AUTOMATIC STREET LIGHT CONTROLLER

A Minor Project Report Submitted To

Rajiv Gandhi ProudyogikiVishwavidyalaya, Bhopal

Towards Partial Fulfilment for the Award Of

Bachelor of Technology

In

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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Session: 2022-2023

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[An Institution Approved By AICTE, New Delhi & Affiliated To RGPV, Bhopal]

DECLARATION

This is to certify that the project report **"AUTOMATIC STREET LIGHT"** submitted by **Raj Yadav (0863EC201022), Sandhya Kashyap (0863EC201029), Salma Bano (0863EC201028), Shraddha Shrivansh (0863EC201032)** to the Prestige Institute of Engineering Management and Research, Indore in partial fulfilment or the award of the degree of B.Tech in Electronics and Communication Engineering is a *bona fide* record of project work carried out by him/her under my/our supervision. The contents of this report, in full or in parts, have not been submitted to any other Institution or University for the award of any degree or diploma.

Date :-

Place :- Indore

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DISSERTATION APPROVAL SHEET

This is to certify that the dissertation entitled **" AUTOMATIC STREET LIGHT "** submitted by Raj Yadav, Sandhya Kashyap, Shradhha Shrivansh, and Salma Bano to the Prestige Institute of Engineering, Management and Research, Indore (M.P) is approved as fulfilment for the award of the degree of "Bachelor of Technology in Electronics and Communication Engineering" by Rajiv Gandhi ProudhyogikiVishwavidyalaya, Bhopal, (M.P.).

Internal Examiner

Date :-

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CERTIFICATE

This is certified that project entitled **" AUTOMATIC STREET LIGHT "** submitted by Raj Yadav, Sandhya Kashyap, Shradhha Shrivansh, and Salma Bano is a satisfactory account of the bona fide work done under our supervision and is recommended towards partial fulfilment for the award of the degree Bachelor of Technology in Electronics and Communication to Rajiv Gandhi ProudyogikiVishwavidyalaya, Bhopal (M.P.)

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Project Guide **HOD**

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ACKNOWLEDGEMENT

After the completion of my Minor project work, words are not enough to express my feelings about all those who helped me to reach my goal, feeling above this is my indebtedness to the almighty for providing me with this moment in life.

First and foremost, I take this opportunity to express my deep regards and heart felt gratitude to my project guide **Mr. Mahendra Singh Thakur (HOD), Department of Electronics and Communication Engineering, PIEMR, Indore** for their inspiring guidance and timely suggestions in carrying out my project successfully. They are also a constant source of inspiration for me. Working under their guidance has been an opportunity for me to learn more and more.

I am extremely thankful to **Mr. Mahendra Singh Thakur (HOD, ECE)** for her cooperation and motivation during the project. I extend my deepest gratitude to **Dr. Manoj kumar Deshpande, Director, PIEMR, and Indore** for providing all the necessary facilities and a truly encouraging environment to bring out the best of my endfulfillment would like to thank all the teachers of our department for providing invaluable support and motivation. I remain indebted to all the non-teaching staff of our Institute who have helped me immensely throughout the project.

I am also grateful to my friends and colleagues for their help and cooperation throughout this work. Last but not least; I thank my family for their support, patience, blessings and understanding while completing my project.

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  - Sandhya Kashyap
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ABSTRACT

The project aims to develop a system which will lead to energy conservation and by doing so, we would be able to lighten a few more homes. The proposed work is accomplished by using an Arduino microcontroller and sensors that will control the electricity based on night and object detection. Mean while, a counter is set that will count the number of objects passed through the road. The beauty of the proposed work is that the wastage of unused electricity can be reduced, the lifetime of the streetlights gets enhanced because the lights do not stay ON during the whole night, and also helps to in my crease safety measurements. We are confident that the proposed idea will be beneficial in the future applications of microcontrollers and sensors etc. Conventional street lighting systems with terms in areas with a low frequency of passers by are online most of the night without purpose. The consequence is that a large amount of power is wasted meaninglessly with the broad availability of flexible-lighting technology like light-emitting diode lamps and everywhere available wireless internet connection, fast-reacting, reliably operating, power-conserving street lighting systems become reality. The purpose of this work is to describe the Automatic Street Lighting (ASL) system, a first approach to accomplish the demand for a flexible lighting control system.

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1. INTRODUCTION :

Street lights are a major requirement in today's life of transportation for safety purposes and to avoid accidents during the night. Despite that, in today's busy life no one bothers to switch it off/on when not required. The project introduced here gives a solution to this by eliminating manpower and reducing power consumption.

