A SERVICE TOOL FOR HOME AUTOMATION USING ARDUINO

TEAM MEMBERS:

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Report submitted for the

Final Project Review: A service tool for home automation using Arduino

COURSE CODE: CSE 2006-Microprocessor and Interfacing
SLOT: A1
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1.AIM:

To make a service tool for home appliances to work automatically.

2.OBJECTIVE:

Our main aim of the course project is to prepare a software service tool for home appliances using the required hardware and software components.

3.ABSTRACT OF OUR PROJECT:

Home automation is a building automation for a home, called a **smart home** or **smart house**. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. When connected with the Internet, home devices are an important constituent of the Internet of Things.

A home automation system typically connects controlled devices to a central hub or "gateway". The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web interface, that may also be accessible off-site through the Internet.

While there are many competing vendors, there are very few worldwide accepted industry standards and the smart home space is heavily fragmented manufacturers often prevent independent implementations by withholding documentation and by litigation.

4.INTRODUCTION TO OUR PROJECT:

Basically our project deals with majorly with three component requirements - hardware, software and an android application.

.What we will be going to do is implement a software tool for home appliances, for that we will be connecting PIR sensor and DHT sensor to the digital and LDR to the analog pin of our Arduino board as input devices.

- We will connect some LEDs and a motor fan to the digital pins of Arduino board as output pins.

- So here, devices which will be connected to input pins analyze the surrounding and send data to Arduino which processes it and command devices connected to output pins accordingly.

5.LITERATURE SURVEY:

On the basis of different home automation projects:

1.Bluetooth based home automation system using cell phones:

In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made

via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.

2. Zigbee based home automation system using cell phones:

 To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is record and store by network coordinators. For this the Wi-Fi network is used, which uses the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home. Over Zigbee network, Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful.

3. GSM based home automation system using cell phones:

 Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. In figure shows the logical diagram the work of A. Alheraish, it shows how the home sensors and devices interact with the home network and communicates through GSM and SIM (subscriber identity module). The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module.

4. Wi-Fi based home automation system using cell phones:

Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. Wi-Fi technology is used by server, and hardware Interface module to communicate with each other. The same technology uses to login to the server web based application. The server is connected to the internet, so remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes with the microcontroller itself. Arduino software is culpable for gathering events from

connected sensors, then applies action to actuators and preprogramed in the server. Another job is to report the and record the history in the server DB. The server application software package for the proposed home automation system, is a web based application built using asp.net. The server application software can be accessed from internal network or from internet if the server has real IP on the internet using any internet navigator supports asp.net technology. Server application software is culpable of, maintain the whole home automation system, setup, configuration. Server use database to keep log of home automation system components, we choose to use XML files to save system log

5. Home automation using RF module:

The important goal of Home Automation System is to build a home automation system using a RF controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current l switches to centralized control system, containing RF controlled switches. Todaytraditional wall switches situated in various parts of the home makes it laborious t for the end user to go near them to control and operate. Even further itturnsinto moreproblematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology. In order to accomplish this, a RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.

6. Home automation using Android ADK:

The devices of home are associate to the ADK and the Connection is established between the Android device and ADK. The devices of house are link to the input/output ports of the board (EMBEDDED SYSTEM) and their current situation will have passed to the ADK. The microcontroller board (Arduino ADK) is based on the ATmega2560. It has a USB host connection to associate with Android based phones, and that is based on the MAX3421e IC. The two important features of Android Open Accessory Protocol 2.0(AOAP) are as follows: It has audio output that is from the Android device to the component and it also support for the component serves as one or more Human Interface Devices (HID) to the Android device. This paper depends upon Android and Arduino platform in which both are FOSS(Free Open Source Software). Including motion sensors for safety systems will detect an unauthorized action and it will automatically notice the user through cell phone or the security system.

