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# Lighting Automation

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***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 aurdino 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 assroom and also a sensor is used for the measuring the temperature, if the temperature is above 25°C the fans will be turned ON.*
***Keywords:** Component, formatting, style, styling, insert*

## I. INTRODUCTION

We are living in 21st century, where automation of any form i.e. home or industry plays an important role in human life. Industrial automation is the control of machinery and processes used in various industries by autonomous systems, through the use of technologies like robotics and computer software, which helps in increasing the efficiency in terms of production, energy & time.Home automation on the other hand, is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one another via the Internet. Each device has sensors and is connected through wifi, so you can manage them from your smartphone or tablet whether you're at home or miles away.

## II. OBJECTIVE

To design & construct the prototype of sensor controlled Home Automation using Arduino. To develop a system that can be used to conserve energy and improve safety and convenience in buildings, outdoor spaces and other areas. Detecting movement in a room to switch the lights ON. Upon detection of NO movement immediate switching OFF of lighting in that room. Depending upon the time of the day switching ON & OFF of the street lights automatically

## III.BLOCK DIAGRAM & METHODOLOGY

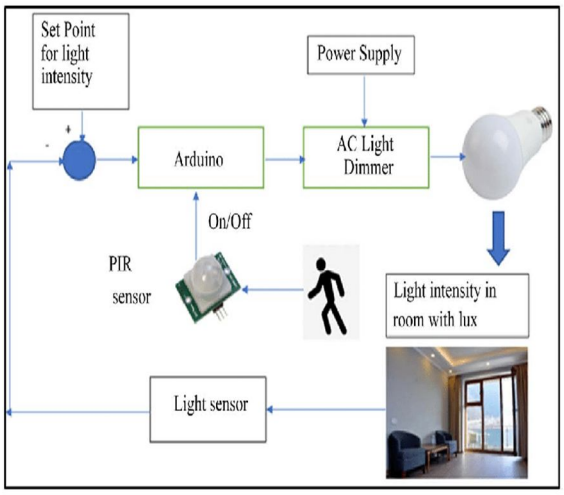


Fig 1: Block diagram

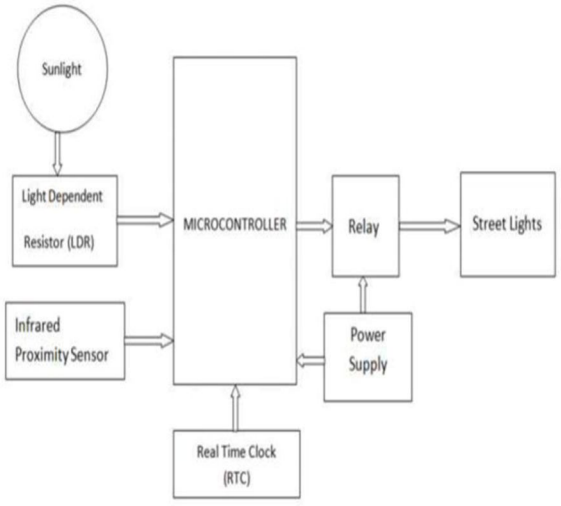


Fig 2: Circuit diagram

 

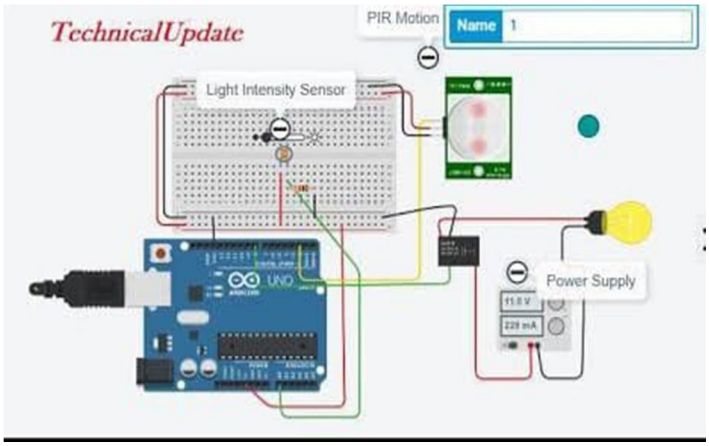


Fig 3: Simulation

In this project Power supply, Arduino UNO, Internal Arduino UNO LED, LDR Sensor, Motion Sensor, Breadboard & relay is used. After uploading the program in Arduino UNO, the external power supply is given. Due to that all functions of equipment's are ON. At that time, depending on light sensed by the LDR sensor & motion detected by the PIR sensor output is displayed on the laptop screen connected to Arduino UNO board & as a result the internal LED of Arduino UNO glows.