This requires three basic components i.e. LDR, Sensors and microcontroller. During that time, there is no requirement for street lights so the LDR keeps the street light off until the light level is low or the frequency of light is low and the resistance of the LDR is high. This prevents current from flowing to the base of the transistors.

Thus the street lights do not glow. As soon as the light level goes high if the light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. Now the circuitry goes in on condition and the block diagram represented here starts working.

2. OBJECTIVE OF THE PROJECT :

This project aims to design an **"AUTOMATIC STREET LIGHT".** That will save a lot of electricity from power illuminating gets wasted in illuminating the street light. We Use LDR to cancel the street light, when the LDR value falls above the threshold value the lights are switched on & when the value falls below the threshold value the lights are switched off. As the light turns ON & OFF according to the requirements it saves lots of power & also decreases our work.

3. METHODOLOGY :

This project basically emphasizes on developing a cost efficient and highly reliable automatic street light system. The main drawback of present conventional switching and timer switching system is wastage of power. Here the prime concern is to design and fabricate a highly reliable automatic street light .

ATmega8 microcontroller is the brain of the entire controlling circuit. The control circuit requires SV DC to operate which is obtained from the rectifier circuit which also includes a step-down transformer and a voltage regulator. The light dependent resistor used as a light sensing device senses light intensity and sends analog signals to the microcontroller. The timer concept is employed along with light dependent resistor.

The real time, ON time and OFF time settings is done using the four button keyboard and liquid crystal display. A tolerance of one hour is provided for the efficient operation of the streetlight. In order to turn ON/OFF the streetlight, two conditions have to be satisfied. One of the condition is light intensity sensing of the light dependent resistor and the other being the timers in the microcontroller.

Once both of these conditions are satisfied the microcontroller generates control signals to energize and de-energize the relay for the streetlight to turn ON and turn OFF. The Analog signals from the LDR are processed in Analog to digital converter (ADC) of the ATmega8 Microcontroller.

The real time and On/Off time is set, A tolerance of one hour is pre-set using codes written in C language and the program is dumped into the microcontroller. The operation of Relay switch is controlled by the ATmega8 Microcontroller.

The project aims at designing a highly reliable automatic street light system, as in the present street lighting system power wastage problems are being encountered due to improper switching operation.

The designed control circuit includes microcontroller used as the main controlling component in the control circuit along with Light Dependent Resistor. The developed system is found to exhibit efficient automatic switching control.

The constructed circuit of automatic street light. The designed system in the project includes codes written in embedded C which is dumped into the ATMEGA8 microcontroller. The microcontroller analyses the analog signals sent by LDR and the ON/OFF time settings done initially using keyboard LCD display. The streetlight turns ON/OFF, only when both the conditions are satisfied.

4. LITERATURE SURVEY :

An automatic street light using a light-dependent moves manual work. The street lights are automatically switched ON when the sunlight goes below the visible region of our eyes. It automatically switches OFF the street lights under illumination by sunlight. The component used for light sensing is a Light Dependent Resistor.

By using the LDR we can operate the streetlight automatically, when an ample amount of light is available the streetlight will be in the OFF state and when it is dark the light will be in the ON state, which means LDR resistance is inversely proportional to light falling on it. It exploits the working of a transistor in the saturation region and cut-off region to switch ON and switch OFF the lights at the appropriate time with the help of an electromagnetically operated switch.

Here LDR sensors will be used which are light sensors and photoelectric sensors light sensor light darkness to activate the ON/OFF switch, so the streetlights will be ready to turn on and the photoelectric sensor will detect movement to activate the streetlights. LDR, which varies according to the amount of light falling on its surface, this gives an induction for whether it is a day-night time, the photoelectric sensors are placed on the side of the road, which can be controlled by microcontroller ARDUINO UNO. If any object crosses the photoelectric beam, a particular light will be automatically ON.

The project represents a new cost-effective solution for street light control systems. The control system consists of control circuitry, internet and electrical devices. Street light controlled street receive that information, and it will decode and find the particular streetlight which will be set using a relay circuit, the notification came it will then decode and finds the appropriate streetlight

which needs to be put ON/OFF using the relay circuit. In this paper, the Infra, from the surroundings and check whether the lights need to be ON or not as per the intensity value.

This system will eliminate the system of manual control as the system will cause to light up when the infrared value becomes than our defined value. Also, the light will automatically switch OFF when detected value of infrared becomes greater than the defined value. This system works in 2 forms, First, for highways Second for the Streets. For highways the lights remain OFF as long as the motion of the object is detected. If motion is detected the light will be in ON state and Glows for specific time interval. In second form the lights do not remain in OFF state, instead they remain ON but in less intensity.

