International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

INTELLIGENT LIGHTING SOLUTION

Debanksh Mohanty[1], Aryan[2], Aman Kumar Srivastava[3]

[1,2,3]*B. Tech, Electrical and Electronics, SRM Institute of science and technology, Chennai, India*

Abstract - *As the world is going towards digitization at a rapid pace and demand for electricity is increasing day by day. As in India the government has said that our consumption is nearly equal in billions and increasing day by day, so to limit these electricity demand and reduce the burden on the grid, we have made a project which reduces the electricity consumption by mainly focusing on the automation of electrical appliances, by the use of different sensors (IR, LDR, Bluetooth Module) by the combination of these the appliance is controlled and the electricity demand is reduced.*

Key Words: **Consumption, Digitization, Electricity, Sensors**

1. INTRODUCTION

As in India with a population of around 1.37Billion the electricity demand is tremendously growing year by year at a rate of nearly 4.72% per year as per the record in 2018. The electricity demand in India is mainly fulfilled by Thermal Power Plants mainly run by NTPC, ADANI POWER, RELIANCE POWER, about 80% load is on the thermal power plants. But as the pollution level is increasing, the government is focusing to move towards renewable sources of energy mainly PV and Wind, and has proposed a plan for meeting half of its electricity demand by renewable resources till 2030. So to meet this plan either we need a huge land (that is PV requires around 5 hectares of land to develop 1MW in comparison to thermal you could generate 1MW in 0.7 hectares' land) and for wind you need optimal climate, which is a disadvantage of renewable sources of energy. So we need to minimize our energy demand we cannot move on adding power plants because we don't have so much land or favorable conditions.

So the method we have to use is either minimize the load or start to use energy efficient appliances to balance the energy demand with the load, for this now the government is developing more schemes like peak shaving, load rescheduling and more. Government is asking people to use energy efficient products like LED bulbs in place of old Fluorescent bulbs which consume more energy in comparison to LED's, But the use of these objects have to be monitored it should be incorporated with the digitalization so that all of the electrical appliance could be controlled with the Internet (from portable devices) which will make it more easier to control and monitor, so in this project we have incorporated the existing sensor in loping manner which works together, and the monitoring can be done. Which effectively reduces the energy consumption and provides a better control operation.

2. SENSOR CONCEPTS AND COMPONENTS USED

2.1 Infrared Sensor(IR)

This sensor works as the eyes of the project and it is used to sense the movement of the person in front of it. As every human radiates some amount of heat in the form of radiation in the infrared region which is sensed by the IR sensor. There are two probes on which sends signals and the other one which catches the signals the timing of both these signals are used to calculate the distance and movement of the person in the project as indicated below in Fig1.

Fig-1 IR sensor

2.2 Light Dependent Resistor Sensor(LDR)

I A light dependent resistor also known as a photoresistor, is a device which depends on the light that is its resistance varies with the light failing on it. In our project it is used to measure the illumination of light present in the room and is tuned according to be ON for the light if it's below the reading condition and Turn OFF if the light present in the room is above the reading capacity. This module has a resistance plate that is placed directly uncovered on which the light falls as shown in Fig 2 below

Fig-2 LDR Sensor

2.3 Bluetooth Module

This is the sensor which is required to control the setup remotely, this module is a hardware component that provides peripheral commands to work with the project, it is connected with two pins, one for transmission and other one for receiving the commands given by the user. It is shown below in Fig 3.

Fig-3 Bluetooth Module

2.3 Controller (Arduino UNO)

The controller that is incorporated in the project is Arduino UNO, which is a microcontroller and the most important element in the project which controls all the command receiving and outgoing, it receives the analog signals that are coming and process it digitally and send the output. It is used as a networking element for all the sensors and devices. It is shown below in Fig3.

