BRACT's

Vishwakarma Institute of Information Technology, Kondhwa(BK), Pune-48

Department of Computer Engineering

Analog and Digital Electronics

Mini Project

On

Light Automation using IOT and PIR

SY BTech Computer Engineering

Academic Year: 2022-23

Group No:

Group Members:

Sr. No.	GrNo.	RollNo.	Name of Student
1	22110043	224001	Anushka Bhagwat
2	22110146	224004	Aryan Pandita
3	22110167	224006	Yashraj Aware
4	22110970	224007	Kaustubh Bhoskar

Faculty Mentor:

Mr. Y. K. Sharma

Index

ABSTRACTION & OBJECTIVE OF PROJECT

ABSTRACTION

In a building, lighting contributes 20-60% of the total consumption of electrical energy usage. To turn on and off the lamp with the switch manually sometimes people forget to turn it off when leaving the room. This resulted in the inefficiency of energy and cost, where the lamps work not based on need. To overcome this problem a need of automation is required, the key point of building automation is focused on better facilitation to the user in terms of comfort at a reduced operating cost. The use of sensors that are built into infrastructure and the data collected in the smart building allows for a significant improvement in the management of the building and the energy efficiency improvement will also contribute to environmental protection. For this project, we proceeded with Light automation.

Light automation is one which saves most of electrical energy, these systems can play an important role in regular energy monitoring and management and therefore save the possible energy and cost

The proposed system is a lighting control system using the internet of things concept so that the lights can be controlled upon a certain threshold number of people in the room.

OBJECTIVE

- To control the light intensities and power consumption.
- Using light sensor will increased the efficiency of the project when it is dark also.
- The idea is to save electricity and creates an environment where is like no more wastage of energy.
- Using 2 Pir sensor will operate the no of person entering into the room and leaving the room

INTRODUCTION

As far as the industry is moving towards reducing man work with the help of automation. Hence, automation is playing a vital role in the growth of the economy and also helpful in normal day to day life. The main idea is to utilize the energy in an efficient way .Automation System is a concept brought forward for smart cities buildings where the lightning system is automated i.e., when there is no movement in the room then the lights get switched off automatically and as soon as the human movement is involved the lights will get switch on by sensing the motion in a room. As there is loss of electrical energy in the homes when we leave the switches on while leaving the room. This emerging technology improves quality of living and provides them with automated secure system . Nowadays, Light automation is one which saves electricity and it is necessary for all of us to save electricity and for future purpose. However there is a solution to control energy wastages at home by using automatic light control energy light control. In this project we will focus on automatic light sensor using Arduino Uno , Pir sensor(Passive infrared sensor)actually used to sense availability of any per-movement .

This project is most important for security aspect to keep the place safe and it also save electricity

HARDWARE & SOFTWARE REQUIRNMENT

The system will require some important parts which are as follows: -

- A PIR sensor
- Relay driver module
- ESP 8266 Wi-Fi module
- Arduino
- Bulb, bulb holder
- Light sensor

A. PIR Sensor

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation. For numerous essential projects or items that need to discover when an individual has left or entered the area. PIR sensors are incredible, they are flat control and minimal effort, have a wide lens range, and are simple to interface with. The PIR acts as a

digital output so all you need to do is listening for the pin to flip high or low. The motion can be detected by checking for a high signal on a single I/O pin. Once the sensor warms up the output will remain low until there is motion, at which time the output will swing high for a couple of seconds, then return low. If motion continues the output will cycle in this manner until the sensors line of sight of still again. The PIR sensor needs a warm-up time with a specific end goal to capacity fittingly.

Fig: PIR Sensor

A. ESP8266

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

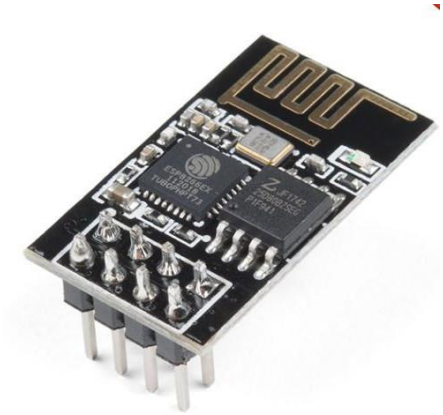


Fig: Wifi module ESP8266

A. Relay Module

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized.

