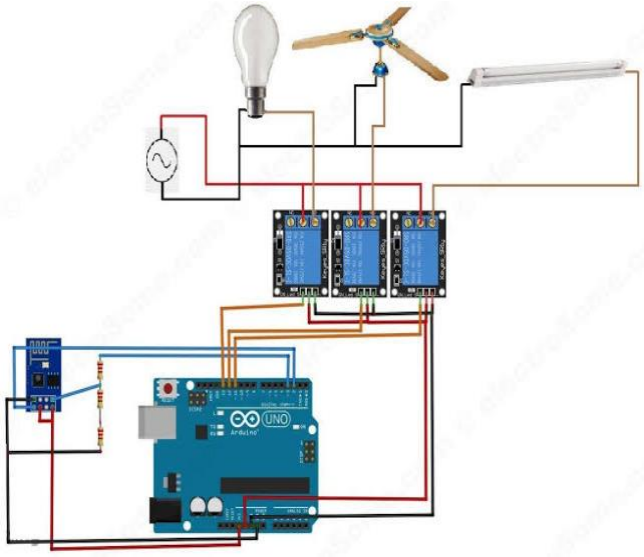
Chapter 01

Introduction

1.1 An Introduction to Bluetooth Control device

Wireless technologies are becoming more popular around the world and the consumers appreciate this wireless that can be attached. lifestyle which gives them relive of the well known "cable chaos" that tends to grow under their desk. with the help of this project we can control electrical appliances of your lab/classroom from anywhere inside the college, just using your smart phone. In this project, we will use wireless bluetooth technology to control the lab/classroom appliances through a android phone.bluetooth has a range of 10-15 meters, so that you can switch on and off any electrical appliance within the range . the project is built on arduino uno and is used to control leds and four home appliances connected to the arduino through relays. the arduino board is interfaced to an hc-05 bluetooth module to pair with the smart phone. in this project, a home automation system is designed which can be controlled by any smartphone.



The automation system connects with the smartphone through Bluetooth. The smart phone sends control signals to switch home appliances ON or OFF by an android app through Bluetooth interface. An app named “Bluetooth Terminal” is used on the smart phone which is capable of sending text strings to a paired device. Another app named “BT Voice Control for Android” can also be used on the smart phone. The BT Voice app takes voice commands in US

English and transfers them as text strings to a paired device. Either of the app will pair with home automation system through HC-05 Bluetooth Module. The proposed system controls the electrical loads based on the data transmitted by the Android device. An Android application should be installed in user's mobile or tablet to control the electrical loads. Using this Android application user can send the commands to the Bluetooth module to control the electrical loads. Wireless technology used in this project is Bluetooth. It can also be called as "Bluetooth Controlled Electronic Home Appliances" or "Android based Home Automation System or "Remote Password Operated Electronic Home Appliances Control System".

1.2 Objectives

Main objective of our project is to integrate all electrical appliances to a control unit that can beoperated by an android application device i.e android smart phone or tablet.with the help of this project we can control electrical appliances of your lab/classroom from anywhere inside the college, just using your smart phone.in this project, we will use wireless bluetooth technology to control the lab/classroom appliances through a android phone.bluetooth has a range of 10-15 meters, so that you can switch on and off any electrical appliance within the range . the project is built on arduino uno and is used to control leds and four home appliances connected to the arduino through relays. the arduino board is interfaced to an hc-05 bluetooth module to pair with the smart phone. in this project, a home automation system is designed which can be controlled by any smartphone.

In this project, we will use wireless bluetooth technology to control the lab/classroom appliances through a android phone. Bluetooth has a range of 10-15 meters, so that you can switch on and off any electrical appliance within the range. Bluetooth has a range of 10-15 meters, so that you can switch on and off any electrical appliance within the range.

The basic aim of home automation is to control or monitor signals from different appliances, or basic services. A smart phone or web browser can be used to control or monitor the home automation system.

Wireless technologies are becoming more popular around the world and the consumers appreciate this wireless that can be attached. Lifestyle which gives them relive of the well known "cable chaos" that tends to grow under their desk. Now with the embedded Bluetooth technology, digital devices form a network in which the appliances and devices can Communicate with each other . Today, home automation is one of the major applications of Bluetooth technology.

Chapter 02

Review of Literature

2.1 Bluetooth Control device using cellphone

In this system user send signal to arduino board by using an android application and a Wireless module connected to that arduino board receives these signal and further sent to arduino for controlling of smart appliances using relay board.Arduino device is used as the controlling hub for this system.To perform the operations"ON" and"OFF" we use the relays. This system is usefull for the peoples who could not move frequently from one place to another for the controlling of home appliances.

Artificial Intelligence is the art in computer science through which we want the computer system to perform that action which involved intelligence. In response to these actions the machines react on the basis of past experiences. To explore the idea of artificial intelligence lets have some examples like Self-driving Cars, Face recognition, Web searches, Industrial robots, Missile guidance and Tumor detection.. Like many more complex problems are already solved by using Artificial Intelligence. Due to interdisciplinary nature of Speech recognition it makes this as most complex area of computer science [81. Naturally the speech is dynamic.

Artificial Intelligence has a special impact in home automation with the new emerging technologies and learning methods. It is a highly beneficial for the disable person if the home automation system works on the basis of voice/speech recognition. Ant colony Optimization found very helpful in solving many issues regarding decision trees. This system helps the disabled persons to perform their routine tasks efficiently.

Many of the Systems designed for Disabled peoples become useless when it comes to a case that anvbodv which is not for the resons. This capable of moving their hands and also unable to speak. If someone succeeded in achieving the directional the discrimination of eye moment then disable persons may be›ke, motion ,appliances able to handle the smart home appliances and this system information will be helpful in improving the quality of their life [5].An activating EOG Bio-potential amplifier is designed and develop ine system is order to obtain the eye signal moment.

The main feature of this system is that the peoples with hands disability can use this system by voice recognition this feature makes this a totally hands free home automation system. This is mainly used system by handicaps and elders who are suffering from hands disability or those

who cannot move their limbs frequently.This is an affordable, easy to use system. Initially the system takes input as voice signals and stores these voice signals in the systems memory. Then the user want to control a specific device then system again take an voice input and compare the input with the already saved directory and if matches then PIR sensor activated for checking the presence of any human if human presence test passes then it activates the relay that is responsible for to perform user intended operation

Implementation of home automation using the latest technology gives us more convenience, security and safety. Smartphone affordability increases every year and smartphones have begun to play important roles in our daily lives due to their size and portability. Google's Android operating system (OS) is one of the leading and most preferred smartphones. Controlling home appliances by using an Android phone gives users the ability to control their home appliances anywhere and at any time while at home and saves time spent in searching for the remote control unit of home automation systems since the user's phone is usually kept close at hand. This project presents the design and implementation of a low cost prototype of a Bluetooth-based home automation system using an Android phone.

2.2 Bluetooth Based Lab/ Classroom Automation System

Basic Intention behind adaptation of home automation system is for the sake of Energy Efficiency, Ease in life and F. Ho for the Security. Home Automation system is a step forward to increasing the Comfort in life and to improve quality of (EO Mar life. This system is proposed for the disabled persons. This used system provides the means of comfort and security for the persons with a certain disability and for elder persons. This system uses the Intel Galileo Board for achieving the som disc information like temperature, humidity, gas, smoke, motion able and fire and for controlling of the different home appliances attached with the system. Incase if the achieved in formation will value increase highly then system is capable of activating EO(the required safety system.