The controlling terminal observes the condition of street lights for its perfect working.

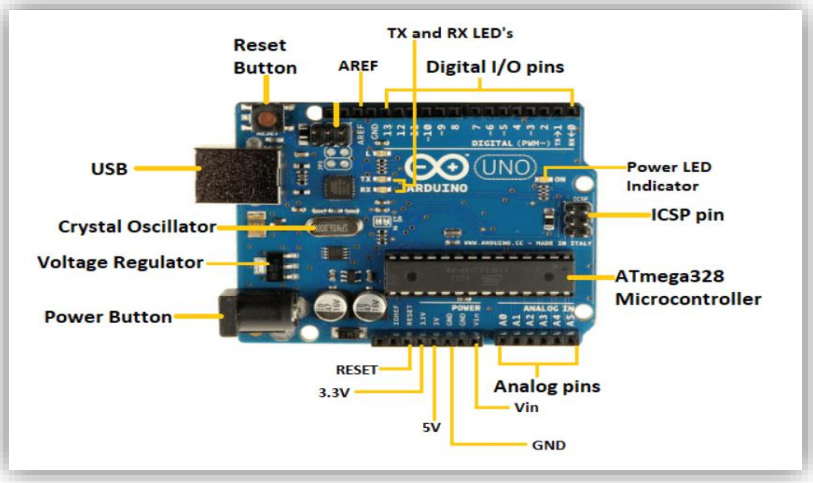
The sensors are used to control the dim/bright of the street lights based on the intensity of the sunlight.

5. THE PROPOSED SYSTEM AND HARDWARE USED :

S.No	Component's	Type	Quantity
1.	Arduino Uno	ATmega328	1 pcs
2.	LED		2 pcs
3.	Registor	220 ohm,1 ohm	2 pcs , 2 pcs
4.	Transistor	BC 547	1 pcs
5.	LDR		2 pcs
6.	Jumper Wire		

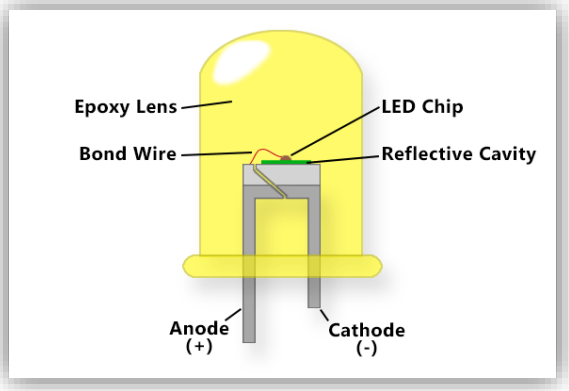
1.1 Arduino ATmega328 –

The Arduino Uno is a microcontroller board which is based on the ATmega328 series controllers and has an IDE (Integrated Development Environment) for writing, compiling and uploading codes to the microcontroller. It has 14 digital input and output pins (of which 6 are PWM) and 6 analogue inputs for communication with electronic componentssuch as sensors, switches, motors and so on. It also has 16 MHz ceramic resonators, a USB connection jack, an external power supply jack, an ICSP (in-circuit serial programmer) header, and a reset button. Its operating voltage is 5v, input voltage 7 to 12v (limit up to 20v)



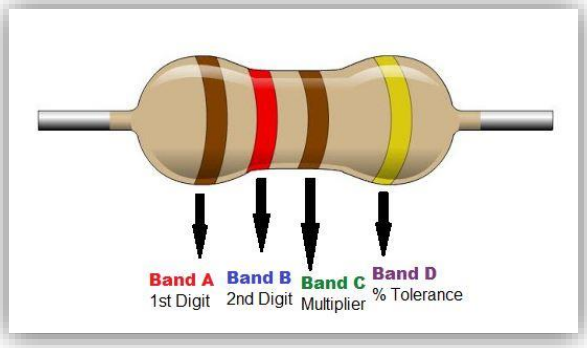
1.2 LEDs –

A LED (light-emitting diode) is a PN junction diode which is used for emitting visible light when it is activated.When the voltage is applied over its elements, electrons regroup with holes within the LED, releasing energy in the form of photons whichgives the visible light. LEDs may have the Dim/full capability.



