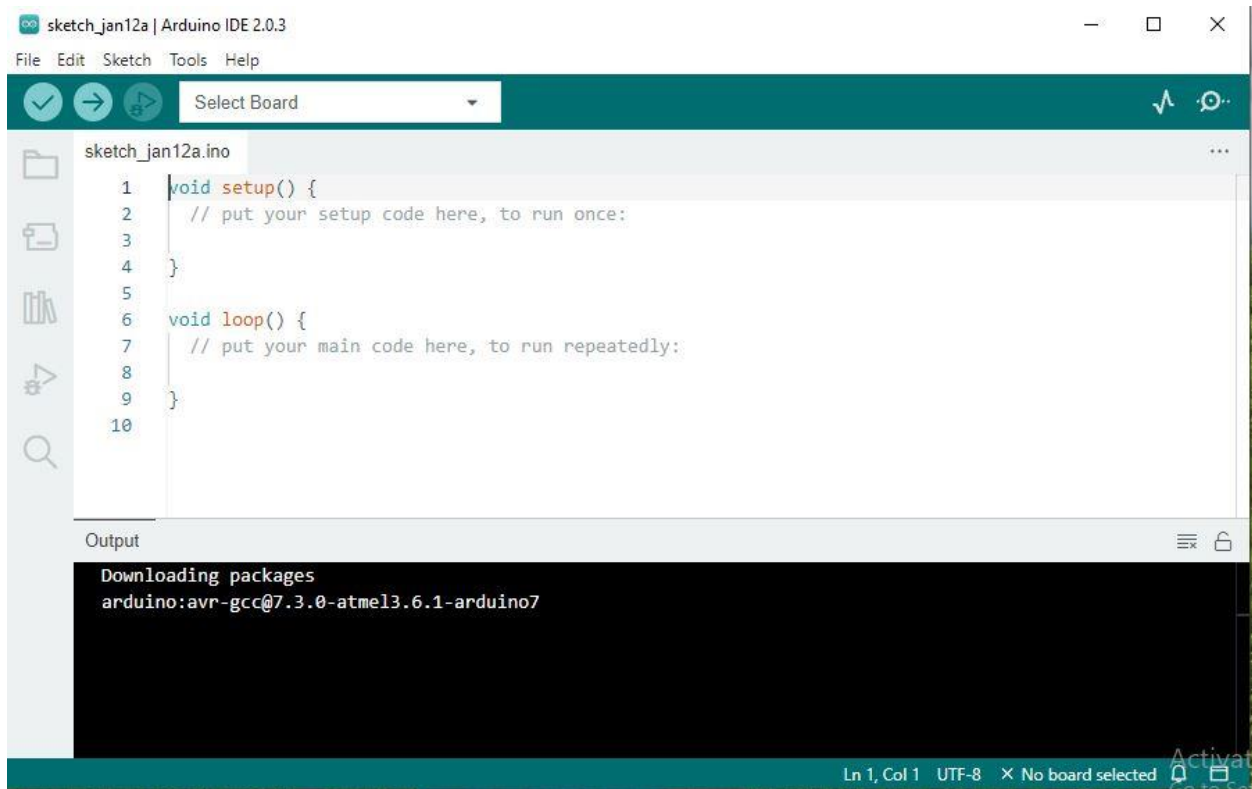


Fig 4.7: Interface of Arduino IDE

Then you have to connecting Arduino IDE with Arduino uno board and serial port(USB).

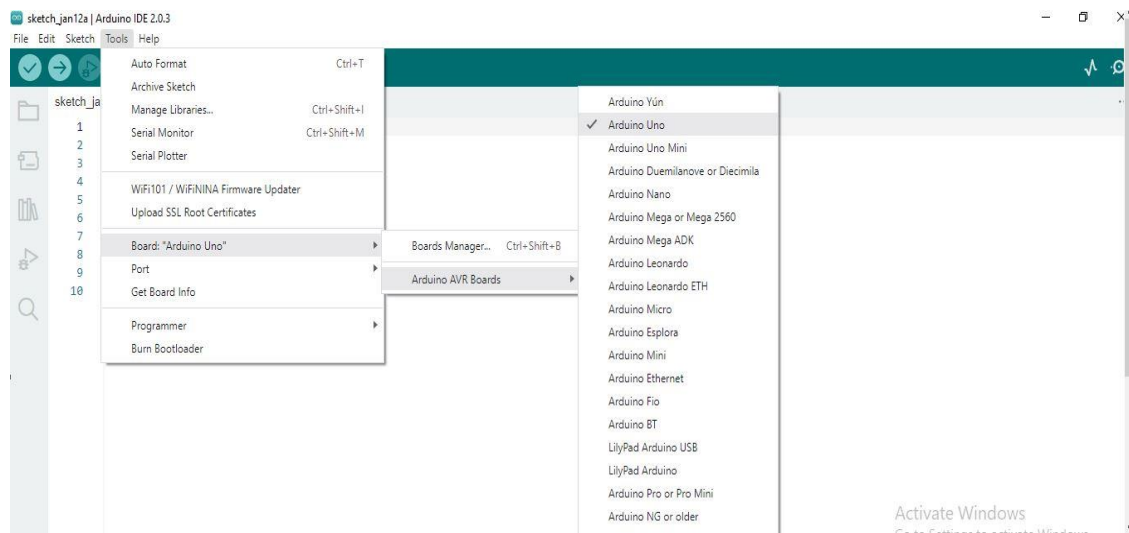


Fig 4.8: Connecting Arduino board

If you downloaded the Arduino IDE before plugging in your Arduino board, when you plugged in the board, the USB drivers should have installed automatically. The most recent Arduino IDE should recognize connected boards and label them with which COM port they are using. Select the Tools pulldown menu and then Port. Here it should list all open COM ports, and if there is a recognized Arduino Board, it will also give it's name. Select the Arduino board that you have connected to the PC. If the setup was successful, in the bottom right of the Arduino IDE, you should see the board type and COM number of the board you plan to program. Note: the Arduino Uno occupies the next available COM port, it will not always be COM6.