## IV. IMPLEMENTATION & WORKING PRINCIPLE

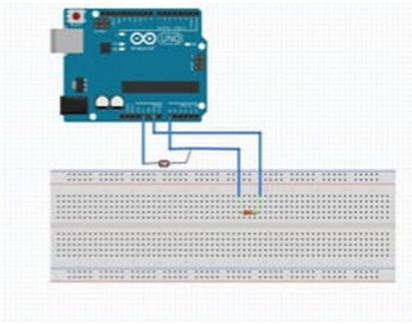

Fig 1: Circuit diagram

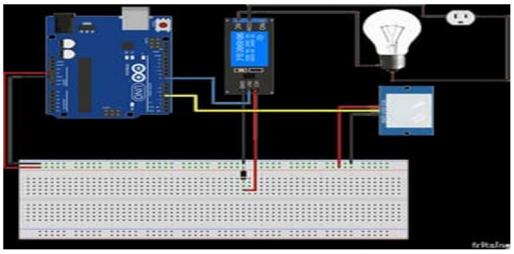

Fig 2: Breadboard connection

Here is a simple Lighting Automation circuit, a prototype for smart home initiative. The circuit consisting of LDR & PIR (Motion Sensor). The LDR sensor's resistance value is dependent on the intensity of available light in the room. The PIR sensor detects the motion.

*1)* Gather all the required components & check for its proper functioning.
*2)* Analize the circuit that is going to be rigged up.
*3)* Start the connection with Arduino UNO ,connect it to the laptop through USB provided for the same & connect the USB pin to the USB port on the Arduino board.
*4)* The Arduino board supplies 5V to the setup.
*5)* Using the Breadboard make the connections for LDR sensor, using connecting wires.
*6)* Connect 5V of Arduino terminal to the VCC of breadboard.
*7)* Similarly ground terminal of Arduino board connected to the respective ground terminal considered on the Breadboard with the help of connecting wires.
*8)* As shown in the circuit, connect the respective terminals of PIR sensor to the Breadboard along with the resistors.
*9)* Follow the similar steps for relay.
*10)* Ensure that the components are interconnected properly to one another & verify the connections done with the circuit diagram.
*11)* As shown in the circuit diagram instead of LED, internal Arduino LED is considered

*12)* Write the code & load it to Arduino IDE after rectifying the errors.
*13)* Upload it to the hardware & run the code.
*14)* After switching ON the hardware, to check for the working of the circuit, cover the LDR sensor completely, as a result of this action after 2s (that's the time delay given in the code), the internal Arduino Led glows to indicate that the LED has been turned ON.
*15)* If some motion is sensed by the PIR sensor, on the screen it displays the result and internal LED of Arduino glows.