7. Cloud Based home automation system:

Home Automation using cloud based system focuses on design and implementation of home gateway to collect data about data from home appliances and then send to the cloud-based data server to get store on Hadoop Distributed File System, it is process using MapReduce and use to implement a monitoring tasks to Remote user Presently home Automation System is persistently developing its resilience by assimilating the

current characteristics which gratify the rising interest of the people. This paper presents the design and development of home automation system that use the cloud computing as service. The current system consists of three important units: the first part is cloud server, handle and controls the data and information of client and users and the status of devices The hardware interface module is the second part which implement the relevant connection to the actuators and sensing devices which give the physical service. Last part is Home Server, which construct the hardware device and gives the user interface. This paper focus to build the web services using cloud which is need for security and storage and availability of the data. The current system is cost efficient, reliable and comfortable which also gives a secured home automation system for entire family.

8. Raspberry pie home automation with wireless sensors using smart phone:

Home Automation System has been developed with Raspberry Pi by reading the algorithm and subject of Email. Raspberry Pi guarantees to be an efficient platform for implementation powerful, and economic smart home automation. home automation using Raspberry pi is better than any other home automation methods in several ways. For example, DTMF (dual tone multi-frequency) using home automation, the call tariff is a big demerit, which is not the problem in their proposed method. In Home Automation using web server, the design of web server and the memory space required is dismiss by this method, because it just uses the already established web server service given by G-mail. LEDs were used to identify the switching action. This System is efficient and flexible interactive. Sending Commands to the Raspberry Pi The script running on server side of our laptop or on a web server receives the input commands from the user and appropriately sends it to the client (Raspberry Pi). Inthis, we will be using those input commands to turn a light ON/OFF. When we give the command to turn ON a light by the server side script, the data and information gets relayed to the Raspberry Pi and its GPIO pin will turns ON a relay. The system can send current updates to the server to detect whether the light is ON/OFF.

9. Wireless Home Automation system using IoT :

This system uses mobiles or computers to control basic home control and function automatically through internet from anywhere around the worldglobally, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The proposed system is a distributed home automation system, consists of server i.e. Wi-Fi module, sensors. Server controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). The Arduino board, with built in Wi-Fi module acts as web server. Automation System can be accessed from the web browser of any local PC using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP (internet IP). Wi-Fi technology is selected to be the network infrastructure that connects server and the sensors. Wi-Fi is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability

6.EXISTING AND PROPOSED SYSTEM:

- PIR proximity sensor will get HIGH input when it will detect someone in the room and will get LOW input in empty room.
- DHT sensor will measure the temperature and humidity in the room.
- If there will be enough brightness in the room that we will be able to read comfortably, LDR will get LOW and when there is insufficient light, it will get HIGH.
- When someone enters the room, PIR sensor gets the input and sends it to Arduino which commands other sensors to get activated.
- Now DHT sensor measures the room temperature and if it is above 20 degrees, it tells Arduino to switch on motor fan otherwise if it is below 20 degrees, it tells Arduino to switch off motor fan.
- At the same time LDR measures brightness in the room and accordingly switch on or off LEDs.
- Finally, when person leaves the room or when there's no one in the room, PIR detects it and commands motor fan and LEDs to be switched off irrespective of temperature or brightness in room.

Tools/components/hardwares/softwares:

1)Hardware requirements:

- Arduino
- Esp8266 WiFi module
- DHT11 temperature and humidity sensor
- PIR proximity sensor
- Light dependent resistor
- LEDs
- Motor fan
- Bread Board

2)software requirements:

- Arduino ide
- Blynk Android application
- IFTTT software

3)android application:

Blynk - It is an android application which connects your microcontroller with your smartphone over WiFi and allows you to control devices with android app.