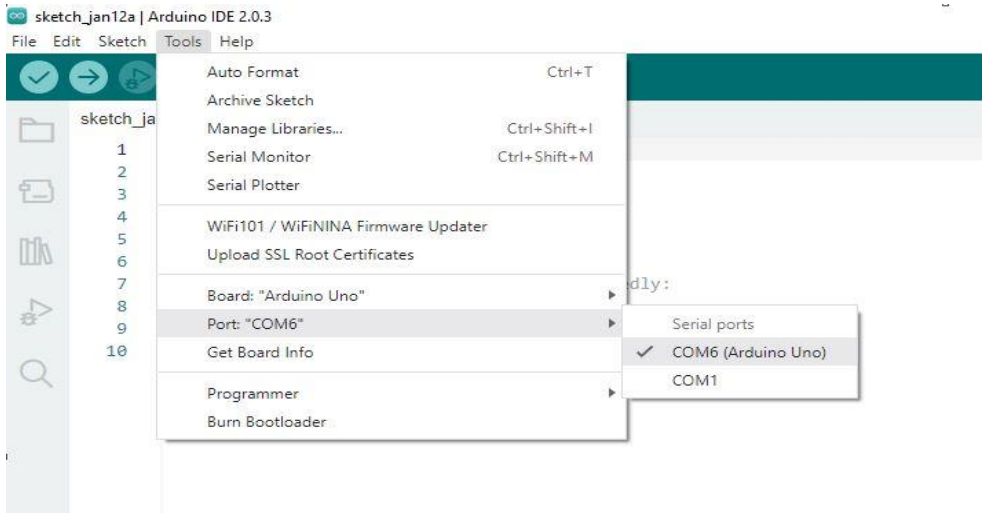


Fig 4.9: Connecting serial port

4.2 Proteus 8.10 setup

Firstly, we have to download Proteus 8.10 software from Proteus website by using this link <https://getintopc.com/software/3d-cad/proteus-professional-2020-free-download/?fbclid=IwAR0Jy15PeO2LBtlioPPzWNKGXyVFBCZacDLif4FBbJLlizFBaNXPIBH7ak0>

Then open the file and start installation process by following step:

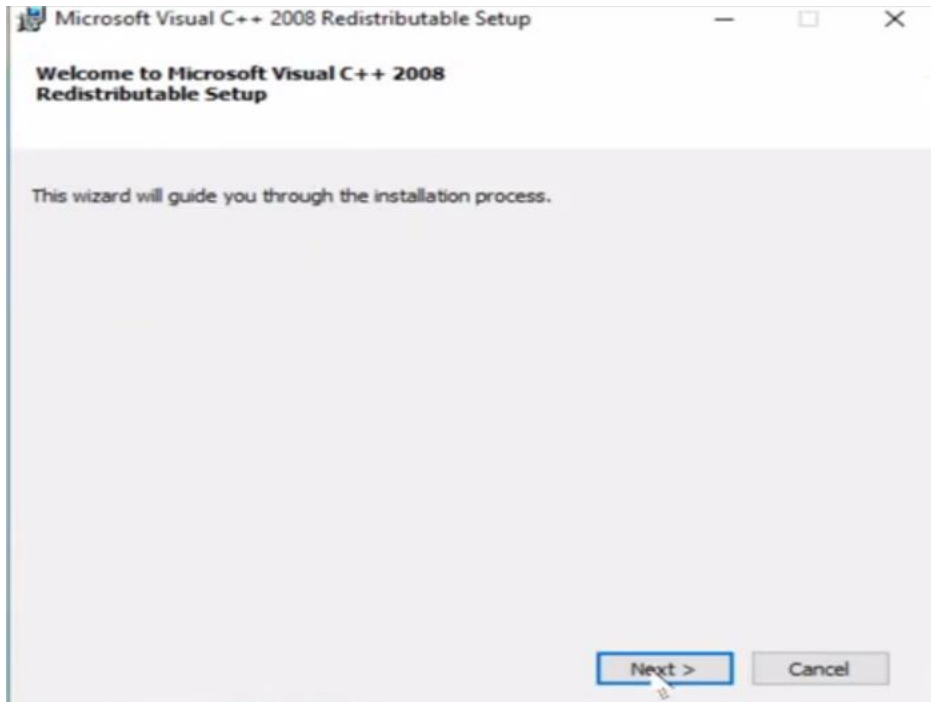


Fig 4.10: Step_1

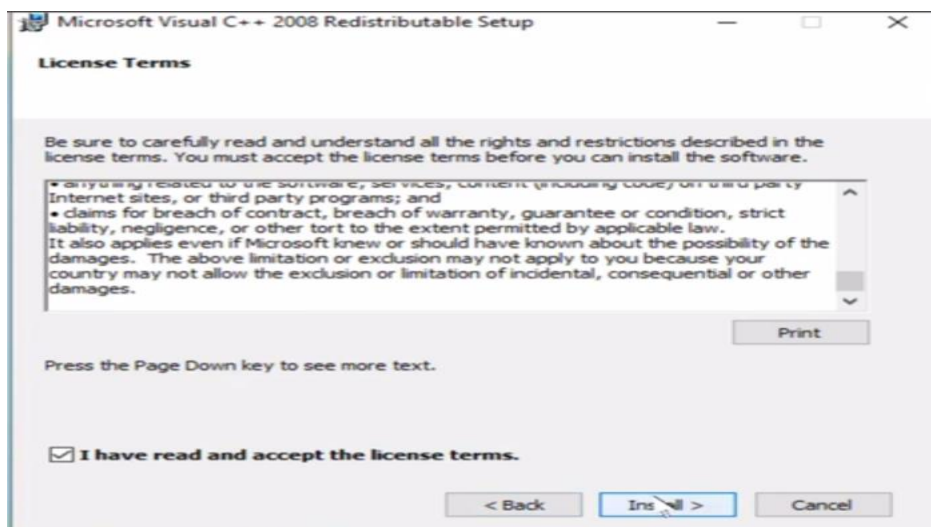


Fig 4.11: Step_2

Firstly, we have to install some components. After completing

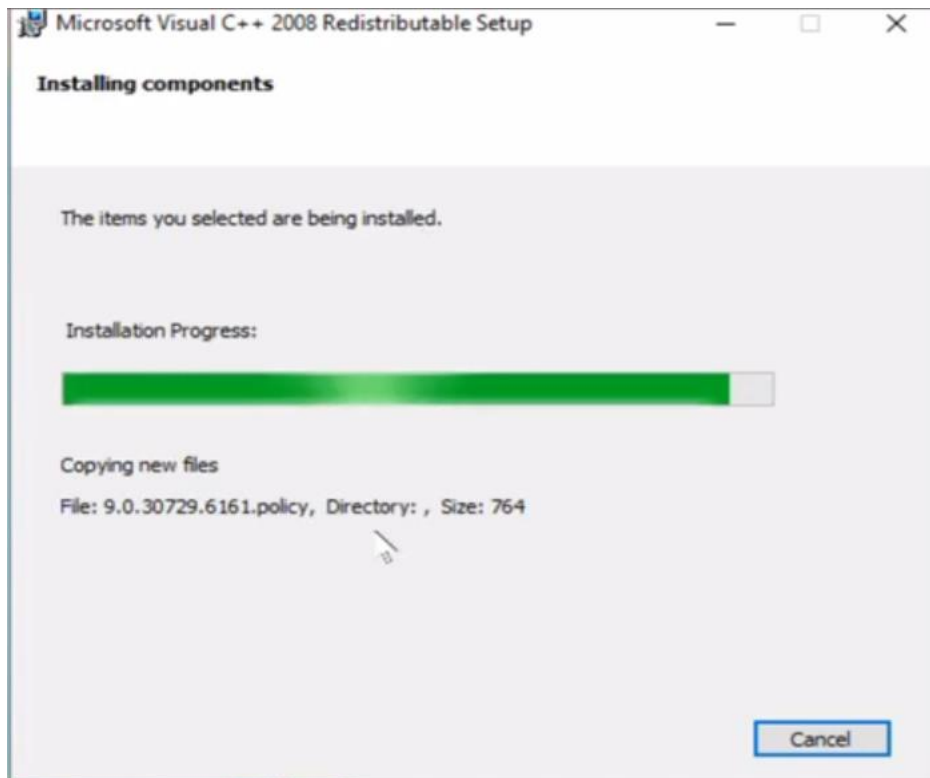


Fig 4.12: Installing components

When the component installation is complete, the following interface will appear. Then you can work on the next step.

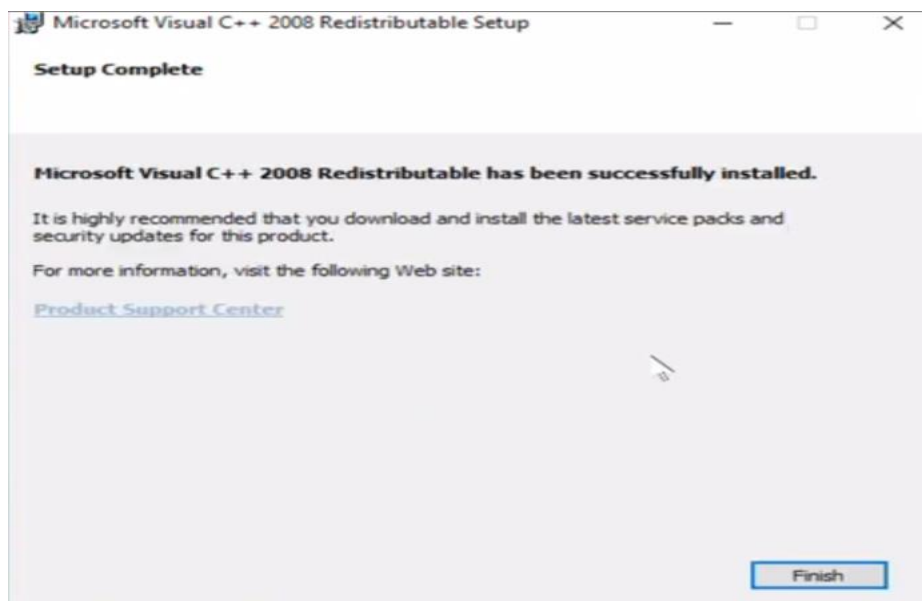


Fig 4.13: Component setup

We can install to any drive. For this you have to go to browse option and select drive and install.