Chapter 03

Hardware Description

3.1Block Diagram and its Working

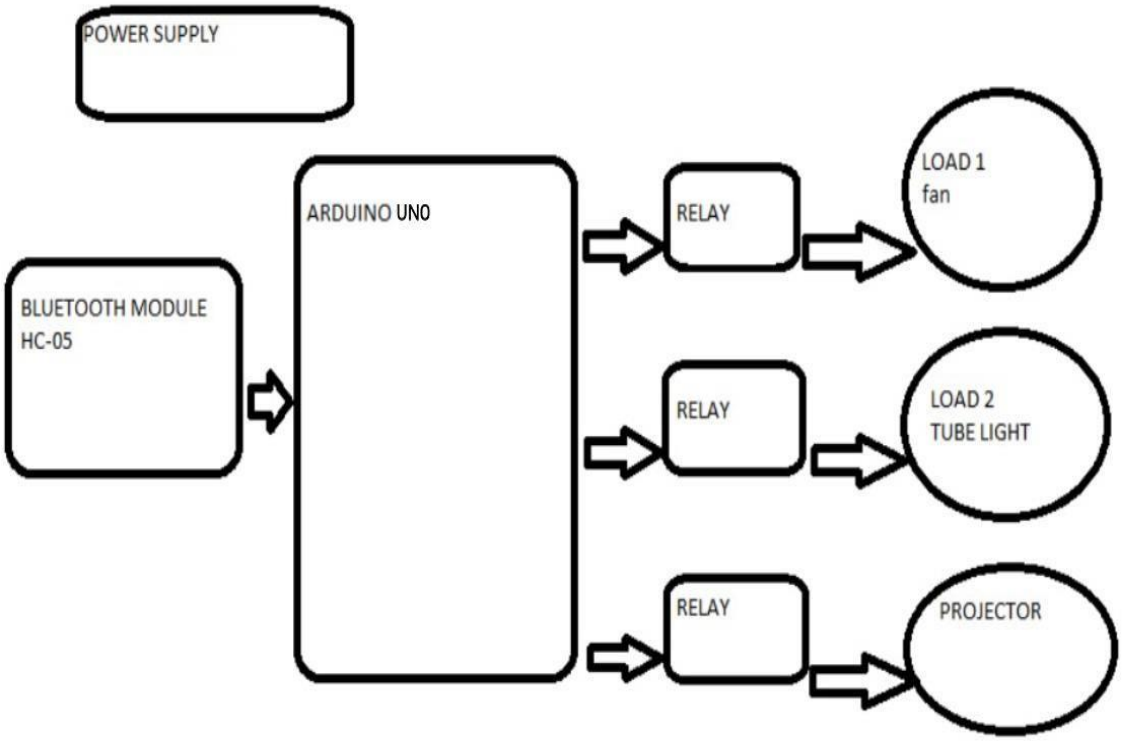
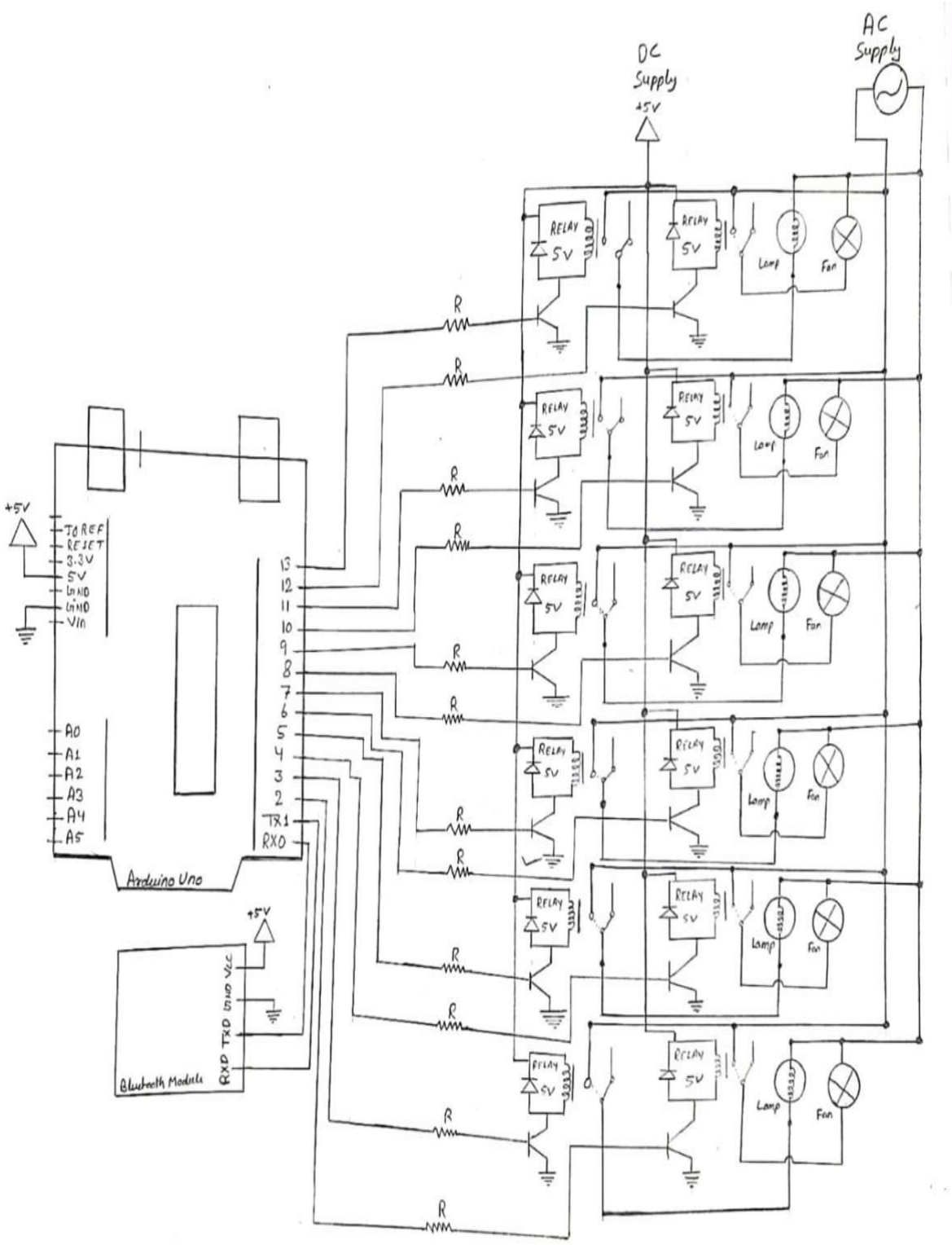


Figure 3.1- Block Diagram

3.2 Circuit Diagram



5v Power Adaptor Using For Relay Module To Operate Relay Module And Arduino Nano , Bluetooth Module Also.Bluetooth Module's Rx And Tx Pins Are Directly Connected To The D2 And D3 Pins Of Arduino Nano.Three Relays Of 5 Volt Are Used As A Switch For Turning On And Off The Lab/Classroom Appliances Running On Ac Mains.Positive Terminal Of The