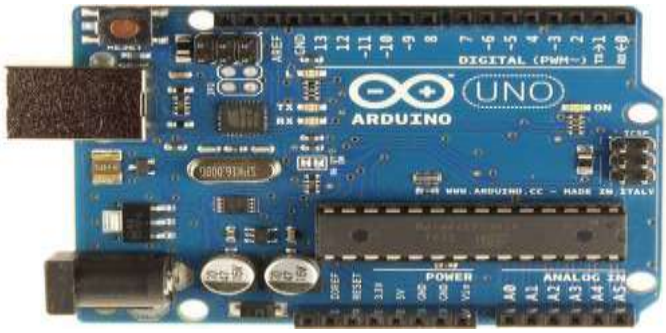


Fig-4 Arduino UNO

2.4 Relay Module

A relay is a electromagnetic switch which is used to control the switching action, it gets the input signal from the sensors through the Arduino UNO and delivers the output at the high voltage terminal by controlling the LED bulb. The 2 Channel relay is shown below in the fig 5.

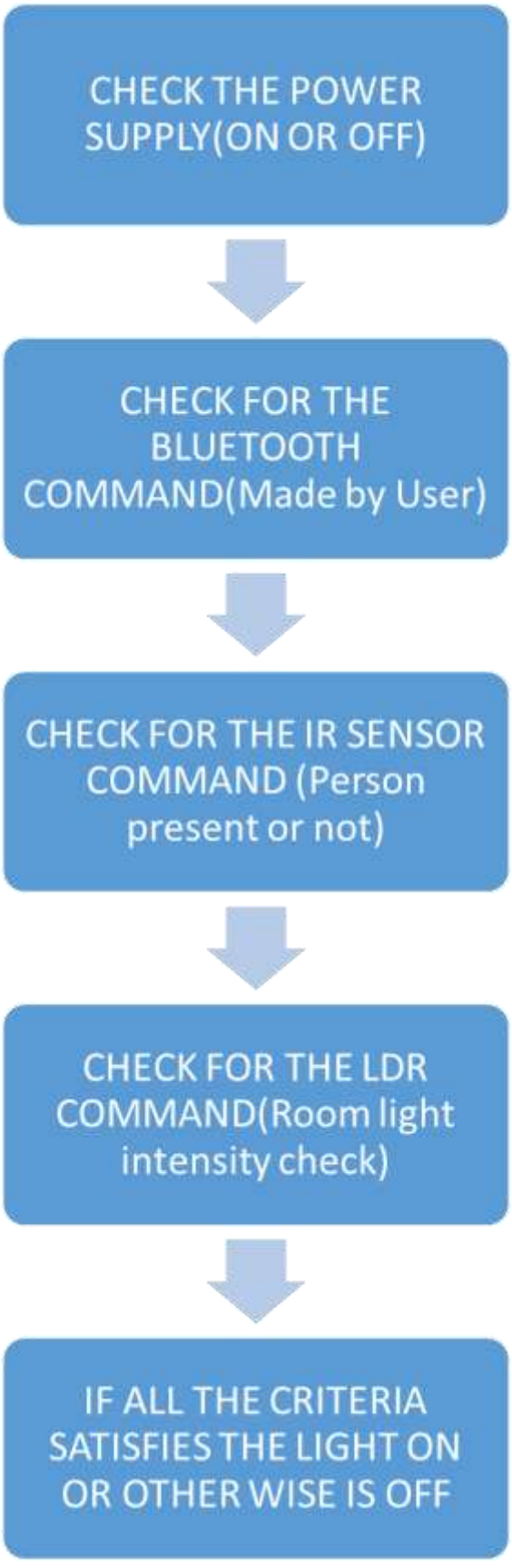
Fig-5 Relay Module

3. WORKING

Three sensors are used in this project; these sensors are connected with the Arduino Uno. Depending upon the light intensity in the room the LDR sensor gives the signal to the Arduino. Similarly, the IR sensor detects the motion of the person and gives the command to the Arduino when someone enters the room to turn on the light. In case the user inside the room wants to turn off the light he can make use of the Bluetooth module and mobile application to turn off the light.

In our project we have used the integration of the three modules, first the user gives command- ON command that is "1" in the app "Bluetooth Terminal HC-05". Then this information is send through the Tx and Rx pin of the module after that Arduino checks from the signal of IR sensor if it gives the ON command that is there is somebody in the room it will then check the command for the LDR which will check for the light intensity level of the room if all the three condition satisfied the Bulb will start to glow. If any of the process in between fails it will turn off the light once again. So in this way there is no use of a single sensor but it works in the coordination of all the three sensors which makes it more efficient.