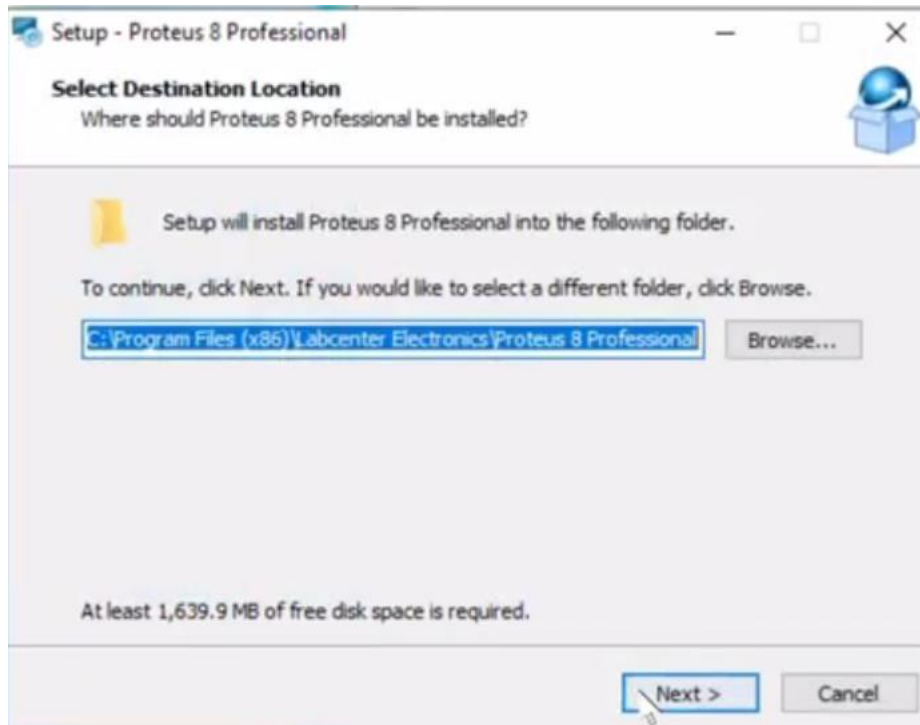


Fig 4.14: Select location

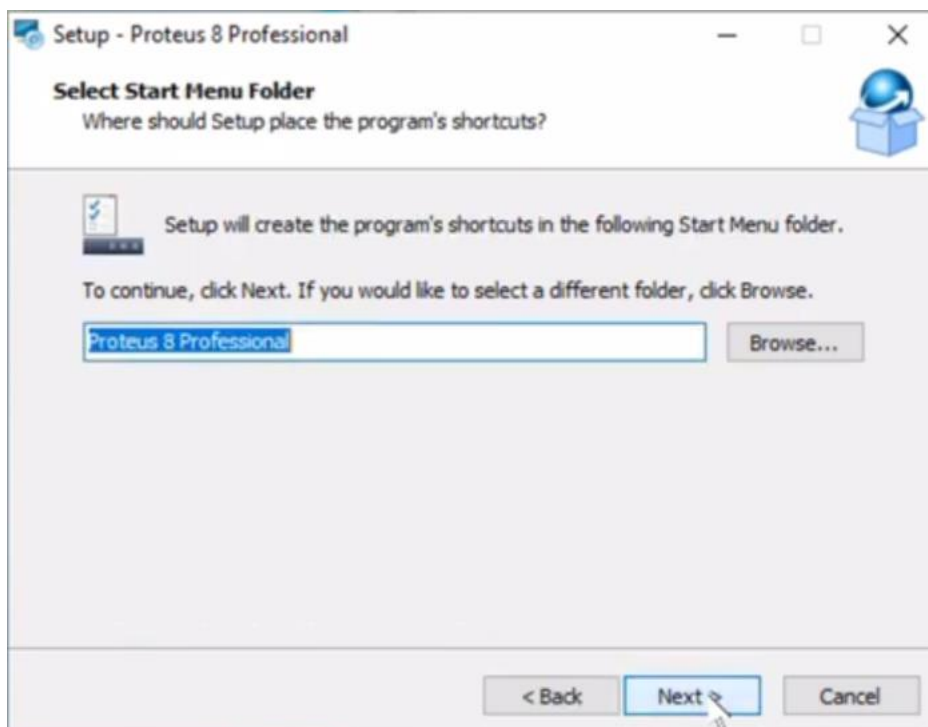


Fig 4.15: Select name

It will take some time to install. You have to wait until it is installed. Once the installation is complete, you can proceed to the next step.

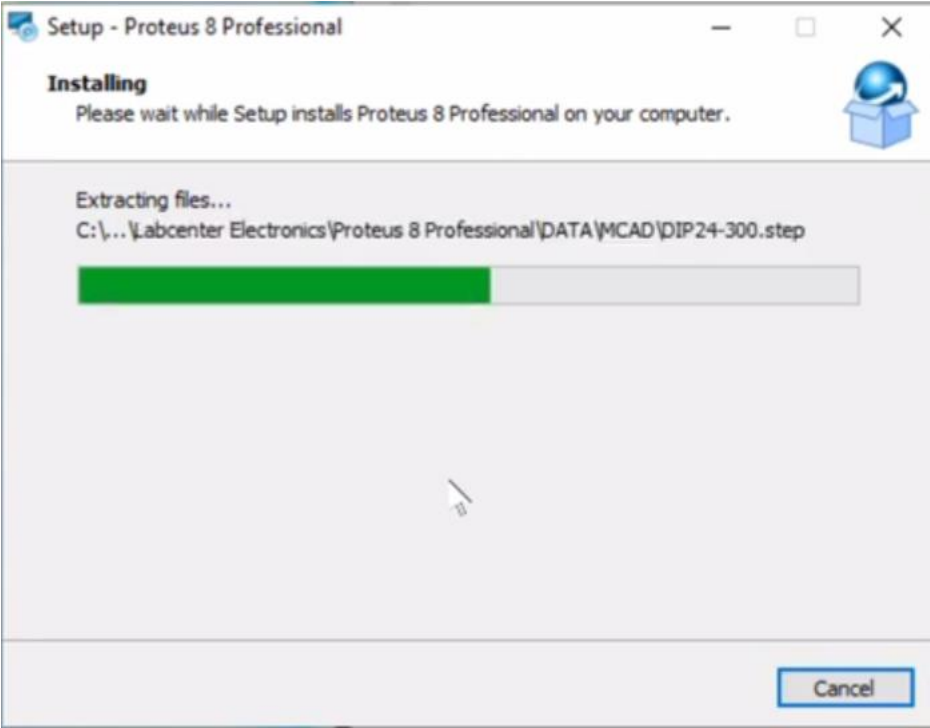


Fig 4.16: Installation start

When the installation is complete, the following interface will appear. Then you can work on the next step.

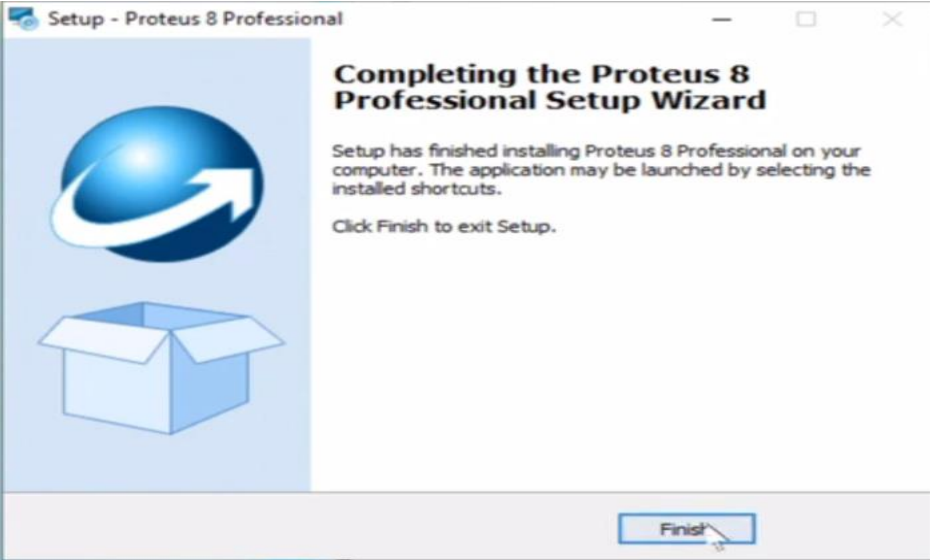


Fig 4.17: Installation complete

After completing installation then you have to open the software and we can see the following interface will appear.