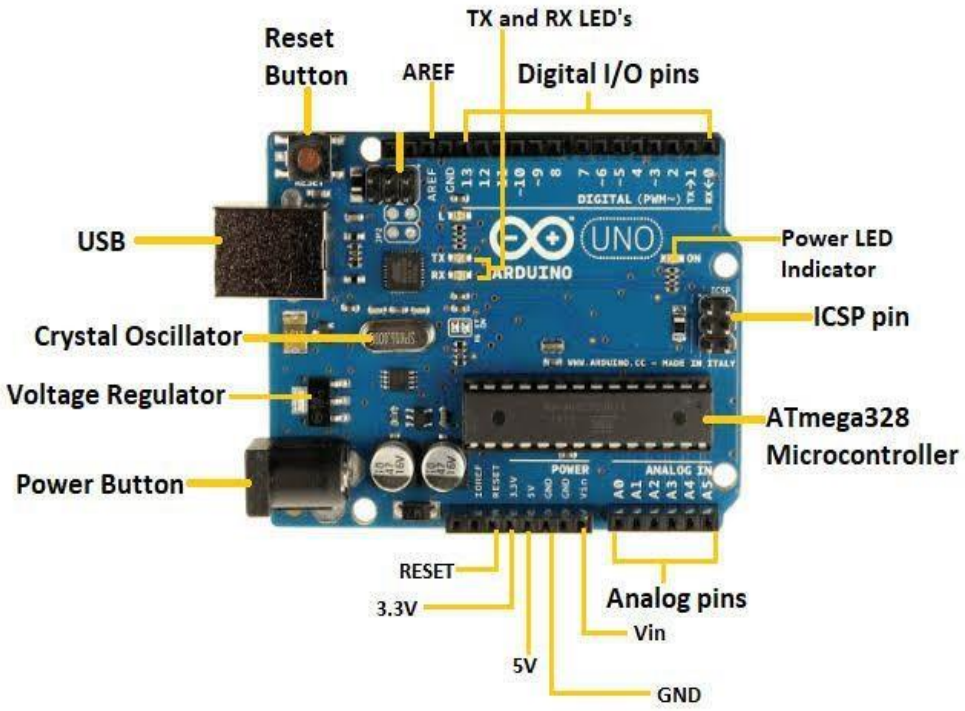
Ac Supply Is Connected To The Appliances And Other Is Relay (Com).One Terminals Of All The Appliances Are Connected To The Main Ac Supply And Others Are Relay

3.2.1 Components used in Circuit

1. Arduino Uno
2. Bluetooth Module
3. Relay
4. Android Phone
5. Power Supply

3.2.2 Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P.It 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 USB cable or power it with a AC-to-DC adapter or battery to get started. The Arduino UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with Arduino Uno.



3.2.3 Bluetooth Module

hc-05 bluetooth module consists two things one is bluetooth serial interface module and a bluetooth adaptor.

bluetooth serial interface module is used for converting serial port to bluetooth it is used for many applications like wireless headset, game controllers, wireless mouse,
wireless keyboard and many more consumer applications.it has range up to 10-15m
which depends upon transmitter and receiver,atmosphere,geographic & urban conditions.it is ieee 802.15.1 standardized protocol,through which one can build wireless personal area network (pan).it uses frequency-hopping spread spectrum (fhss) radio technology to send data over air.

3.2 Relay

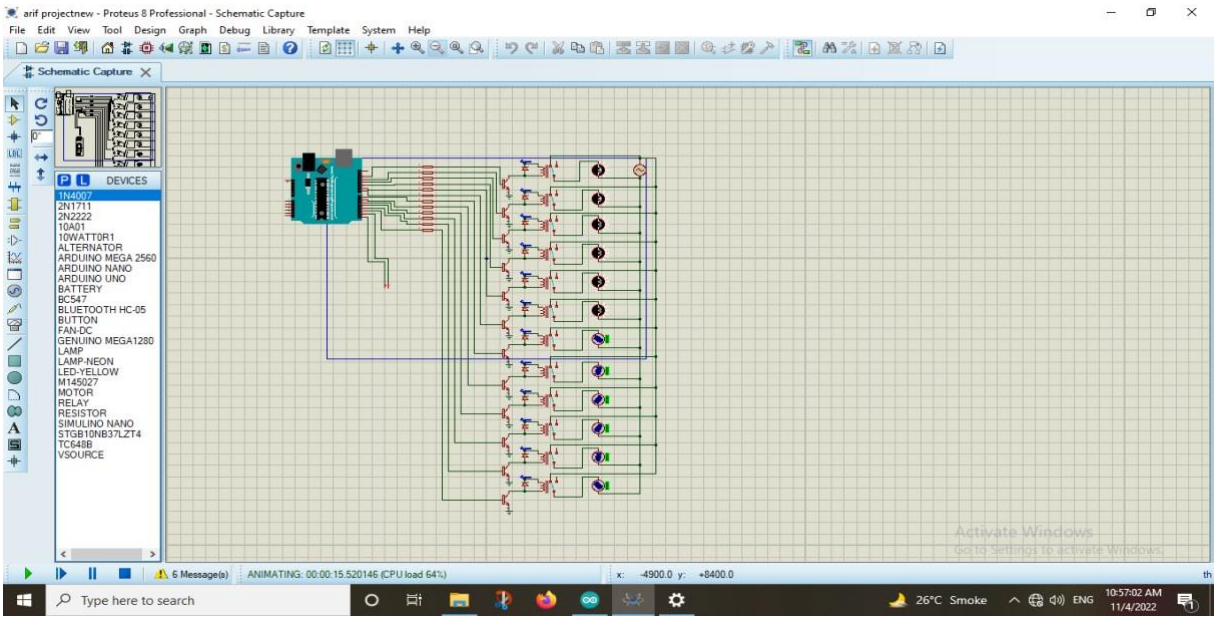
A 5v relay is an automatic switch that is commonly used in an automatic control circuit and to control a high-current using a low-current signal. the input voltage of the relay signal ranges from 0 to 5v.normal voltage is 5v dcnormal current is 70maac load current max is 10a at 250vac or 125v acdc load current max is 10a at 30v dc or 28v dcit includes 5-pins & designed with plastic materialoperating time is 10msecrelease time is 5msecmaximum switching is 300 operating per minute.