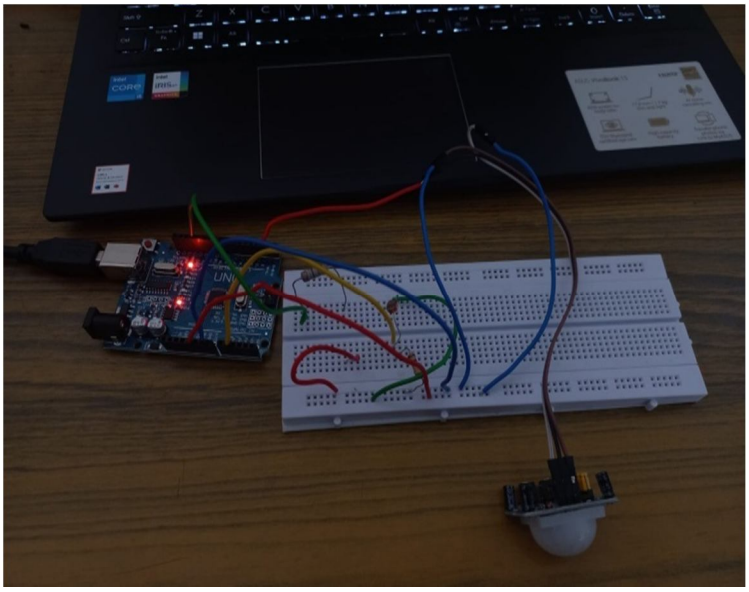

Fig 3: Connection diagram

## V. SOFTWARE & HARDWARE DESCRIPTION

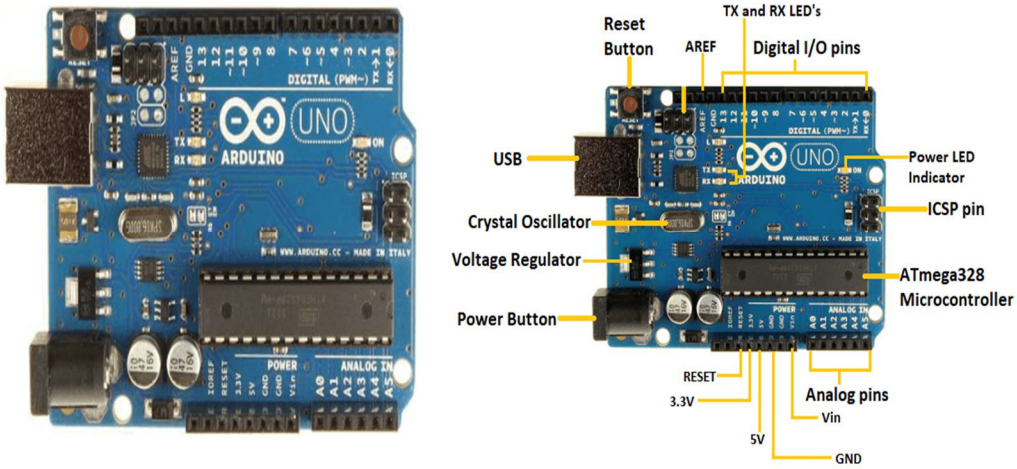


Fig 4: Pins of Arduino UNO

The Arduino UNO includes:
*1)* 6 analog pin inputs
*2)* 14 digital pins
*3)* USB connector
*4)* Power jack, and
*5)* An ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.

a) *ATmega328 Microcontroller*- It is a single chip Microcontroller of the ATmel family. The processor code inside it is of 8-bit. It combines Memory (SRAM, EEPROM, and Flash), Analog to Digital Converter, SPI serial ports, I/O lines, registers, timer, external and internal interrupts, and oscillator.
b) *ICSP Pin* - The In-Circuit Serial Programming pin allows the user to program using the firmware of the Arduino board.
c) *Power LED Indicator*- The ON status of LED shows the power is activated. When the power is OFF, the LED will not light up.
d) *Digital I/O Pins*- The digital pins have the value HIGH or LOW. The pins numbered from D0 to D13 are digital pins.
e) *TX and RX LED's*- The successful flow of data is represented by the lighting of these LED's.
f) *AREF*- The Analog Reference (AREF) pin is used to feed a reference voltage to the Arduino UNO board from the external power supply.
g) *Reset Button*- It is used to add a Reset button to the connection.
h) *USB*- It allows the board to connect to the computer. It is essential for the programming of the Arduino UNO board.
i) *Crystal Oscillator*- The Crystal oscillator has a frequency of 16MHz, which makes the Arduino UNO a powerful board.
j) *Voltage Regulator*- The voltage regulator converts the input voltage to 5V.
k) *GND*- Ground pins. The ground pin acts as a pin with zero voltage.
l) *Vin*- It is the input voltage.
m) *Analog Pins*- The pins numbered from A0 to A5 are analog pins. The function of Analog pins is to read the analog sensor used in the connection. It can also act as GPIO (General Purpose Input Output) pins.