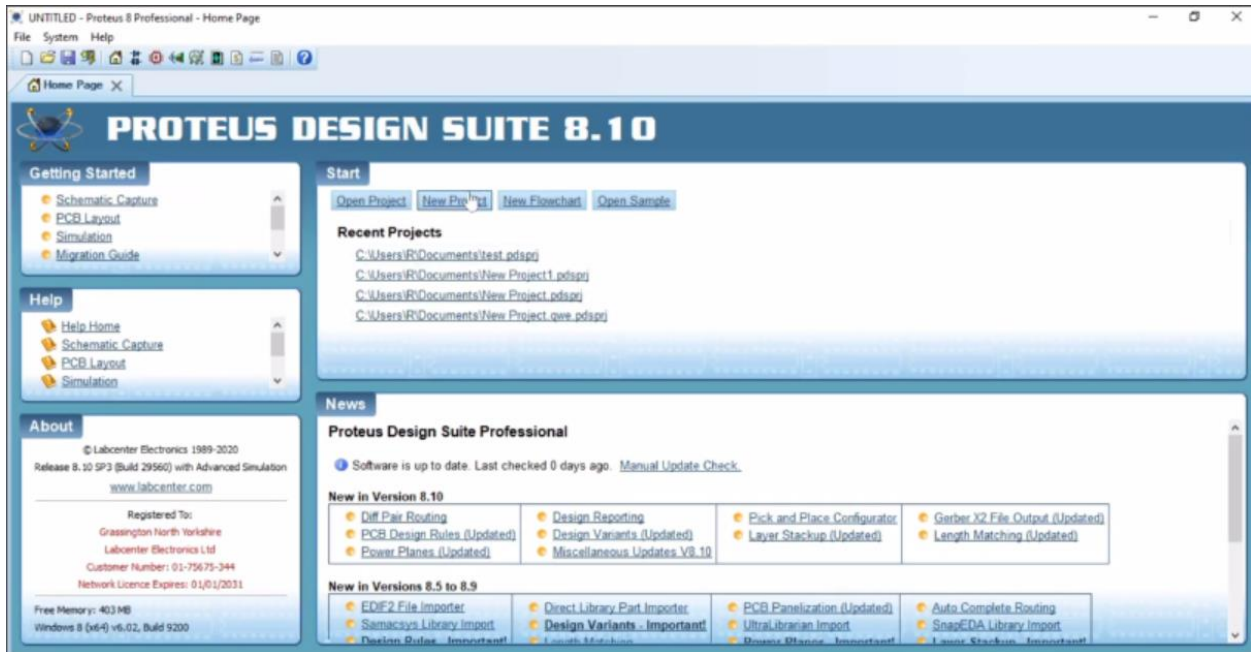


Fig 4.18: Software interface

After installing all instructions, we can start our work from here.