Chapter 04

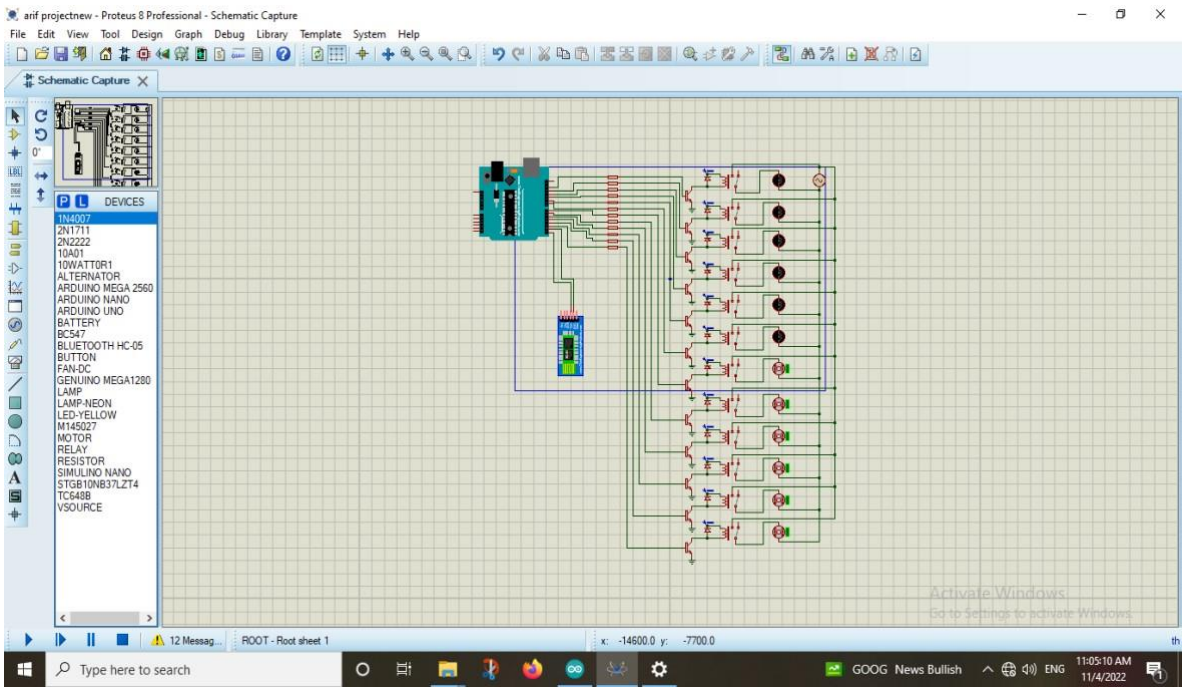
Result and discussions

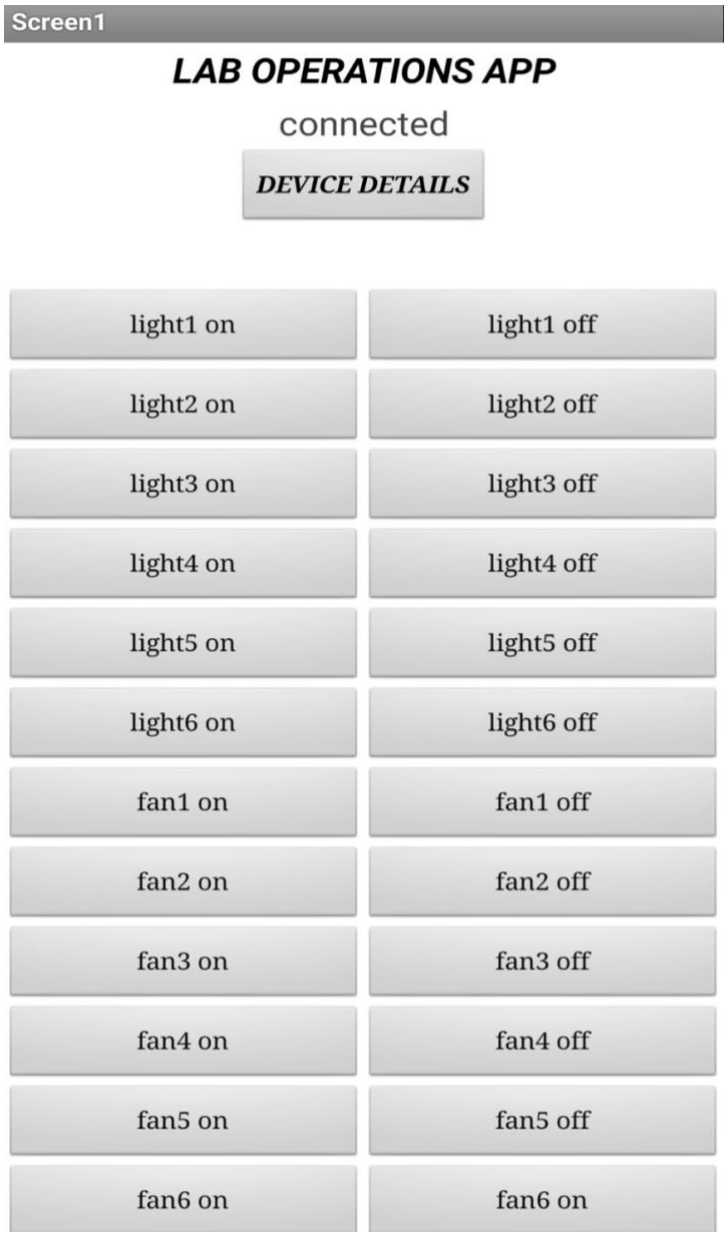
4.1 Design and Simulation

SIMULATION AT ON CONDITION



SIMULATION AT OFF CONDITION





Bluetooth remote control application on android device

4.2 Working Principle

In this project we have used arduino uno for controlling the whole process of this project. and a bluetooth module is used for controlling the lab/classroom appliances wirelessly.
home appliances will turned on and off when user will touch button in theandroid mobile phone by using bluetooth app.to run this project,first we need to download bluetooth app form google play store.

4.3 Bluetooth Pairing Process

Search for new bluetooth device from your phone. You will find bluetooth device with "hc-05" name.click on connect/pair device option; default pin for hc-05 is 1234 or 0000.after pairing two bluetooth devices, open terminal software (e.g. Teraterm, realterm etc.) In pc, and select the port where we have connected usb to serial module. Also select default baud rate of 9600 bps.in smart phone, open bluetooth terminal application and connect to paired device hc-05.it is simple to communicate, we just have to type in the bluetooth terminal application of smartphone. Characters will get sent wirelessly to bluetooth module hc-05. Hc-05 will automatically transmit it serially to the pc,which will appear on terminal.sameway we can send data from pc to smartphone.

4.4 Working

After installing the app, we need to open it and then search bluetooth device and select hc-05 bluetooth device. And then configure keys.

Steps:-

1.download and install bluetooth controller.

2.turned on mobile bluetooth.

3.now open bluetooth controller app

4.press scan

5.select desired bluetooth device (bluetooth module hc-05).

6.now set keys by pressing set buttons on screen

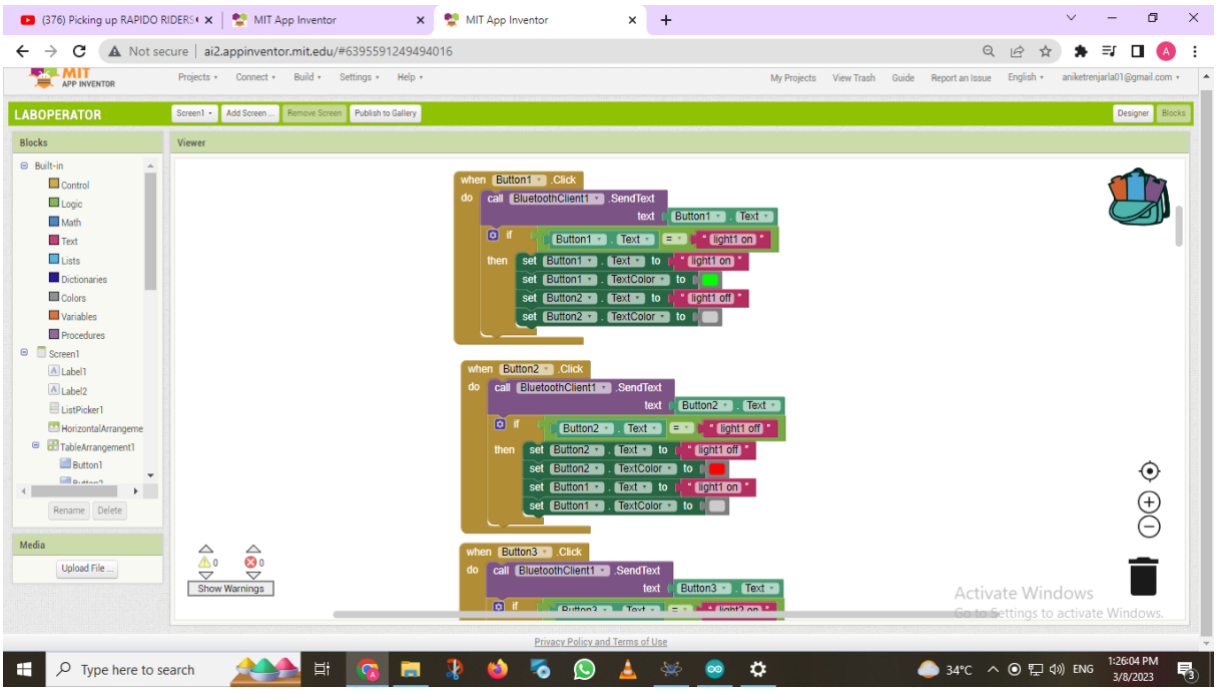
When we touch any button in bluetooth controller app then android phone sends a value to bluetooth module, after receiving this value, bluetooth module sends the received value to the arduino nano and the arduino nano reads it and compare it with predefined value and send the command to the relay and then specific relay