### *A. LDR Sensor*

Photoresistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity.

Fig 5

In the dark, their resistance is very high, sometimes up to 1 MΩ, but when the LDR sensor is exposed to light, the resistance drops dramatically, even down to a few ohms, depending on the light intensity. LDRs have a sensitivity that varies with the wavelength of the light applied and are nonlinear devices.

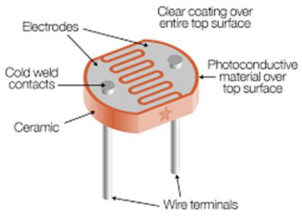


Fig 6

### *B. PIR Sensor*

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects. PIR sensors mostly used in PIR-based motion detectors. Also, it used in security alarms and automatic lighting applications.


Fig 7 The above fig, shows a typical pin configuration of the PIR sensor.

The PIR sensor consists of 3 pins:

1) Pin1 corresponds to the drain terminal of the device, which connected to the positive supply 5V DC.
2) Pin2 corresponds to the source terminal of the device, which connects to the ground terminal via a 100K or 47K resistor. The Pin2 is the output pin of the sensor. The pin 2 of the sensor carries the detected IR signal to an amplifier from the sensor.
3) Pin3 of the sensor connected to the ground.

*C. Relay*

The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area through ON or OFF.


Fig 8

1) *Relay Pins*

a) *COM:* common pin
b) *NO:* Normally open – there is no contact between the common pin and the normally open pin. So, when you trigger the relay, it connects to the COM pin and power is provided to the load.
c) *NC:* Normally closed – there is contact between the common pin and the normally closed pin. There is always connection between the COM and NC pins, even when the relay is turned off. When you trigger the relay, the circuit is opened and there is no supply provided to the load.

2) *Working Principle Of Relay*

It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energises the electromagnetic field which produces the temporary magnetic field. This magnetic field moves the relay armature for opening or closing the connections. The small power relay has only one contacts, and the high power relay has two contacts for opening the switch. The inner section of the relay is shown in the figure below. It has an iron core which is wound by a control coil. The power supply is given to the coil through the contacts of the load and the control switch. The current flows through the coil produces the magnetic field around it.

Due to this magnetic field, the upper arm of the magnet attracts the lower arm. Hence close the circuit, which makes the current flow through the load. If the contact is already closed, then it moves oppositely and hence open the contacts.

*D. Arduino- IDE Software*

Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial.

## VI. RESULTS & CONCLUSIONS

The design and construction of Lighting Automation was outlined in a block diagram and then circuit was designed and tested. Finally the circuit was arranged, connected properly and tested. In this project IC (CA3140, NE555, UM 3561). The circuit we use three of the Ant-Bag Snatching Alarm is designed around the operational amplifier CA3140 (IC1) which is configured as a comparator. Normally, the non-inverting input is higher than inverting input and the output is High from the pin6 and the output pin is fed to the trigger pin 2 of IC NE555.

Thecauseofhigh output of IC1 the trigger pin 2 is high and as a result the IC 2 output pin 3 is low and the alarm is off. A resistor along with a capacitor is connected to reset pin 4 of IC2 in order to prevent false triggering. When there is a bag-snatching attempt, the plug connected to the circuit detaches. At that moment,
the voltage at the invertinginputofIC1exceedsthe voltage at the non-inverting input and subsequently its output goes low.
This sends a low pulse to trigger pin 2 of IC2 to make its output pin 3 high. Consequently, the alarm circuit built around ICUM3561 (IC3) gets the supply voltage at its pin5. It's output is fed to the base of single-stage transistor amplifier BD139 (T1) that amplifies the generated alarm signal. A loud speaker is connected to the collector of T1 to produce the alarm. The alarm can be put off if the plug is inserted into the socket again. It is a simple circuit and low costly. It's easy to carry anywhere with bag, suitcase and pursue.
The circuit kept in your bag or suitcase sounds a loud alarm, simulating a police horn, if someone attempts to snatch your bag or suitcase. This will draw the attention of other passengers and the burglar can be caught red handed.