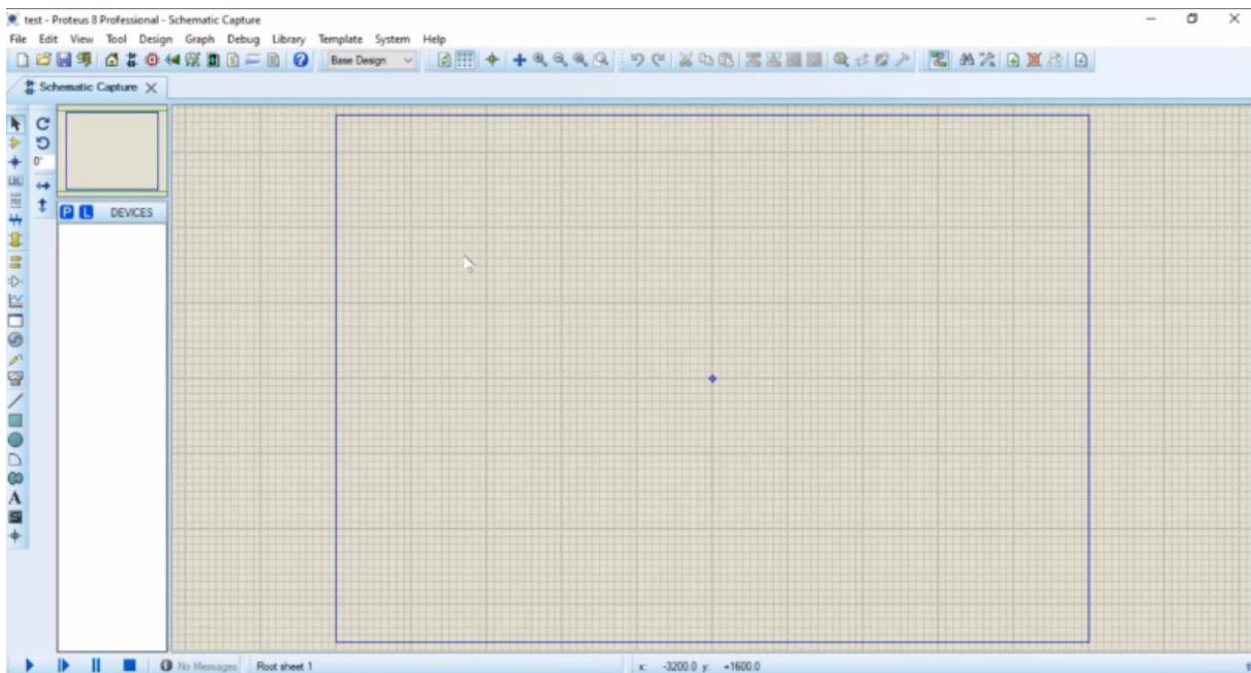


Fig 4.19: Working interface

4.3 Program

Below is the Arduino code that we compiled and programmed on our Arduino UNO.

```
int load1 = 2;
int load2 = 3;
int load3 = 4;
int load4 = 5;
String sms;
void setup() {

    pinMode(load1, OUTPUT);
    pinMode(load2, OUTPUT);
    pinMode(load3, OUTPUT);
    pinMode(load4, OUTPUT);

    digitalWrite(load1, HIGH);
    digitalWrite(load2, HIGH);
    digitalWrite(load3, HIGH);
    digitalWrite(load4, HIGH);

    Serial.begin(9600);
}
void loop() {
    if (Serial.available() != 0) {
        sms = Serial.readString();
    }
    if (sms == "light on") {
        digitalWrite(load2, LOW);
    }
    if (sms == "light stop") {
        digitalWrite(load2, HIGH);
    }
    if (sms == "fan on") {
        digitalWrite(load1, LOW);
    }
    if (sms == "fan stop") {
        digitalWrite(load1, HIGH);
    }

    if (sms == "second fan on") {
        digitalWrite(load3, LOW);
    }
}
```

```
}  
if (sms == "second fan stop") {  
    digitalWrite(load3, HIGH);  
}  
if (sms == "second light on") {  
    digitalWrite(load4, LOW);  
}  
if (sms == "second light stop") {  
    digitalWrite(load4, HIGH);  
}  
  
if (sms == "all on") {  
    digitalWrite(load1, LOW);  
    digitalWrite(load2, LOW);  
    digitalWrite(load3, LOW);  
    digitalWrite(load4, LOW);  
}  
  
if (sms == "all stop") {  
    digitalWrite(load1, HIGH);  
    digitalWrite(load2, HIGH);  
    digitalWrite(load3, HIGH);  
    digitalWrite(load4, HIGH);  
}  
}
```

CHAPTER 5

BLOCK DIAGRAM AND FLOW CHART

5.1 Block diagram

Block diagram describes which equipment is used.

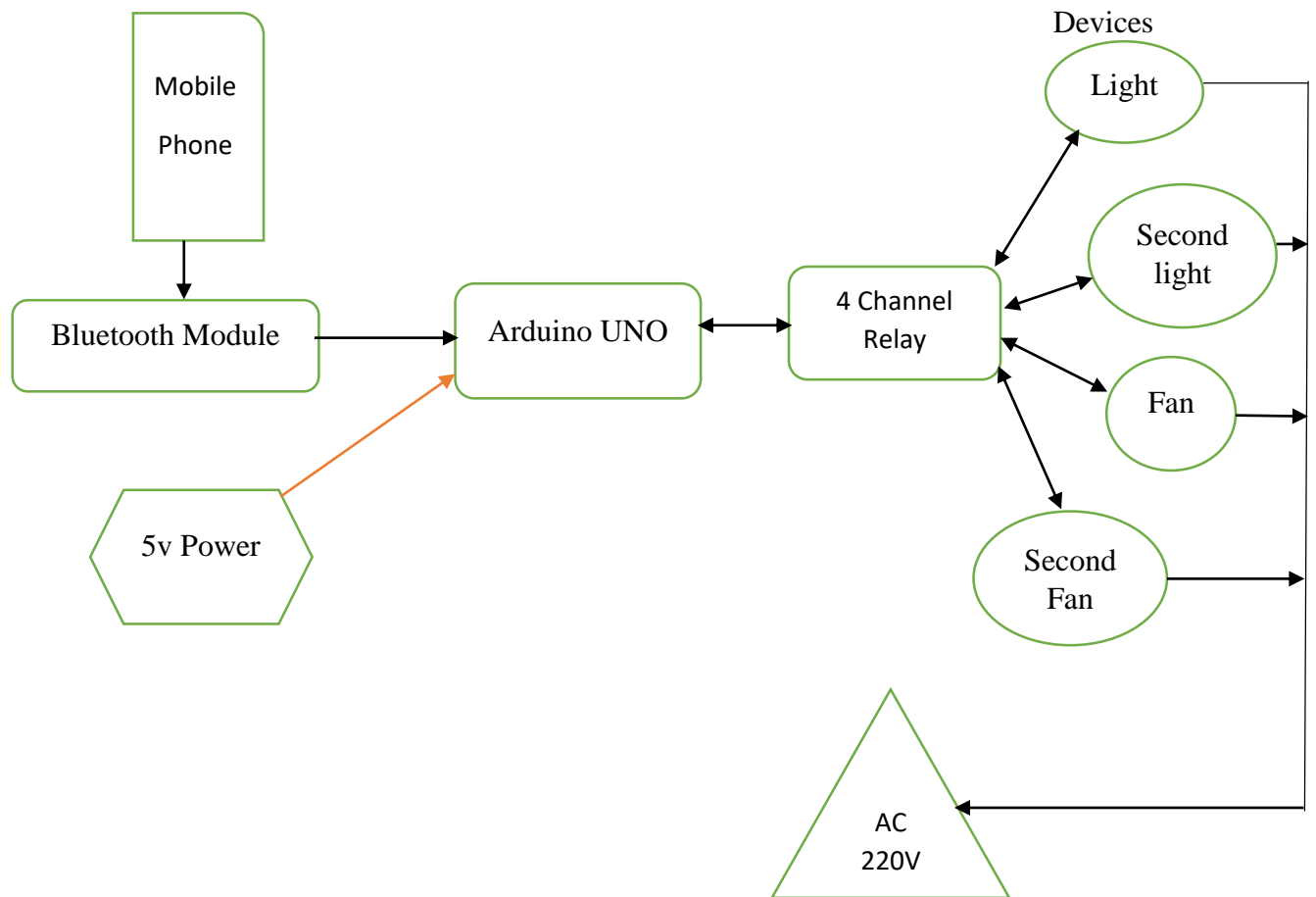


Fig 5.1: Block diagram

5.2 Flow chart

Flow chart describes how the system works.

