



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## AUTOMATIC LIGHTING AND CONTROL SYSTEM FOR CLASSROOM

HARSHITHASINDHE K H<sup>1</sup>, IRSHAD K F<sup>2</sup>, KIRANKUMAR B M<sup>3</sup>, M C DIVYA SHREE<sup>4</sup>, PROF.GAGANAMBHA<sup>5</sup>

<sup>1</sup>student,(4VM18EE015),ELECTRICAL AND ELECTRONICS ENGINEERING,VVIET,MYSORE,INDIA

<sup>2</sup>student,(4VM18EE017),ELECTRICAL AND ELECTRONICS ENGINEERING,VVIET,MYSORE,INDIA

<sup>3</sup>student,(4VM18EE020),ELECTRICAL AND ELECTRONICS ENGINEERING,VVIET,MYSORE,INDIA

<sup>4</sup>student,(4VM18EE027),ELECTRICAL AND ELECTRONICS ENGINEERING,VVIET,MYSORE,INDIA

<sup>5</sup>Faculty,ELECTRICAL AND ELECTRONICS ENGINEERING,VVIET,MYSORE,INDIA

**Abstract:** In most of the educational institutions, the significant amount of energy is spent for illuminating the classrooms and for switching the fans, computers and so on. Sometimes due to unnecessary consumption of energy the energy costs may rise. practices. In order to minimise the energy consumption or to avoid energy waste during unoccupied and daylight hours, here more efficient equipment is designed for utilization of improved lighting design. Here we have established a lighting control system in which the light circuits and fans in classroom remain Off in the absence of students and switches on in their presence. When student enter classroom, Infrared energy emitted from the person activates the IR sensor and the Arduino acts as power saving device according to relay operations. By using IR Sensor is detected the relays are triggered and the fan and lights are switched On. Measuring the brightness of the cl motion LDR Sensor for classroom and also a sensor is used for the measuring the temperature, if the temperature is above 25°C the fans will be turned ON.

**Index Terms - Component, formatting, style, styling, insert.**

### Introduction

A lot of people in the world are without electricity and modern lighting. This problem is more severe in rural areas or in cities. The rural electrification varies widely from country to country. Our country frequently suffers from unreliable and intermittent electricity supply. In some places, people get electricity only few hours a day. Without adequate electricity, it becomes challenging for adults towards concentrating on their professional work or studies. Rural communities of course need a reliable and sustainable solution for lighting towards providing a brighter future. The country has made significant progress towards the augmentation of its power infrastructure. Moreover, poor quality of power supply and frequent power cuts and shortages impose a heavy burden on India's fast growing trade and industry. So current scenario insist towards highly efficient and effective usage of any form of power in educational institutions like Colleges and universities where we use power for our teaching in class room or labs. It is common practice that most of us leave the class rooms or labs with Air conditioner, Fan and lighting on even if no students or Faculty members are present. In some cases we see only few students sitting in one corner of the class room or lab and entire fan, light and aircon is running. All these amounts to unnecessary wastage of power contributing to country energy resource. Lot of research has been conducted on smart lighting system, where automated lighting system with visitor counters has been implemented. This system is used in controlling the lights and fans in a room and keeps track of number of persons / visitors entered or exit from the room. Researchers also have employed vacancy sensor that replaced the standard wall switches. Using passive Infrared Technology called IR, these sensors combined the occupancy detection and voltage switching in a single package. In addition to home based lighting control, there has also been research conducted on street lights towards controlling the energy saving. But in all the research discussed, there are some few limitations like two people entering room at the same time if doors are wide open, range of sensors to cover the large room and also cost effectiveness. So we here have developed a Automatic Lighting control for classrooms by considering our class rooms being divided into grids. Here we have one IR sensor placed at the entrance of class room and also another IR sensor inside the class room where classrooms divided into grids to sense the presence of human. The reason behind placing sensor is that the ceiling mounted sensors are expensive and that these sensors can sense object/personnel to a limited range only. This means that one sensor might not cover a full room and as such requires additional wiring in case of wired sensors. The advantage of our system is that electrical appliances be switched on or off in a particular area in class room based on the presence.