Operates .if any match is occurred the arduino nano performs relative operation.same

Operation will performed each time when button pressed.now, when user touch 'fan

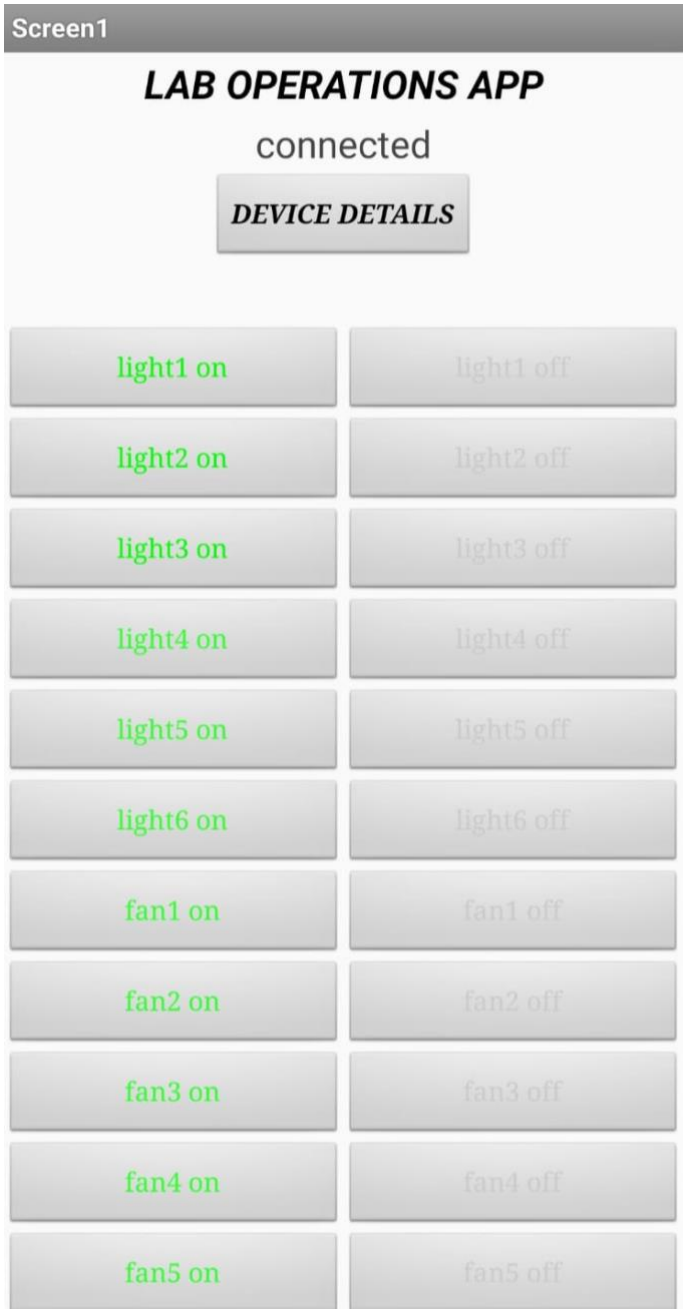
On' button in bluetooth controller app then arduino nano receives '1' via bluetooth module and then controller switch 'on' the fan by using relay driver and relay.and

When user touch 'fan off' button in bluetooth controller app then arduino nano

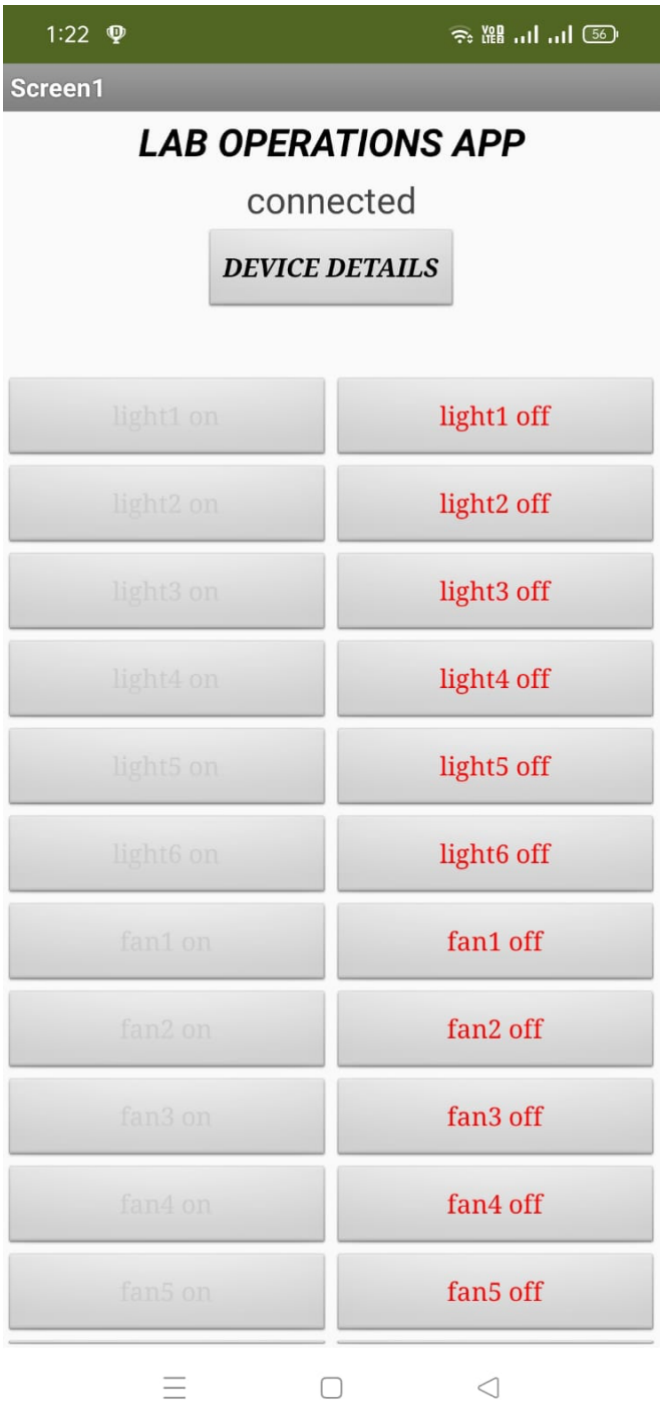


Program for Bluetooth remote application

This program works on each and every buttons used in bluetooth remote application for eg light 1 to switch on or off we need to set command on this program using lab operator software where each button can be customised and can be set using users advise. In this project we have used many buttons for lights as well as for fans for eg switch on light 1 , switch off light 1 or switch on fan 1 or switch off fan 1 . this will directly be processed in an application where we will directly control light or fan using bluetooth remote control device .