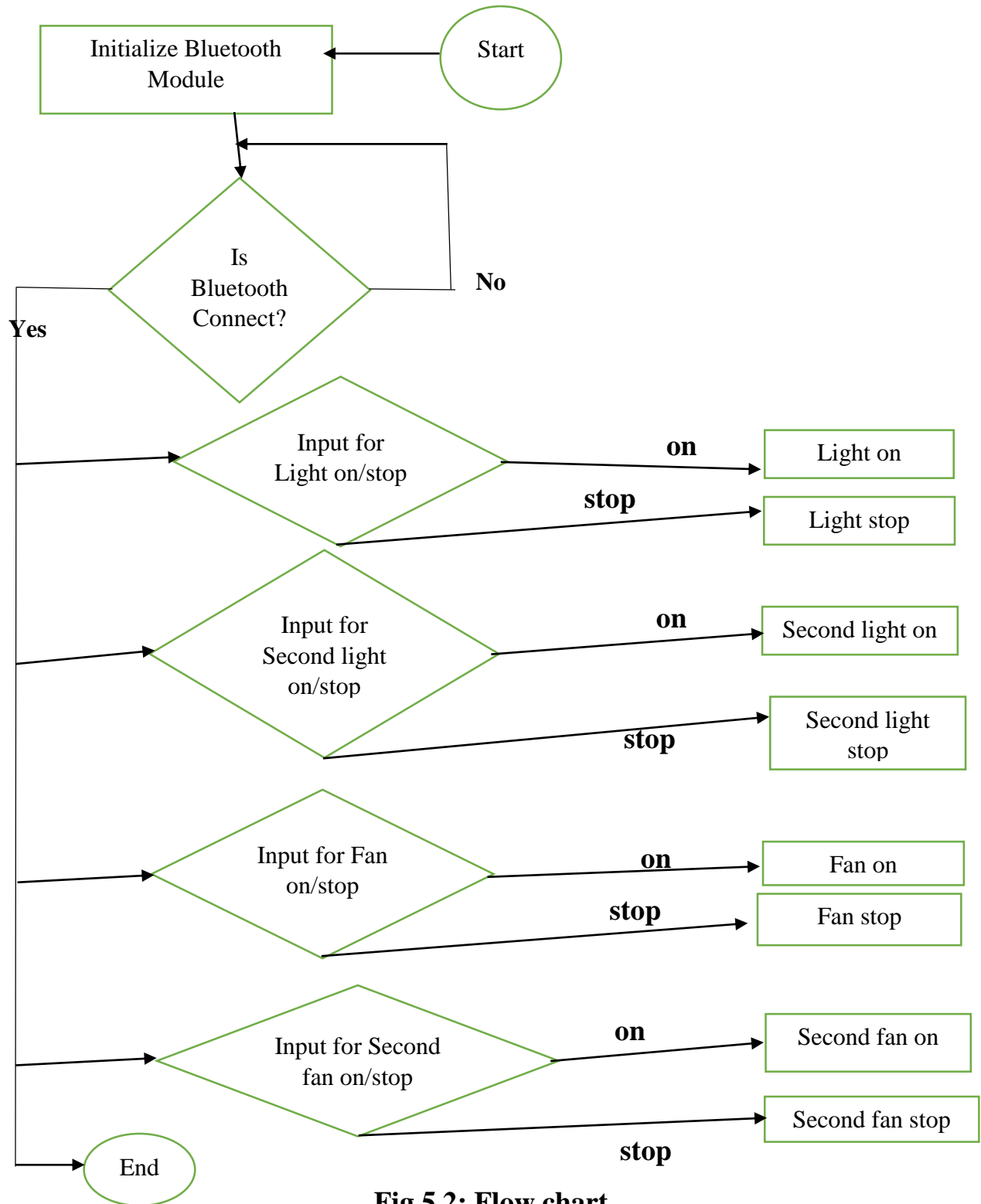


Fig 5.2: Flow chart

CHAPTER 6

METHODOLOGY, IMPLEMENTATION AND WORKING PROCEDURE

6.1 Methodology

When we control the voice, speech recognition is a technology where the system understands the words given through speech. The main aim of this project is to control LEDs through the human voice. In this system, we have used a voice recognition module to recognize the voice of the user for controlling the LEDs turning on and off. The advancement of use in this project is to control home appliances by using voice command to this project can also work as a home automation system. The command was set in the Arduino board. The home appliances can be controlled by two methods, by giving voice commands or by using mobile as a remote controller. Arduino is a simple integrated development environment that runs on any PC and allows users to write programs for Arduino in C language. The entire programs are installed in an Arduino controller for any commands.

6.2 Implementation

The microcontroller board we used in this project is Arduino UNO. There are many Arduino boards which we chose Arduino UNO board because it has 13 input output pins out of which we need four outputs. We have used four outputs 2, 3, 4, 5 of this board to operate four loads. As Arduino board itself cannot receive Bluetooth signal, we used a Bluetooth module which is HC-05. Bluetooth HC-05 module can directly communicate with Arduino and receive any data from mobile. The Tx and Rx ports of this Bluetooth module are linked with the Tx and Rx ports of the Arduino. Here the Tx port of Bluetooth is linked with the Rx port of Arduino and the Rx port of Bluetooth is linked with the Tx port of Arduino. For example, if we give a command like turn on the light, the mobile will immediately send this command to the Bluetooth module and the Bluetooth module will receive the data and give the command to the Arduino and the Arduino will immediately receive the command and turn on the light. We know that the Arduino board passes 5v and 0v when a pin is turned on or off. Arduino will supply DC 5v when on and 0v when off. We use relay here because we can never run large loads with this DC 5v. Relay an electromagnetic switch. Relay can easily turn large loads on and off. It can operate large loads at any low voltage. Here we have used 4 channel relay module as relay module because we have used four loads in this project. We have used four loads i.e. light, second light, fan and second fan in this project. In this project, the command Bluetooth module of the mobile will be received and sent to the Arduino, and the Arduino will send the command to relay and turn on the relay switch and turn on the load.