## I. PROBLEM STATEMENT

People tend to leave the appliances on for a very long time without switching it Off. Due to carelessness of user large amount of power is consumed and thus energy is wasted. IR sensors are insensitive to very slow motion of the object. Because of this sometimes it would not be able to detect human beings. In order to overcome these situation, we have designed a lighting control system which automatically switches Off the appliances when the place is unoccupied.

## II. OBJECTIVES

- To decrease the energy consumption, it can reduce the energy consumption from normal practice in order to save energy for future.
- To reduce the over expenditure on electric bills

## III. METHODOLOGY

The entire smart lighting system for class room are divided into three parts which are Hardware sensing unit, Hardware processing unit, Hardware control unit. These details are discussed below

### 1. Hardware Sensing Unit

The sensing unit primarily deals with the input parameters required for automation. According to the selected area, the following points need to be kept in mind which is:

- Dynamic human motion
- Feasibility
- Economical

So based on the above points, we have selected IR (infrared) sensor for detecting human presence as shown in fig 1.1

Here we have used two IR sensors in entry and exit gate, connected to pin 3,4 of the Arduino.

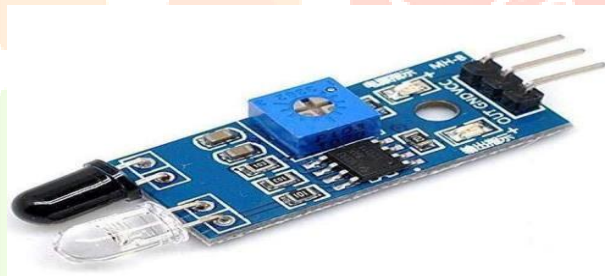


Fig1.1 IR sensor

**IR sensors** sense the motion of a person whether they are in the range or outside the range. These sensors are small, inexpensive, low power, easy to use and don't wear out. This is one reason as why these sensors seen in appliances and gadgets in home or business. "IR motion" sensors. These are shown in Fig1.2

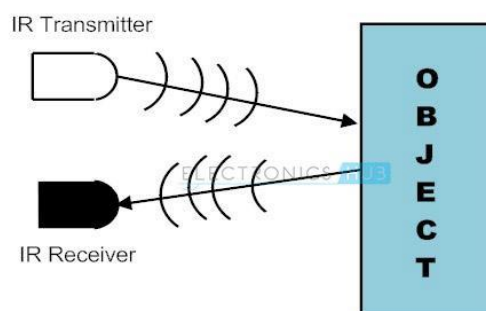
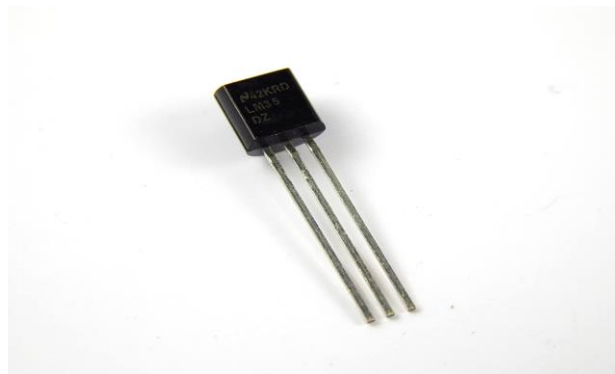


Fig1.2 IR sensor working

## Temperature sensor

Temperature sensor LM35 is an integrated analog temperature sensor whose electrical output is given in Degree Centigrade. LM35 is a temperature sensor which can measure temperature in the range of  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ . It is a 3-terminal device that provides analog voltage proportional to the temperature. Higher the temperature, higher is the output voltage. The output analog voltage can be converted to digital form using ADC so that a microcontroller can process it.



**Fig1.3 Temperature sensor LM35**

**LDR Sensor** ( Light Dependent Resistor) has resistance that varies as the light falls upon it. This feature has made this component are useful to be used in the light sensing circuit in this work. When the light level decreases, the resistance of the LDR increases.



**Fig1.4 LDR sensor**

The LDR is connected to the Ground and Analog Input, A0 of the Arduino Uno and has been declared as an input to the system. In this project, the LDR is responsible for detecting the luminance of the light from the environment. And the light switches ON only when light intensity is low, by avoiding the lights remain in on position even when there is sufficient light intensity in classroom.