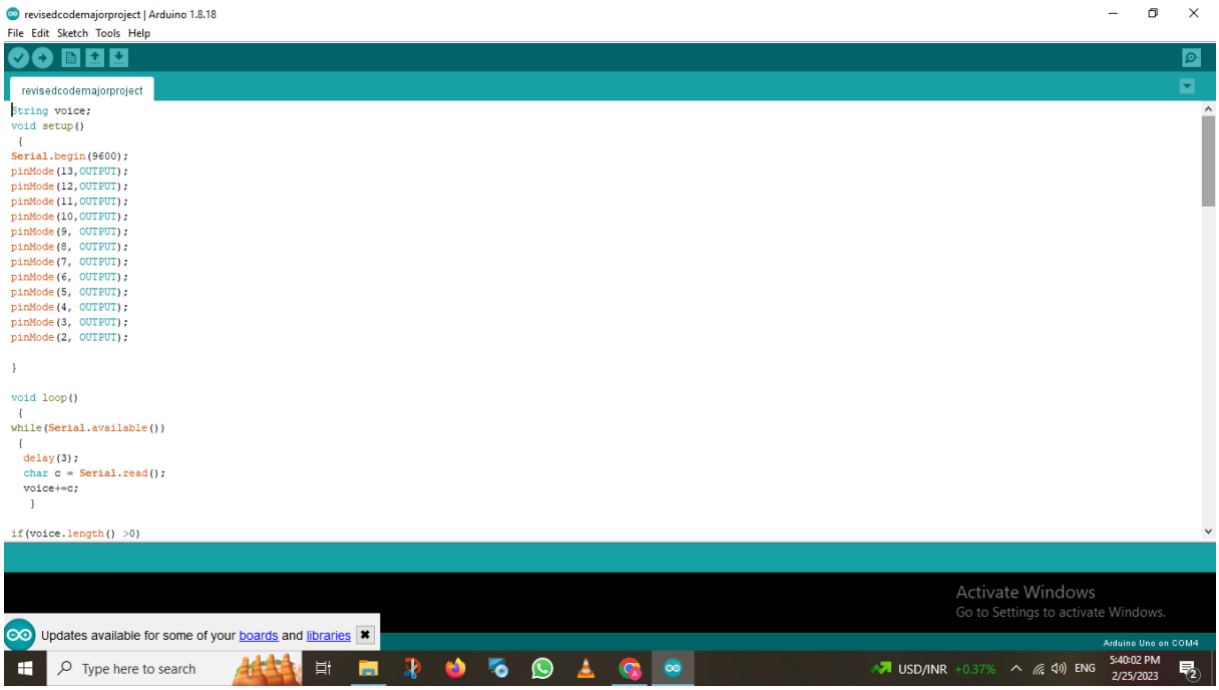


Bluetooth remote control display while all lights and fans on



Bluetooth remote control display while all lights and fans off

4.5 Arduino Software



We need to program the Arduino UNO to act as an ISP (In-System Programmer), so that it can burn the bootloader onto the Breadboard chip.

1. Open the Arduino IDE
2. Open the ArduinoISP sketch (under File, Examples)
3. If you're using version 1.0 of the IDE:

Search for *void heartbeat* and change the line that reads:

delay(40);

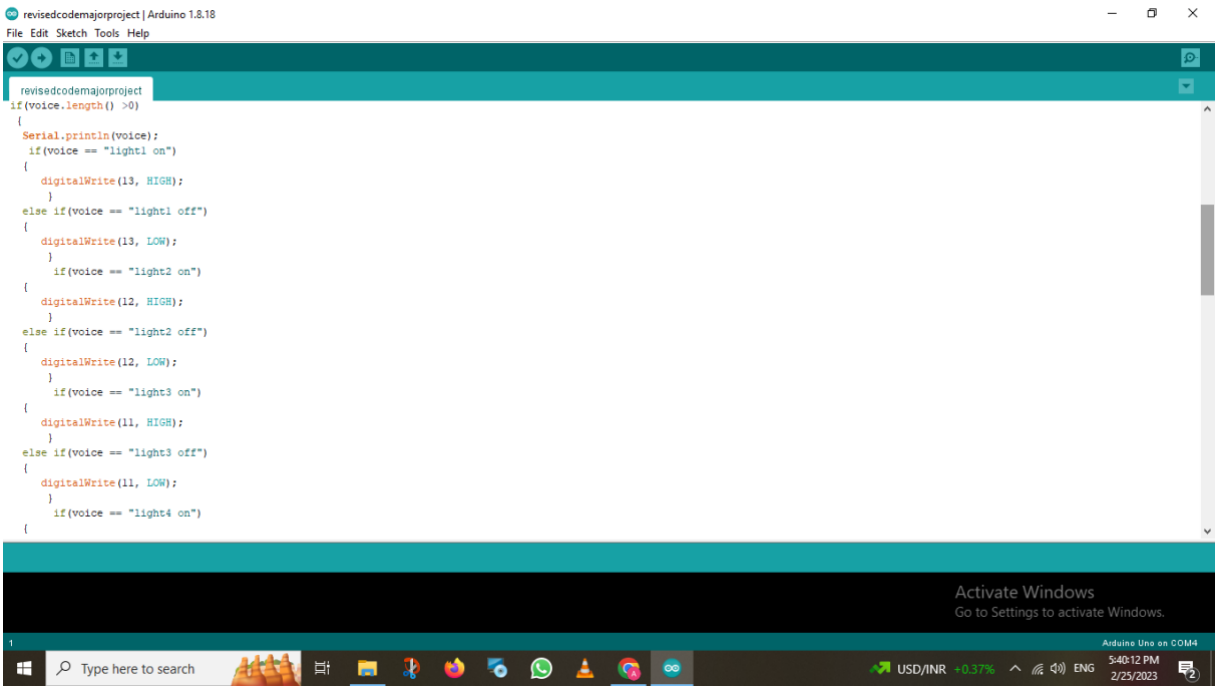
to

delay(20);

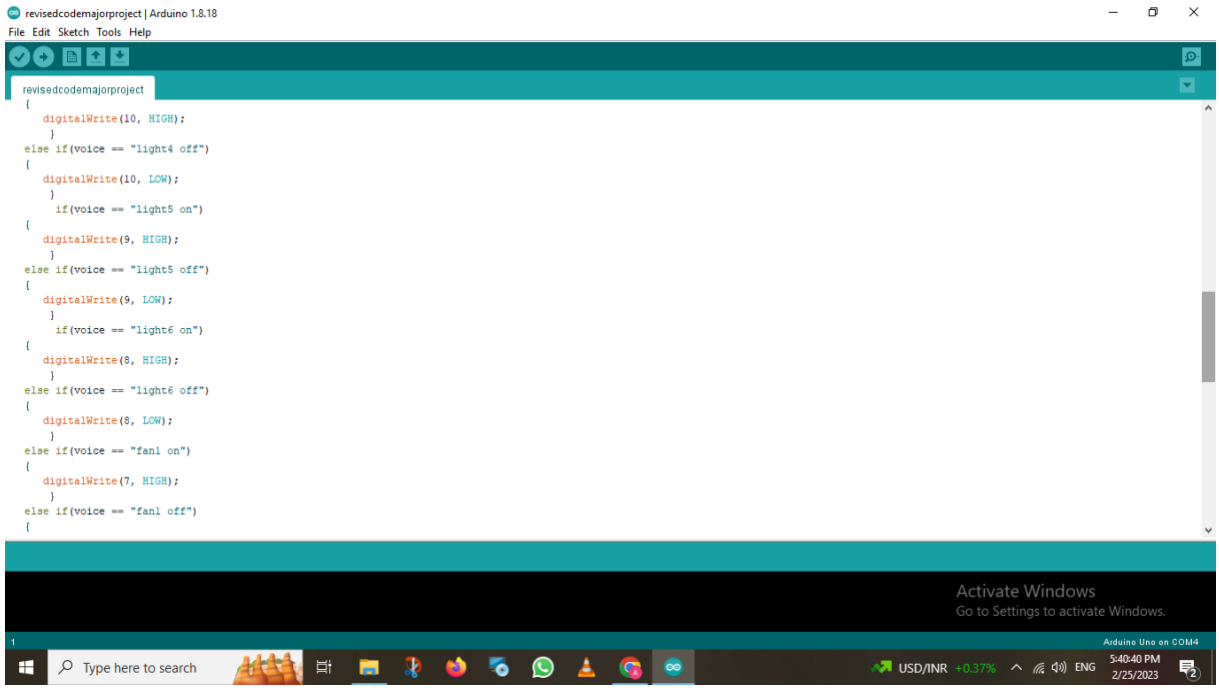
Connect your UNO to the PC, making sure it's not connected to the Arduino

In this project we have used Arduino Uno for operating Relay and bluetooth module.