IFTTT - It is another application which allows you to link your google account with Blynk application so that we can control devices with Google Android Assistant

SYSTEM DESIGN AND ARCHITECTURE:
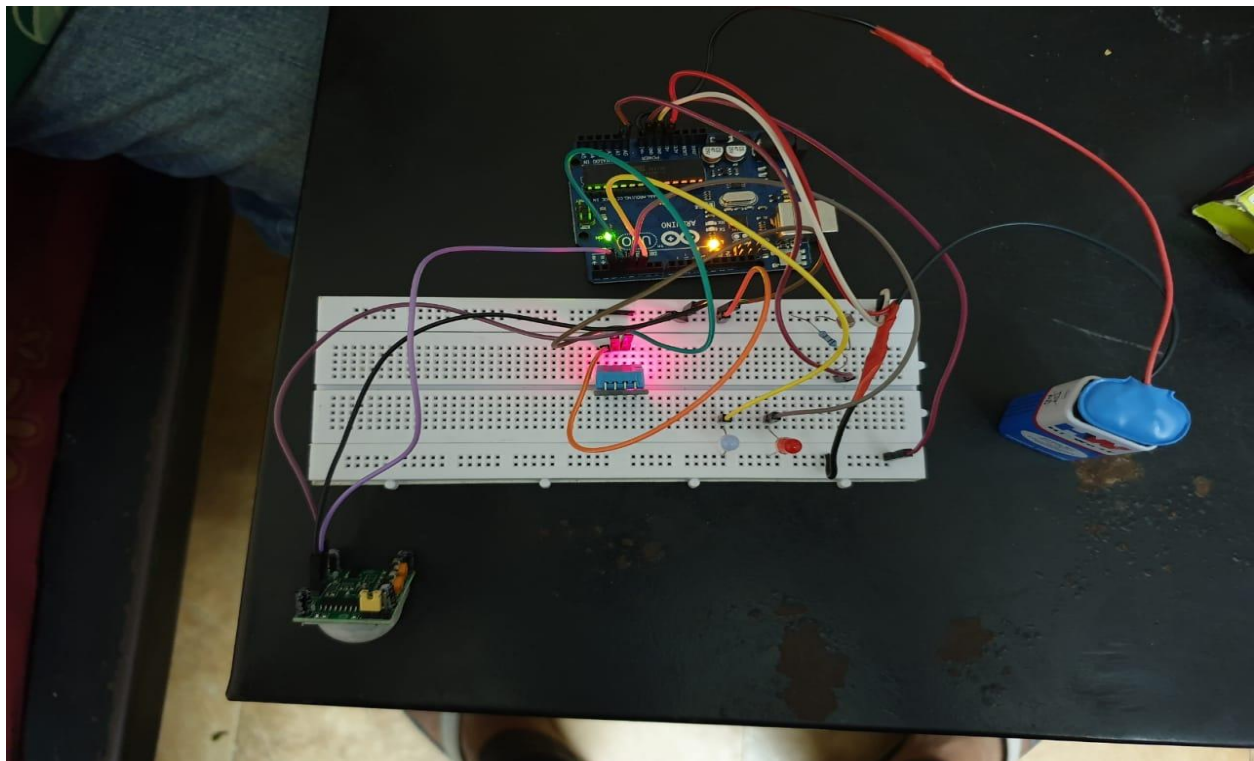