## 2. Hardware Processing

The earlier stated parameters are been analyzed, processed and corresponding action according to the stats are been triggered. Keeping the economical and ease of operation ARDUNIO UNO board has been opted as shown in Fig.3 Arduino board will process the input parameters according to the program burnt on the board. Arduino is a micro-controller and has its own programming language, used to control its functionality which is burnt on the board. Arduino Uno is a microcontroller board based on the ATMeg 328P. It consist of 14 digital I/O pins, 6 analog inputs, 16 MHZ Quartz Crystal, USB connection, Power Jack, ICSP header and reset button.

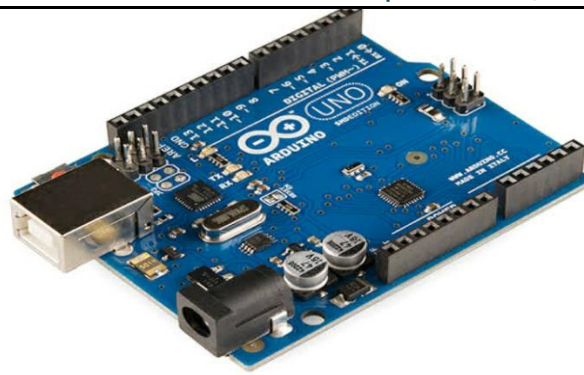
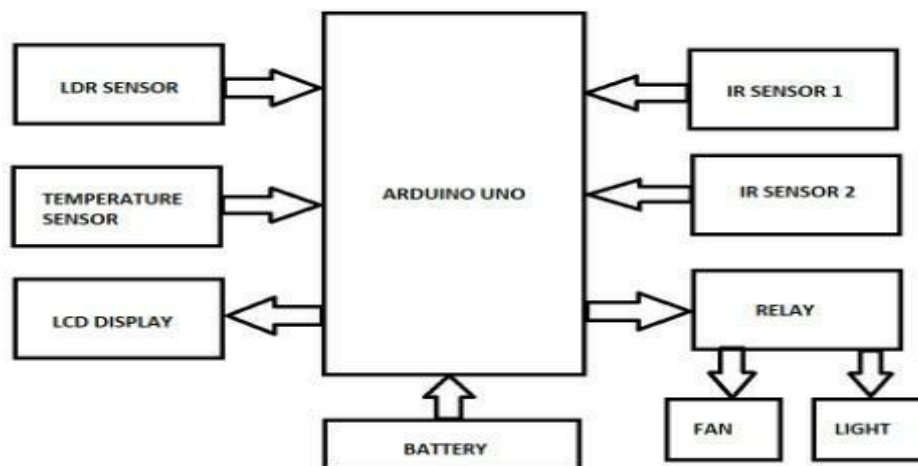
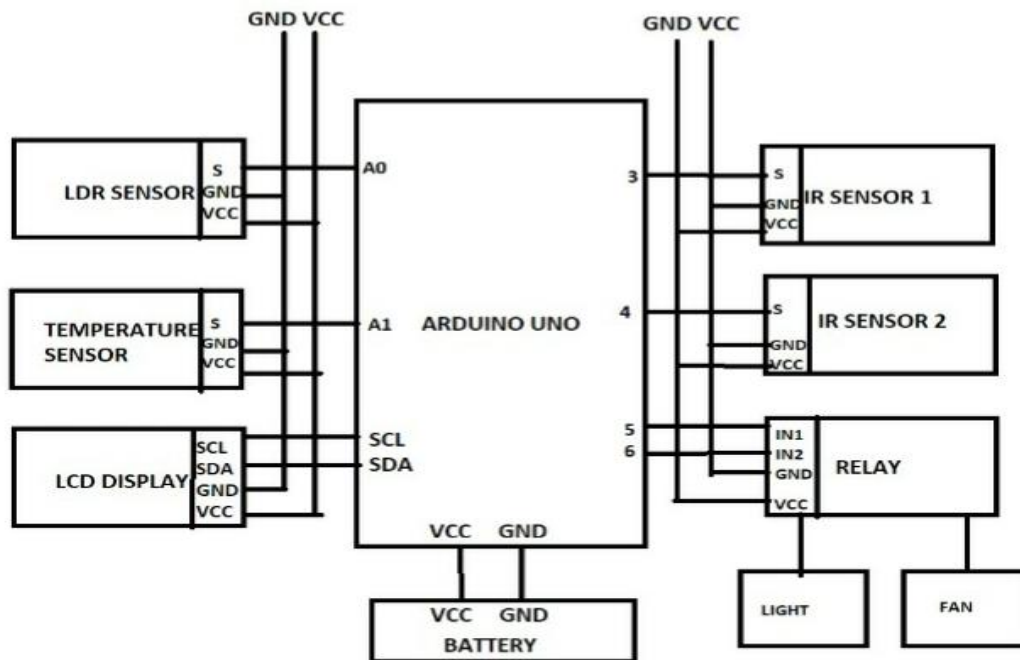