Arduino Uno is a microcontroller board based on the ATmega328P.It 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 USB cable or power it with a AC-to-DC adapter or battery to get started. The Arduino UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with Arduino Uno.

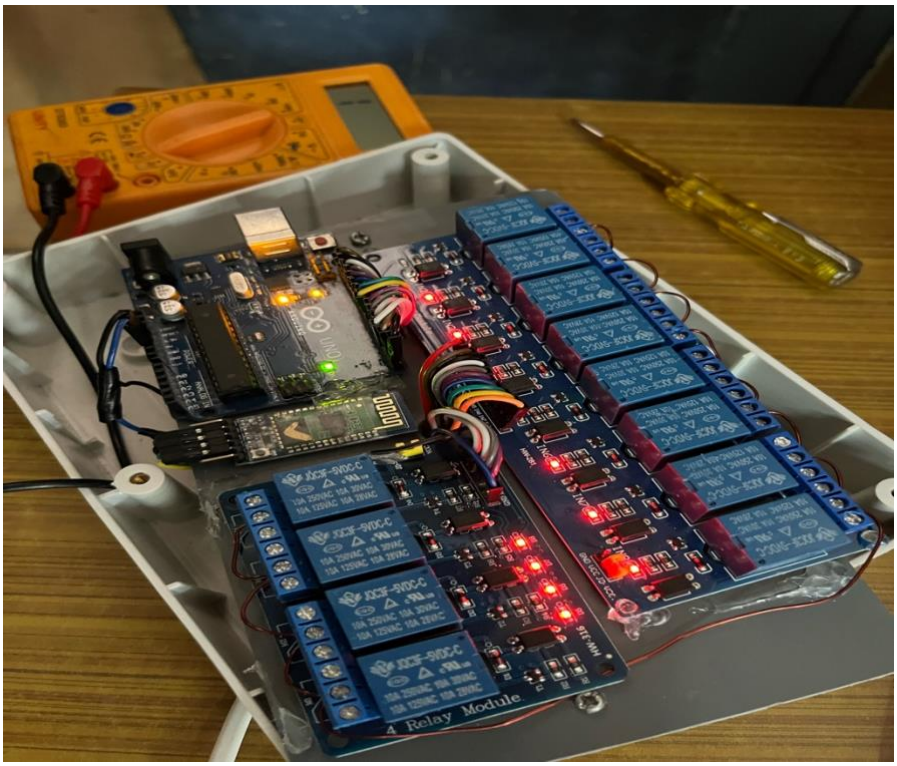


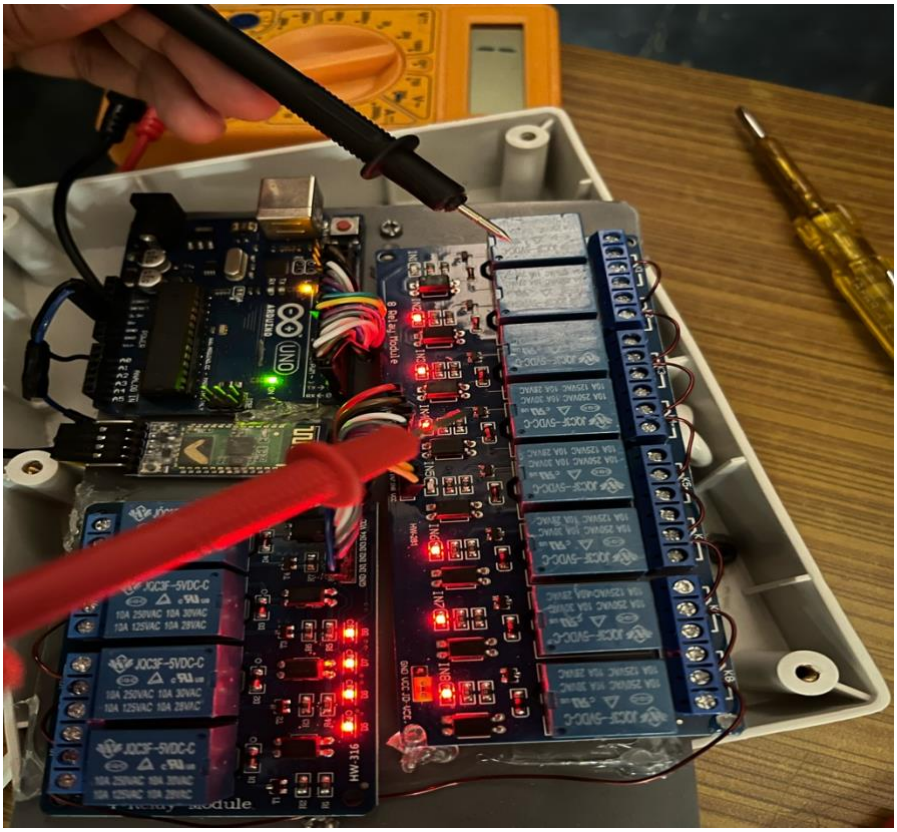
Program Code for Arduino Software



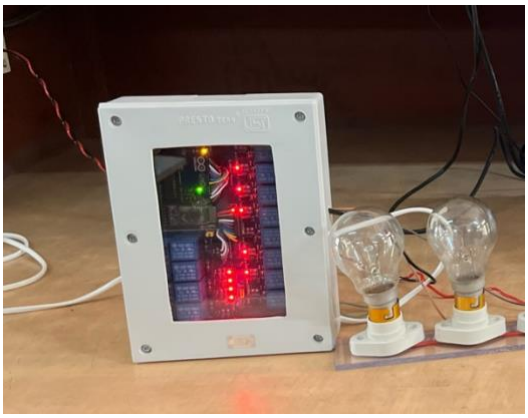
4.6 Hardware Results

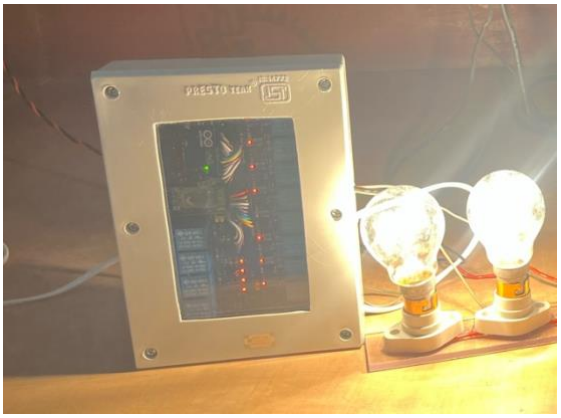
4.6.1 Testing

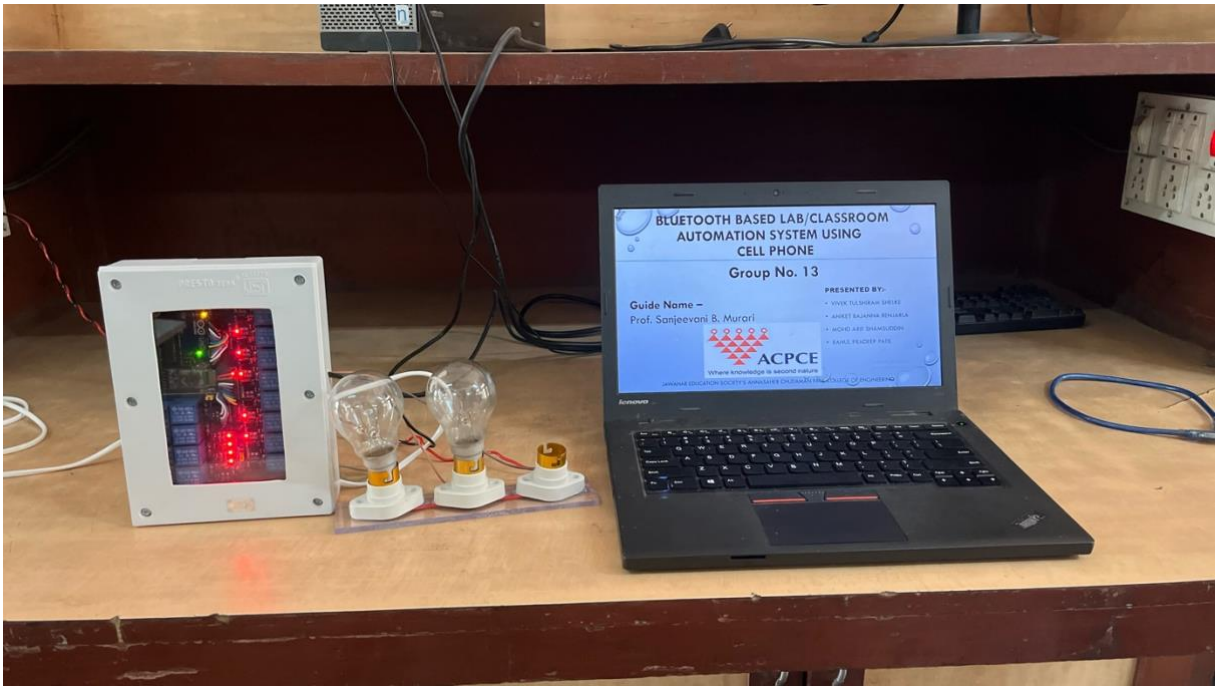




4.6.2 Final Testing







Bluetooth Based Lab/Classroom Automation System using Cellphone

Chapter 05

Advantages and Disadvantages

5.1 Advantages

Ease of access is a huge advantage if you have a smart home. If you forget to turn off your geyser after a warm shower or leave the AC remote somewhere and can't find it, you can make things work remotely via the voice-activated system or an app. Home automation technology is an effective way to get things done easily, even if you are not at home. You can save more on your electricity and utility bills as your home is equipped with automated monitoring systems that let you use the technology efficiently. Most smart devices are based on human technology and power off automatically after sensing your absence. So, from heaters to Air conditioning systems, you contribute to save energy sources.

Advanced security systems are one of the main reasons why homeowners opt for automation. Technology is your best option, especially when you live in a neighbourhood with a bad reputation.

5.2 Disadvantages

Upfront costs of equipment and installation are the leading disadvantages of home automation systems. Although smart technology can help you save on your bills, it's the initial cost that can leave you surprised.

Smart Homes are based on the internet technology; it’s vulnerable to hacking. In addition, most systems require password-based authentication, and in case your credentials are leaked, anyone can misuse this technology and compromise your security. Getting started with private WiFi is also costly to add more to the pain.

The maintenance costs can be high as you may also need a professional to repair and look after your system from time to time. Make sure maintenance is done properly by a professionally licensed agency

Chapter 06

Conclusion and future scope

6.1 Conclusion

The full functionality of the Lab/Classroom automation system was tested and the wireless communication between the cell phone and Arduino BT was found to be limited to >15m in a concreted building and maximum of 20 m range was reported to be applicable in an open range.

In our project, our prime objective is to operate the load without any presence .this project gives basic idea of how to control various load using android phone.this project is based on android and arduino platform both of which are foss(free open source software).so the overall implementation cost is very moderate and it is affordable by a common person.looking at the current scenario we have chosen android platform so that most of the people can get benefit the design consists of android phone with classroom devices.user can interact with the android phone and send control signal to the arduino which in turn will control other embedded devices.we have discussed a simple prototype in this project but in future it can be expanded to many other areas .