## VII. FUTURE SCOPE

For future development, the possibility could be to design several bags in the same style to be ableto make an entire collection. I think the prospective customers would like to buy products that are designed with the same idea or that are part of an entirety,

## VIII. ACKNOWLEDGMENT

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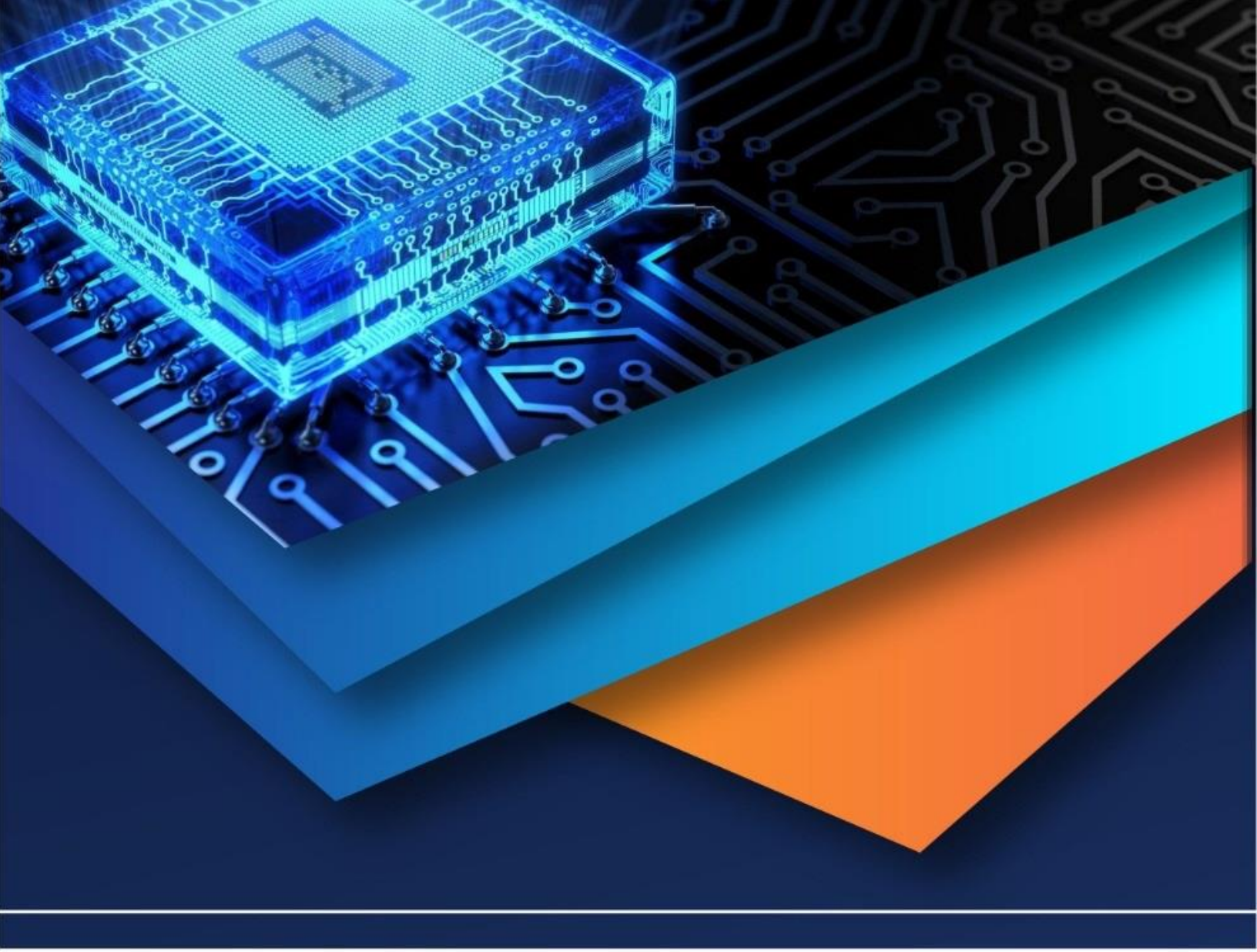

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