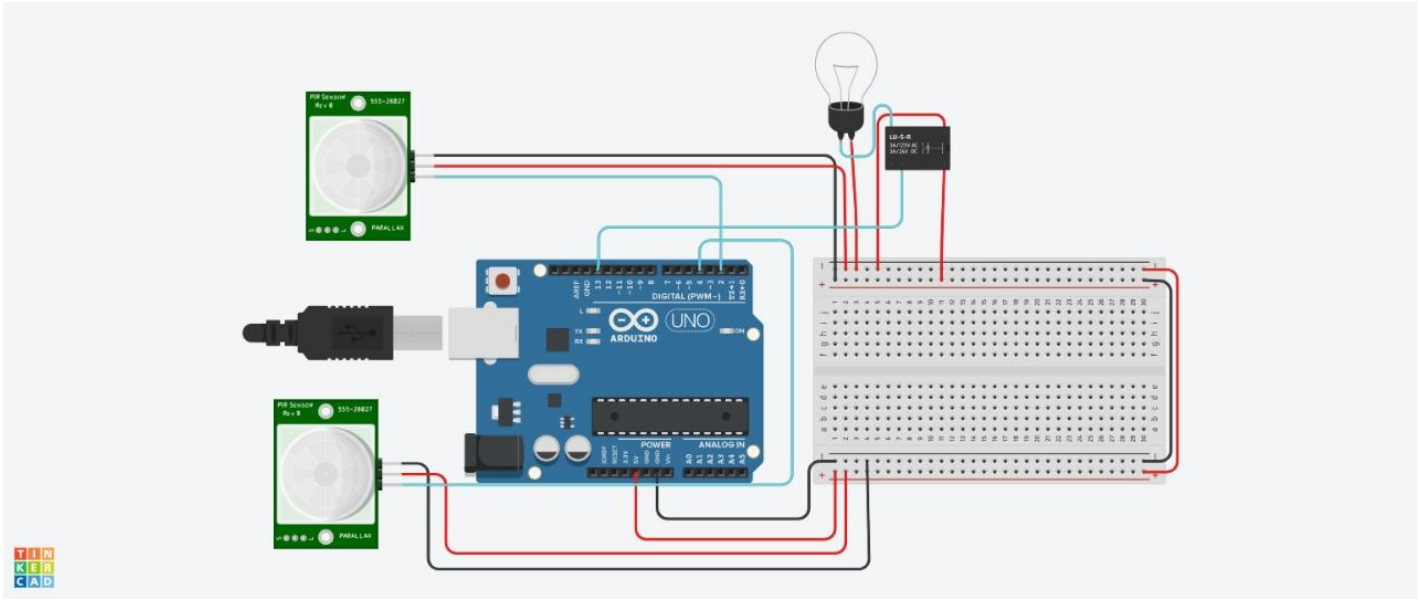
Fig: Relay Module

IMPLEMENTAION LOGIC

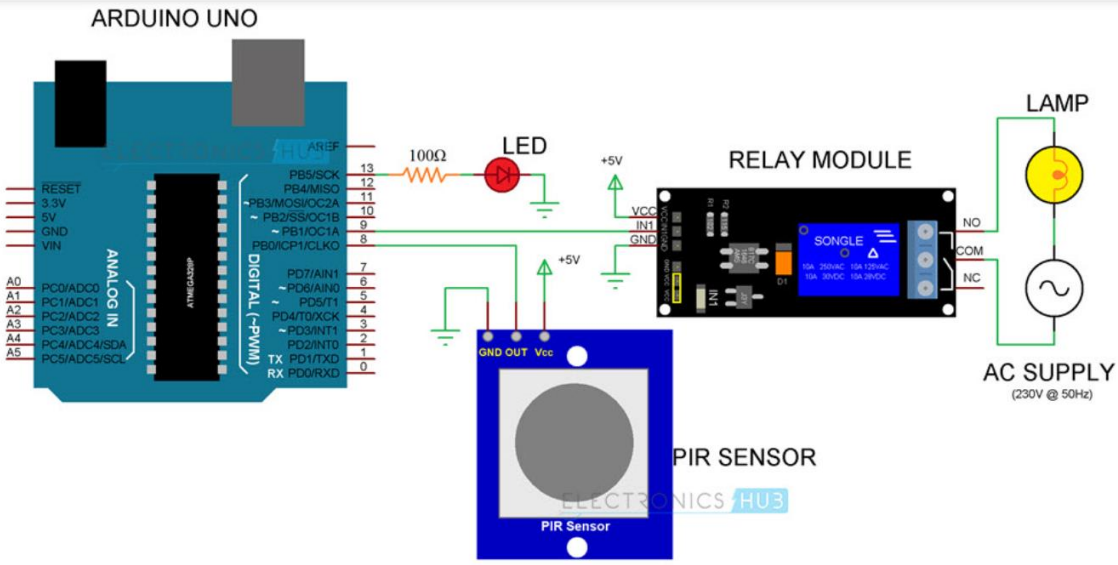
A)CODE:

```
int led = 13;                // the pin that the LED is atteched to
int outdoor=2;
int indoor = 4;              // the pin that the sensor is atteched to
int perout=0;
int perin=0;
int state = LOW;             // by default, no motion detected
int val = 0;                 // variable to store the sensor status (value)

void setup() {
  pinMode(led, OUTPUT);      // initalize LED as an output
  pinMode(outdoor, INPUT);    // initialize sensor as an input
  Serial.begin(9600);        // initialize serial
}

void loop(){
  val = digitalRead(outdoor);   // read sensor value
  if (val == HIGH) {           // check if the sensor is HIGH
    digitalWrite(led, HIGH);   // turn LED ON
    delay(500);                // delay 100 milliseconds

    if (state == LOW) {
      Serial.println("Motion detected!");
      state = HIGH;       // update variable state to HIGH
      perout++;
    }
  }
  else {
      digitalWrite(led, LOW); // turn LED OFF
      delay(500);             // delay 200 milliseconds

      if (state == HIGH){
        Serial.println("Motion stopped!");
        state = LOW;       // update variable state to LOW

    }
  }
  Serial.print("perout = ");
  Serial.println(perout);
```