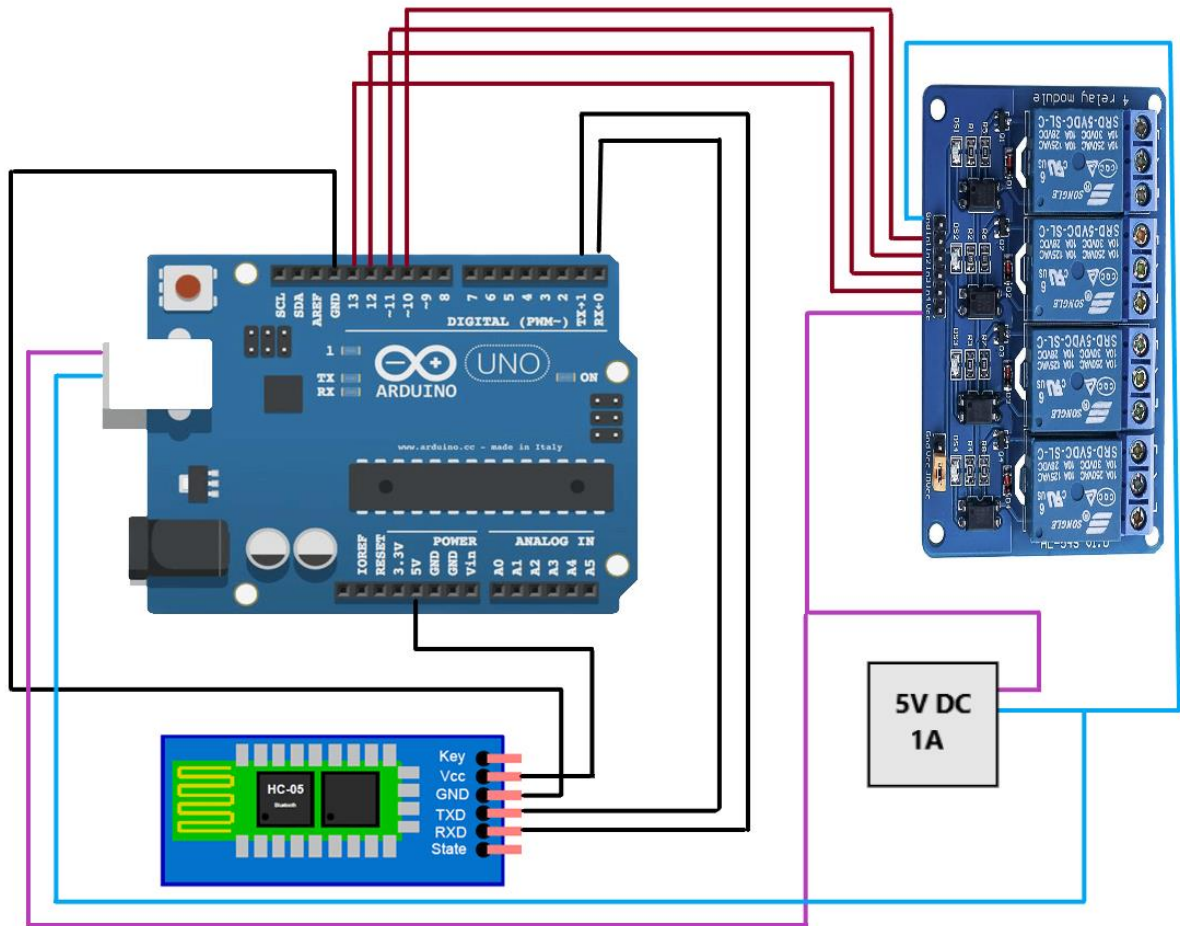


Fig 6.1: Circuit diagram

6.3 Working Procedure

This system is designed and implemented to assist and provide support in order to fulfill the needs of elderly and disabled in the home [1]. Automation gives us more comfort and increasing work efficiency. The world is moving firstly towards automation. People have less time to handle any work so automation is a simple way to handle any device or machine will work to our desire [2]. We know that the world is moving fast and all systems are converted into automated. We also developed an Arduino based home automation system. Arduino is connected to the Bluetooth module which receives the information from the user [3]. Arduino also connected relay, which receives information from Arduino and performs the operation [4]. We used HC-05 model Bluetooth module that is well known to us [5]. We control the system by mobile application through this Bluetooth module. This creates an environment for controlling home automation system. Here we can control light and fan. In future, we can control door, water motor and see the water level and room temperature.

CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 Conclusion

In this project, we will use an HC-05 Bluetooth module and a smartphone to send voice commands to control LEDs to receive voice commands. We are using an “Arduino Bluetooth Voice Controller” android app which you can download from play store. The speech is received by a microphone and processed by the voice module using voice command. The voice command is given by using mobile to the Bluetooth which has certain features like controlling which LEDs open and close.

This project is very important for all people. In modern time, everyone wants to do all the work easily. If you want to use all electronic devices easily at home, then this project can play an important role. For example, without pressing the switch, the electronic device will be activated by giving a voice message. This project can play the most important role for people with disabilities. The electronic device they want to activate will give a voice message and the device will be activated immediately. We were successful in developing a system through which the user was given the ability to either control their household appliances through application or by using voice commands.

Automation plays a key role in the world of technology. Home automation allows us to control household electrical appliances such as light, door, fan, AC, etc. It also provides home security and an emergency system. Home automation does not only reduce human efforts, energy efficiency and time-saving. The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations.

7.2 Future Work

In the future, on the new technology can be included which reduces human effort, which is being researched. We made a type of device which is compact in size, low cost, more capacity, long life and more distant signal receivers. This system which saves the electricity and improve human life style. The basic most vital goal of home automation is to ensure amenity of user time and making life simpler even if guided us to frugal of electricity. In this project we proposed the idea of smart homes that can support several types of home automation system. There are a variety of enhancements that could be made to this system to achieve greater accuracy. So, in future we have a plane to work on of those ideas: -

Smart Door Lock:

In future we are going to learn the way to form password-based door Lock Security System using Arduino & keyboard. As thefts are increasing day by day security is turning into a significant concern today. So, a digital code lock will secure your home or locker simply. it'll open your door only if the proper countersign is entered.

Gesture Control:

The next big thing in smart home technology is gonna be gesture control. Gesture controls can make using technology feel more natural than even voice recognition. We are just started working on it and hopefully will be able to implement the technology to our project.

Smart Gardening:

To decorate our smart home, we are thinking about a smart gardening system. With the aid of sensors such as humidity sensor, moisture sensor, LDR, temperature sensor, all parameters of the garden such as temperature, humidity, moisture, humidity, light intensity are monitored. And the garden owner will track this information directly from his / her mobile phone.

Make our Own App in Android Studio:

At this moment we are controlling our home appliances via voice command app inverter. In upcoming days we've planned to design and develop an Android App using Android Studio.

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