6.2 Future Scope

Other features can be added in the future such as biometrics so that unauthorised persons can not have access to the appliances and an also timing schedule can developed for each appliances connected this will effectively conserve energy. a low cost and highly reliable lab/classroom automation system that can assist handicapped/old aged people, as well as a user-friendly device was developed.

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- https://www.ijert.org/Bluetooth-based-Home-Automation-using-Arduino-
- https://www.pantechsolutions.net/home-automation-using-bluetooth
- https://smartify.in/knowledgebase/build-bluetooth-controlled-home-automation-setup-using-arduino/amp/
- https://techatronic.com/home-automation-using-arduino-and-bluetooth/
- https://www.electronicshub.org/bluetooth-controlled-electronic-home-appliances/
- https://www.instructables.com/Bluetooth-Control-Home-Automation/?amp_page=true
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- https://www.projectsof8051.com/arduino-based-home-automation-using-bluetooth/amp/
- https://www.slideshare.net/AshishKumarThakur6/home-automation-using-bluetooth-aurdino-based
- http://www.irphouse.com/ijert20/ijertv13n12_153.pdf
- https://predictabledesigns.com/home-automation-with-an-arduino-a-basic-tutorial/

Appendix

Program Code :

```
 String voice;
void setup ()
Serial.begin (9600); pinMode (13, OUTPUT); pinMode (12, OUTPUT);
pinMode (11, OUTPUT);
pinMode (10, OUTPUT);
pinMode (9, OUTPUT);
pinMode (8, OUTPUT);
pinMode (7, OUTPUT);
pinMode (6, OUTPUT);
pinMode (5, OUTPUT);
pinMode (4, OUTPUT);
pinMode (3, OUTPUT);
pinMode (2, OUTPUI);
}
void loop ()
while (Serial.available ())
{
delay (3);
char c = Serial. read () ;
voice+=c;
if (voice.length () >0)
{
Serial.printIn (voice);
if (voice == "light1 on")
digitalwrite (13, HIGH);
else if (voice == "light1 off")
{
digitalWrite (13, LOW);
}
if (voice == "light2 on")
{
digitalWrite (12, HIGH);
else if (voice == "light2 off")
{

digitalWrite (12, LOW);
11 voice ==
"light3 on")
{

digitalWrite (11, HIGH) ;
else if (voice ==
"light3 off")
{
digitalWrite (11, LOW);
"light4 on")
digitalWrite (10, HIGH);
else if (voice
"light4 off")
digitalWrite (10, LOW);
if (voice == "light5 on")
{

digitalWrite (9, HIGH);
else if (voice == "light5 off")
{

digitalWrite (9, LOW);
}
if (voice == "light6 on")
{

digitalWrite (8, HIGH);
else if (voice == "light6 off")
{

digitalWrite (8, LOW);
}

else if (voice
```

```
 == "fan1 on")
{

digitalWrite (7, HIGH);
else if (voice
"fan1 off")
{

digitalWrite (6, LOW);

else if (voice == "fan3 on")
{

digitalWrite (5, HIGH);
else if (voice == "fan3 off")
digitalWrite (5, LOW);
]

else if (voice == "fan4 on")
digitalWrite (4, HIGH);
else if (voice == "fan4 off")
digitalWrite (4, LOW);
}


else if (voice == "fan5 on")
digitalWrite (3, HIGH);
else if (voice == "fan5 off")
digitalWrite (3, LOW);
e 8e 11 V0108 ==
"fan6 on")
{


digitalWrite (5, LOW);
else if (voice == "fan4 on")
digitalWrite (4, HIGH);
else if (voice == "fan4 off")
{
digitalWrite (4, LOW);
}
else if (voice == "fan5 on")
{
digitalWrite (3, HIGH);
}
else if (voice == "fan5 off")
{
digitalWrite (3, LOW);
}
else if (voice == "fan6 on")
{
digitalWrite (2, HIGH);
〕
else if (voice == "fan6 off")
{
digitalWrite (2, LOW);
}
voice = “ “ ;
}
```