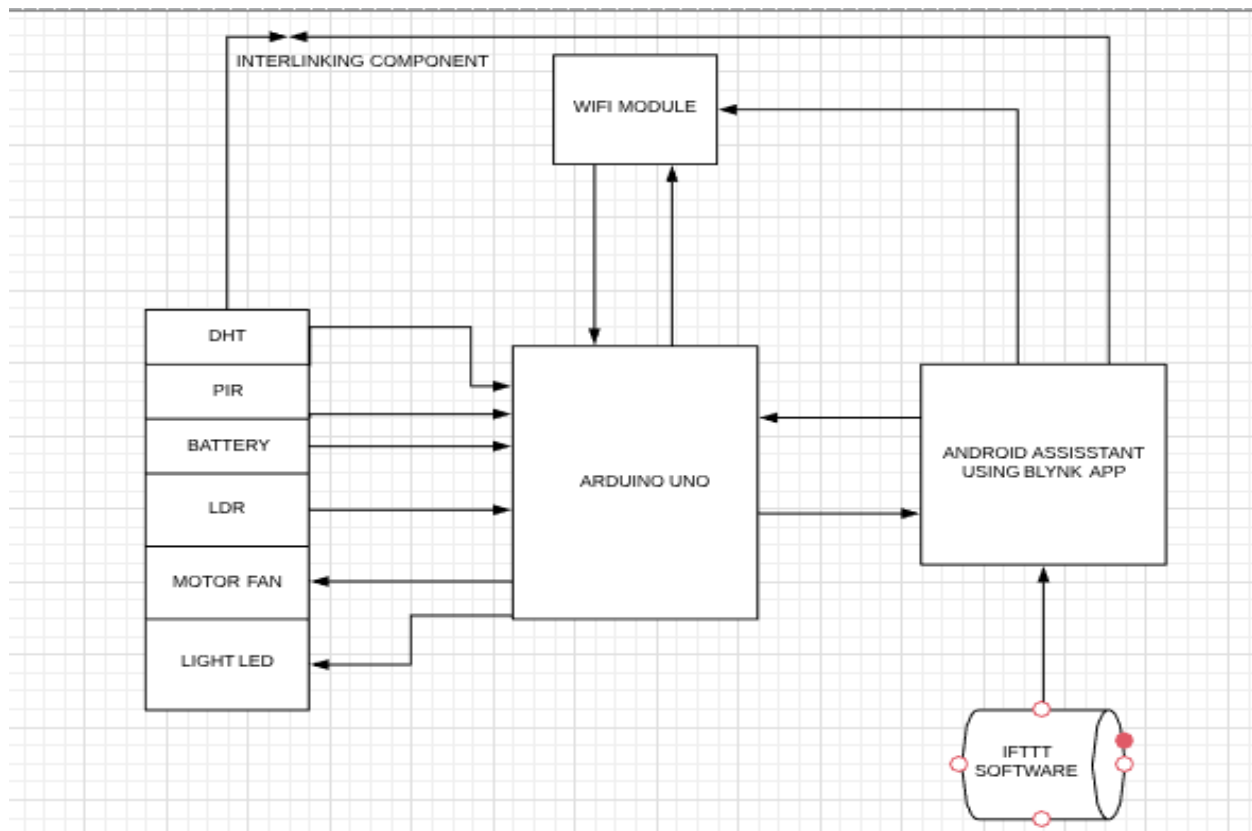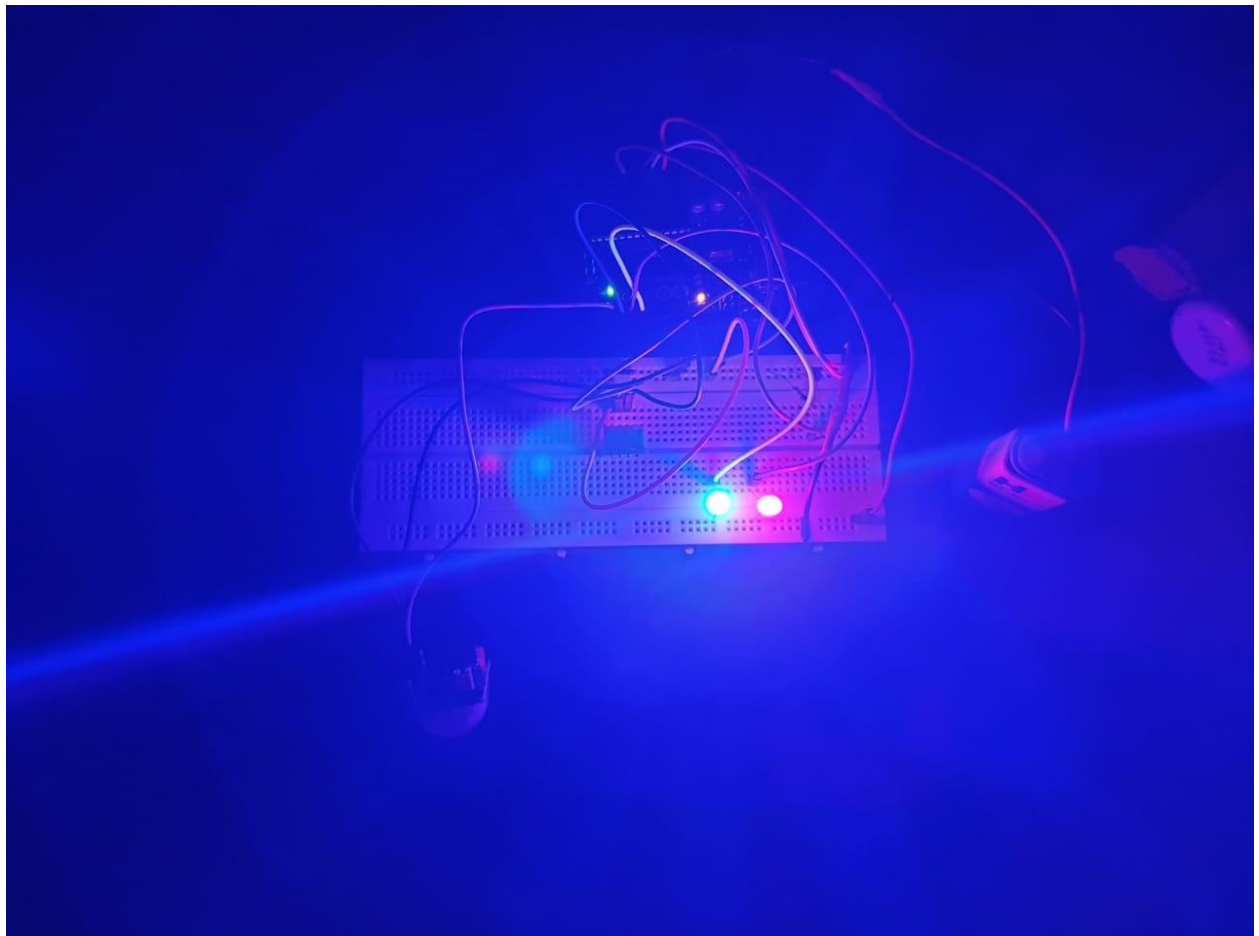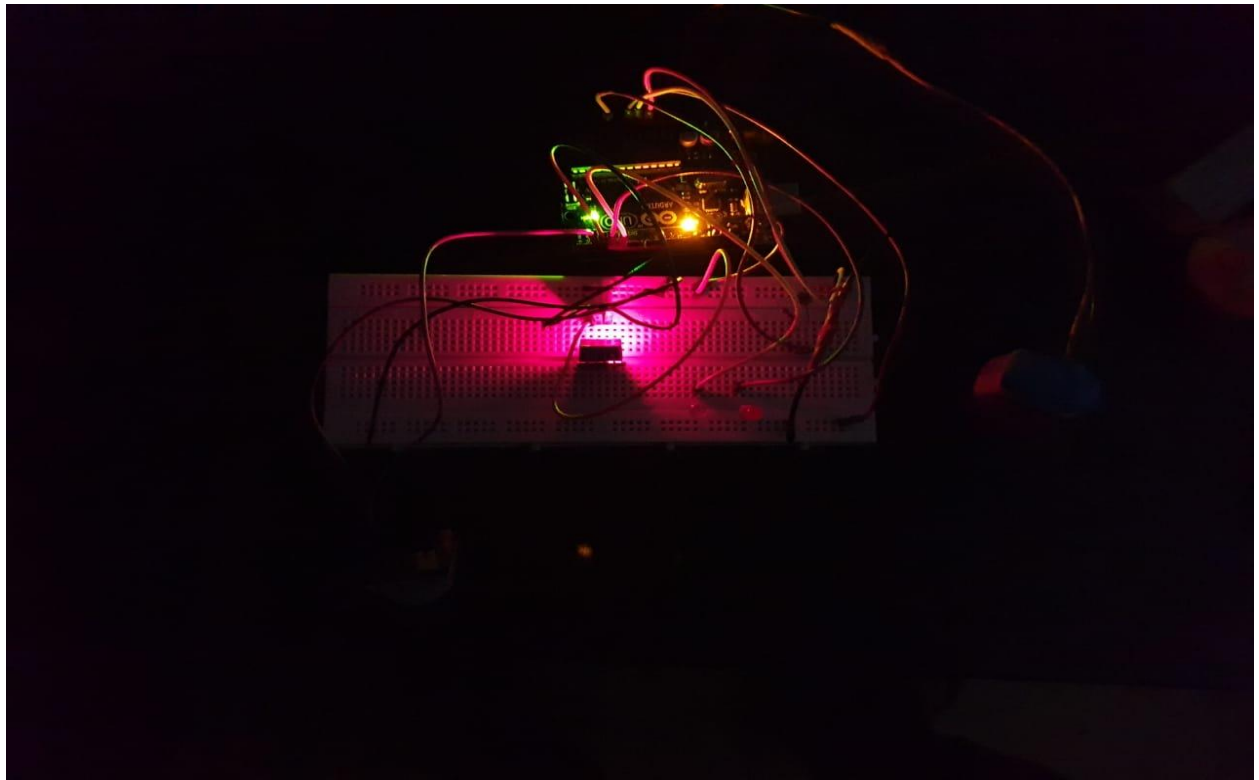
8.ALGORITHM:

START

1)Initialize dht library and analyze dht pin , dht type

2)Assign the values for pir,ldr,led,motor and set pir and ldr value to 0

3)Define the pin mode for pir,led and motor

begin:

4)PIR reads the humidity first , then DHT measures the surrounding temperature

5)set ldr value to analog read mode and set constrain as 0,255 with interval 100

6)Now initialize PIR to digital read mode

7)if pir val==1 and temperature>20 then, motor will get activated

8)Else motor will be shut down for t<20

9)Now set ldr value to analog write mode with delay of 6sec

10)If pirval==0 ,then motor and led shuts down

11)Now print temperature inside the room along with ldr and pir values

12)END

Code:

```
#include <DHT.h>

#define DHTPIN 4

#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

int pir= 2;

int ldr=A0;

int led= 6;

int mot= 8;

int pirval=0;

int ldrval=0;

void setup() {

  pinMode(pir,INPUT);
```

```arduino
  pinMode(led,OUTPUT);

  pinMode(mot,OUTPUT);

  Serial.begin(9600);

  // put your setup code here, to run once:


}


void loop() {

  int h= dht.readHumidity();

  int t= dht.readTemperature();



  ldrval = analogRead(ldr);

  ldrval = constrain(ldrval,0,100);

  ldrval = map(ldrval,0,100,255,0);



  pirval= digitalRead(pir);



  if (pirval==1){

   if (t>20){

     digitalWrite(mot,HIGH);

   }

   if (t<20){
```

```
   digitalWrite(mot,LOW);

  }

  analogWrite(led,ldrval);

  delay(3000);

 }

 if (pirval==0){

  digitalWrite(mot,LOW);

  digitalWrite(led,LOW);

 }

 Serial.print("temp=");

 Serial.println(t);

 Serial.print("ldrval=");

 Serial.println(ldrval);

 Serial.print("pirval=");

 Serial.println(pirval);

 // put your main code here, to run repeatedly:



}
```

9.CONCLUSION:

Survey of different home automation system shows that there are various kinds of technologies used to implement this type of system. All the proposed systems have been presented and compared in this paper which reveals some merits and demerits of the systems. This review explained different home automation system e.g. Web based, Bluetooth-based, mobile-based, SMS based, ZigBeebased, Arduino microcontroller based, Android app based, IOT based and cloud-based. Due to its performance, simplicity, low cost and reliabilityhome automation system is making its position in global market,that day is not so far when every home will be the smart home.

10.RESULT:

Here by processing our project, the proximity sensor recognises if any person is inside the room by calculating the change in humidity and temperature difference inside the room before and after entering of the person , so that our system project is built in such a way that it detects and switches on the light ,fan inside the room . Here we have innovated a new software tool to access this system architecture with the help of the Blynk.

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