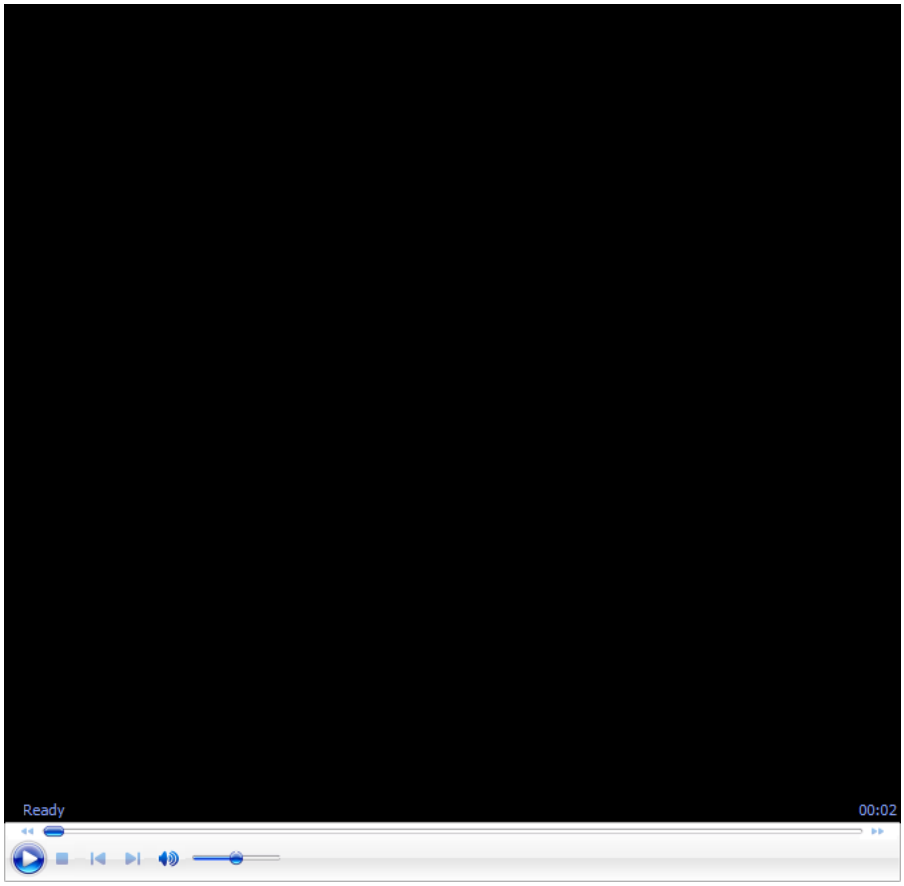
SIMULATION:


DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN
PARALLAX
TINKERCAD

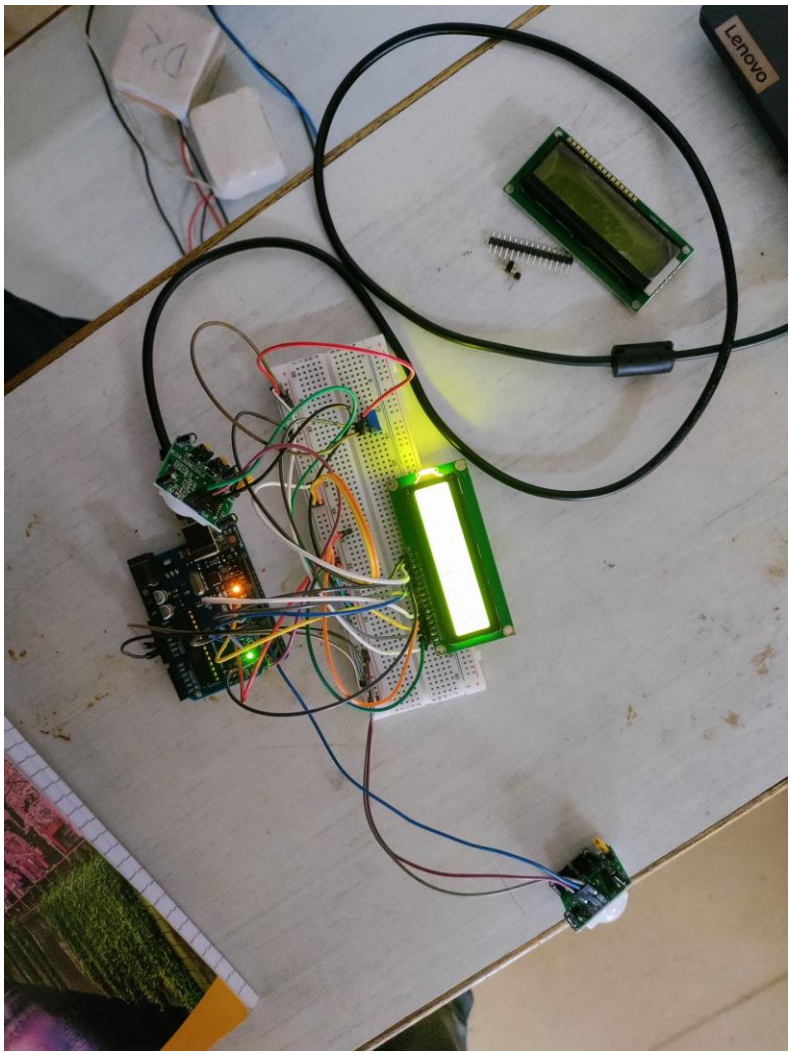
CIRCUIT DIAGRAM



VIDEO OF ACTUAL MODEL



SNAPSHOTS OF MODEL



PROJECT COST ESTIMATION

COMPONENTS	COST
Breadboard	100/-
Jumpwires(male to male)	30/-
PIR Sensor (x2)	200/-
Relay 5V	110/-
Wifi module ESP8266	150/-
LDR	10/-

Conclusion

This article proposes an energy-saving, easy-to-install, wireless, low-cost IoT-based leader-follower smart office lighting control system that is very suitable for installation in the office of a large company or factory. It uses a system counter and an infrared human motion sensor (PIR Sensor) working in coordination; only when no one is in the space do all the LED lights in the room enter low-light mode together, and there is no misjudgement. The system can easily achieve energy savings and convenient control of a large-scale smart LED lighting system. Moreover, the cost of this system is only 1/10 that of installing a smart system, and there is no need to replace the original LED lights. The original light fixtures can be used in the system without additional wiring or setting up a server. In addition to directly setting the parameters of LED lights through the IoT, unlike general induction lights, the recommended office lighting system operates in low-light mode instead of total darkness when there is no one in the office space. Taking a general 15 W T8 LED tube (induction light) as an example, if users switch to the recommended office lighting system (assuming that the office is occupied for 10 hours a day and that the hourly low-light mode time is 20 minutes), the power-saving rate is as high as 28.13%.

In addition, when the system counter is 0, but people are still present in the office, the PIR sensor is still unable to sense if the people in the office are completely still. Therefore, in the future, we will fine-tune the strategy and add a judgment condition that the count is set to be 0, but when the PIR sensor senses that people are still present in the office many times, the counter will be changed to a policy of 1, solving this problem. Furthermore, in future work, we plan to focus on considering the lighting effects of natural light so as to obtain increased energy savings and make the system more efficient

REFERENCES

- **SMART LIGHTING AND SECURITY SYSTEM(IEEE):-**
- **GRAPHENE CONTROL AUTOMATIC LIGHTING(IEEE):-** https://ieeexplore.ieee.org/document/8391972
- https://how2electronics.com/bidirectional-visitor-counterwith-
- Muhammad Ahmad Baballe, Mukhtar Ibrahim Bello, Abubakar Abdullahi Umar, Dahiru Bello, Shehu Atiku Muhammad and Suleiman Rabiu Dan Sharif, Visitors Counter with Gate Control and Automatic Room Light Controller (ON/OFF), Global Journal of Research in Engineering & Computer Sciences ISSN: 2583-2727 (Online) Volume02| Issue 02 | March-April | 2022