**R.V. College of Engineering, Bengaluru**

**(Autonomous Institution Affiliated to VTU, Belagavi)**

**Department of Electronics and Communication Engineering**



**3rd Semester**

**Self study Report**

**HOME AUTOMATION AND AUTOMATED STREET LIGHTING**

Group Members USN Signature

1. SHRIYA BARPANDA 1RV17EC149

2. VAJRA R SINGH 1RV17EC176

Class incharge signature :

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**INTRODUCTION**

* Smart-Home is one such energy efficient innovation, which aims to achieve energy optimization and reduced and convenient physical manual input. Operating appliances is made as easy as a few taps on a smart phone screen.
* The Automated Street Lighting system cuts down on manual input as well as statistically reduces power consumption by an exorbitant amount by detecting motion and turning ON in an automated fashion as and when light is needed.
* Inefficient lighting wastes significant financial resources every year, and poor lighting creates unsafe conditions. Energy efficient technologies and design mechanism can reduce cost of the street lighting drastically.
* The proposed home automation system allows user to switch ON and OFF the lights, fans etc. from any part of the world since this system is controlled using GSM module.
* Integrating this with multiple systems enables convenient communications with said systems thereby simplifying things for the user

**PROPOSED DESIGN**

HOME AUTOMATION

16x2 LCD DISPLAY

PHONE

ARDUINO in connection with a RELAY MODULE

GSM MODULE

AUTOMATIC STREET LIGHTING SYSTEM

LIGHT FROM SURROUNDINGS

ARDUINO in combination with a RELAY MODULE

LDR

PIR SENSOR

**COMPONENT SPECIFICATION**

**PIR Sensor**

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view.

**Relay Module**

A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current.

**LDR Resistor**

Light dependent resistors, LDRs or photoresistors are often used in circuits where it is necessary to detect the presence or the level of light.

**GSM Module**

GSM is a mobile communication modem; it is stands for Global System for Mobile communication.

A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator.

It can be connected to a computer through serial, USB or Bluetooth connection.

**APPLICATIONS**

* This particular Home Automation System has been developed using a SIM800A GSM Module, which helps establish communication between mobile devices and the Arduino which in turns gives the feedback to the devices which are in connection with it, which enables the connected electrical appliances in a home which can be controlled using SMSs from your phone.
* This model is designed to implement to make Homes Smart and Automated.
* This system enables us to control Lighting using external inputs from the surroundings and turn ON or OFF completely minimizing manual input.
* The PIR Sensor detects motion when something passes by and gives feedback to the Arduino which therefore turns the light ON for a specified period of time, after which it turns it OFF.
* The LDR sensor takes external input from the environment, based on which it gives feedback to the Arduino, to keep the light switched off during Daytime/whenever there is Natural Lighting even on detection of movement from the PIR Sensor

**CODE**

// include the library code:

#include <LiquidCrystal.h>

const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;

LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

int pir =13;

int ldr =10;

int buzzer =6;

int l1 =7;

int l2 =8;

int l3 =9;

char str[15];

int count=0;

int i=0;

int flag=0;

void setup()

{

lcd.begin(16, 2);

// pinMode(fire\_sensor,INPUT);

pinMode(l1,OUTPUT);

pinMode(l2,OUTPUT);

pinMode(l3,OUTPUT);

pinMode(buzzer,OUTPUT);

pinMode(pir,INPUT);

pinMode(ldr,INPUT);

lcd.setCursor(0, 0);

lcd.print("Home Automation");

lcd.setCursor(0, 1);

lcd.print("Stt light contrl");

Serial.begin(9600);

delay(2000); delay(2000); delay(2000);

//Serial1.begin(115200);

Serial.println("AT+CNMI=2,2,0,0,0");

delay(500);

Serial.println("AT+CMGF=1");

lcd.clear();

}

// -------------------------------------maain function-------------------------------------------------//

void loop()

{

int a,b;

lcd.setCursor(0,0);

lcd.print("LT1");

lcd.setCursor(5,0);

lcd.print("LT2");

lcd.setCursor(10,0);

lcd.print("STLT");

if(flag==1)

{

check();

flag=0;

i=0;

delay(1000);

}

else

{

}

a=digitalRead(ldr);

//Serial.print("LDR OUTPUT=");

//Serial.println(a);

delay(1000);

if(a==1)

{

b=digitalRead(pir);

//Serial.print("PIR OUTPUT=");

//Serial.println(b);

// delay(1000);

if(b==1)

{

digitalWrite(l3,1);

lcd.setCursor(10,1);

lcd.print("ON ");

//Serial.println("street light on");

delay(1000);

}

else

{

digitalWrite(l3,0);

lcd.setCursor(10,1);

lcd.print("OFF");

}

}

else

{

digitalWrite(l3,0);

lcd.setCursor(10,1);

lcd.print("OFF");

}

}

//-----------------------------baud rate for gsm----------------------------------------//

void serial\_baud()

{

Serial.begin(9600);

}

////------------------------------------------message check-------------------------------------//

void serialEvent()

{

while(Serial.available())

{

if(Serial.find("\*"))

{

digitalWrite(buzzer, HIGH);

delay(500);

digitalWrite(buzzer, LOW);

while (Serial.available())

{

char inChar=Serial.read();

str[i++]=inChar;

if(inChar=='#')

{

flag=1;

return;

}

}

}

}

}

void check()

{

if(!(strncmp(str,"light1 on",9)))

{

digitalWrite(l1,HIGH);

lcd.setCursor(0,1);

lcd.print("ON ");

Serial.println("light1 on");

delay(2000);

}

else if(!(strncmp(str,"light1 off",10)))

{

digitalWrite(l1,LOW);

lcd.setCursor(0,1);

lcd.print("OFF");

Serial.println("light1 off");

delay(2000);

}

if(!(strncmp(str,"light2 on",9)))

{

digitalWrite(l2,HIGH);

lcd.setCursor(5,1);

lcd.print("ON ");

Serial.println("light2 on");

delay(2000);

}

else if(!(strncmp(str,"light2 off",10)))

{

digitalWrite(l2,LOW);

lcd.setCursor(5,1);

lcd.print("OFF");

Serial.println("light2 off");

delay(2000);

}

}

**EXPECTED OUTCOMES**

* Using easy-to-use Technology to design a smart home system for higher efficiency and reduced workload.
* Minimizing manual input by automatically controlling lighting systems using Passive InfraRed Sensors.
* Enabling the use of large scale smart automated systems using this technology thereby reducing dependency on manual labour.
* Minimizing energy consumption and thereby reducing power wastage using automatic lighting systems.

**SIMULATED OUTPUT**

* Integration of all the components to create a prototype of a working model.
* Used the relay module to facilitate the working of higher voltage devices.
* Achieved motion sensitivity using a PIR sensor.
* Achieved light sensitivity using LDR resistor.
* Established a communication between the mobile device and the Arduino.
* Testing of Circuit with the lights using GSM commands.