Fig2.1 Arduino Uno board

## 2.2 BLOCK DIAGRAM OF LIGHTING SYSTEM FOR CLASSROOM



## 2.3 CIRCUIT DIAGRAM



**LCD display** is used to display the count of person entering and leaving the classroom and indicates the switching position of fan and light .

### 3. Hardware Controlling Unit

The following sum up the unit-

- Relay
- Battery
- Electrical Appliances, the signals will be sent to processing unit.

**Relay** is an electrically operated switch which uses an electromagnet towards mechanically operating a switch. There are other operating principles such as solid state relays too. Relay are used in appliances where it is deemed necessary to control a circuit by low power signal or when several circuits need to be controlled by a signal. We want Arduino to control AC powered devices like lamps, fans or other household devices. But because the Arduino operates at 5 volts, it cannot directly control these higher voltage devices. So we use relay to control voltage.

#### Relay Basics

Relay has 5 pins, three of them are high voltage terminals (NC, COM, and NO) that connect to the device you want to control. The mains electricity enters the relay at the common (COM) terminal. While use of NC & NO terminals depends upon whether you want to turn the device ON or OFF

#### One channel relay module

This module is designed for switching only a single high powered device from your Arduino. It has a relay rated up to 10A per channel at 250VAC or 30VDC.

#### LEDs

There are two LEDs on the relay module indicating the position of the relay. The Power LED will light up when the module is powered. The Status LED will light up when the relay is activated.

#### Output Terminal Block

We have three channels of the relay broken out to blue screw pin terminals. The channels are labeled for their function: common (COM), normally closed (NC), and normally open (NO).



**Fig3.1 Relay Unit**

## RESULTS AND DISCUSSION

Based on Automatic lighting control and system developed for Classroom implementation, it's observed that average electricity consumed in the classroom has been reduced.

From the above proposed system, we can count the number of person entering and exiting the classroom, switch the lights on in presence of human and the fan operates when the atmospheric temperature is high. Also the classroom which was consuming lot of electricity before , the consumption is been reduced to some extent. From this we can be conclude that the energy is conserved.

## ADVANTAGES/APPLICATIONS

### Advantage of Automatic lighting system for classroom:

- The main Advantage of this System is it Reduces the over Energy consumption.
- This lighting system Encourages Energy conservation programs.
- Helps with utility costs. One of the biggest and most obvious benefits of automatic lights in classrooms is the utility saving potential.
- Makes things easier for students.
- Better for the environment.
- Burden of Manual operations of the system is reduced.

### Applications of Automatic lighting system for classroom:

- This System is mainly used in Schools, Colleges and universities.
- This System can also be applicable for Vehicle lighting systems using LDR Sensor.
- This can also be Applicable in office workspace.
- This can be used in conference halls and also in Seminar halls.

## CONCLUSION

Energy is considered as the vital input for development of the countries economy. According to the results it is observed that educational institutes consume large amount of electricity and it is important that electricity needs to be saved for future use.

Accordingly here we have, designed automatic lighting and control system where IR sensor is placed at entry and exit doors of the classroom to capture the entrance of human inside class room and accordingly lights turn on or off in there presence by sending signal to relay. The room temperature is detected by the temperature sensor and immediately the fan is turned on when the temperature is high.