4. FLOW CHART



5. CODE

The code is written in the Arduino IDE which controls the whole project-

```
#include <SoftwareSerial.h>// import the serial library
//#define relay 13
int led=13;
int ir=A5;
int ldr=A0;
int has;
SoftwareSerial Genotronex(10, 11); // RX, TX
int BluetoothData; // the data given from Computer
void setup() {
pinMode(ir,INPUT);
pinMode(ldr,INPUT);
pinMode(led,OUTPUT);
Serial.begin(9600);
Genotronex.begin(9600);
Genotronex.println("Bluetooth On please press 1 or 0 blink
LED ..");
}
void loop() {
unsigned int Ldr;
if (Genotronex.available()){
BluetoothData=Genotronex.read();
Serial.println(BluetoothData);
if(BluetoothData=='1'){// if number 1 pressed ....
while(1){BluetoothData=Genotronex.read();
if(BluetoothData=='0'){
digitalWrite(led,0);
Genotronex.println("LED On D13 Off ! ");
break;}
Ldr=analogRead(A0);
Serial.println (Ldr);
has= digitalRead(ir);
Serial.println (has);
if(has==0){
if(Ldr<=700){
digitalWrite(led,HIGH);
}
else
{digitalWrite(led,LOW);}}
else
{digitalWrite(led,LOW); } }
Genotronex.println("LED On D13 ON ! ");}
}}
```

6. CONCLUSIONS

This project was made with all the hardware components and the results were justified, and the energy saving was recorded. Below in the two figures it can be seen. Fig 6 and Fig 7, In the Fig 6 it can be seen the light is currently not ON as there is no human interface present, but as soon as a finger is brought near to the IR sensor the light glows as shown in fig 7. The project was controlled by the Bluetooth module through the android app “Bluetooth Terminal HC-

05", This project can be implemented on large scale in office buildings and factories.

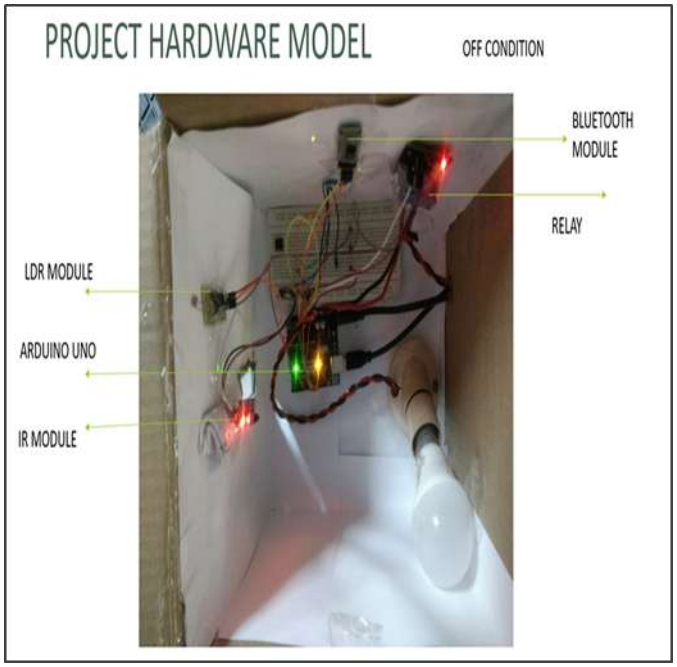


Fig-6 Off Condition

Fig-7 On Condition

REFERENCES

[1] Yusaku Fujiir, Smart street light system with energy saving function based on the sensor network, Conference: Proceedings of the fourth international conference on Future energy systems

[2] Smart Street Lighting System Chetna Badgaiyan, Palak Sehgal, International Journal of Science and Research (IJSR)

[3] Mrs.M.PriyaDharsini, SMART STREET LIGHTING, International Research Journal of Engineering and Technology(IRJET)

BIOGRAPHIES

Studying in SRM Institute Of Science And Technology, Chennai, B.Tech Electrical And Electronics Engineering graduating in 2020.

Studying in SRM Institute Of Science And Technology, Chennai, B.Tech Electrical And Electronics Engineering graduating in 2020.

Studying in SRM Institute Of Science And Technology, Chennai, B.Tech Electrical And Electronics Engineering graduating in 2020.