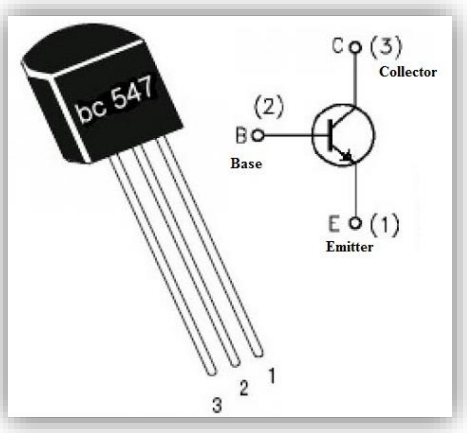
1.3 Resistors –

A resistor is a passive electronic component, used with other electronic components such as LEDs and sensors to prevent or limit the flow of electrons through them as illustrated in. It works on the principle of Ohm's law which prevent overflow of voltage.



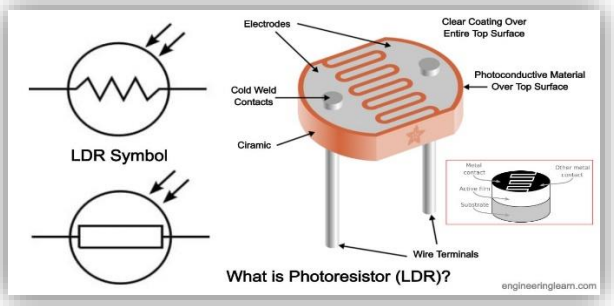
1.4 Transistor –

BC547 transistor has a gain value of 110 to 800, this value determines the amplification capacity of the transistor. The maximum amount of current that could flow through the Collector pin is 100mA, hence we cannot connect loads that consume more than 100mA using this transistor. To bias a transistor we have to supply current to base pin, this current (I_B) should be limited to 5mA.

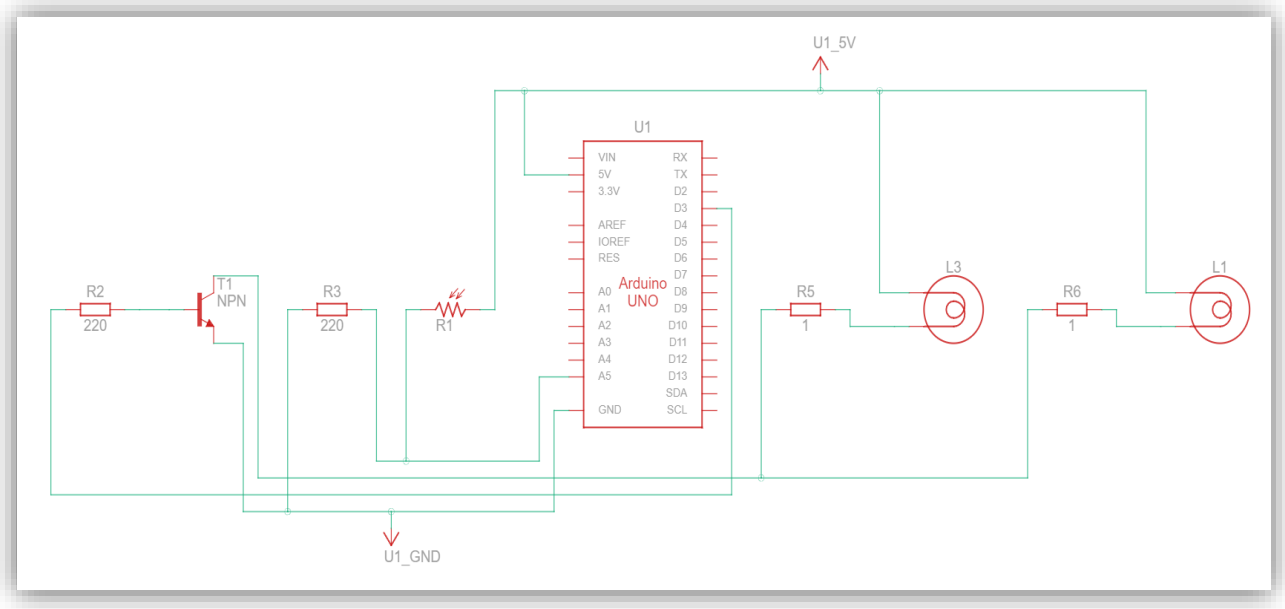


1.5 LDR -

LDR (Light Dependent Resistor) as the name states is a special type of resistor that workson the photoconductivity principle means that resistance changes according to the intensity of light. Its resistance decreases with an increase in the intensity of light. It is often used as a light sensor, light meter, Automatic street light and in areas where we need to have light sensitivity. It is also called a Light Sensor.



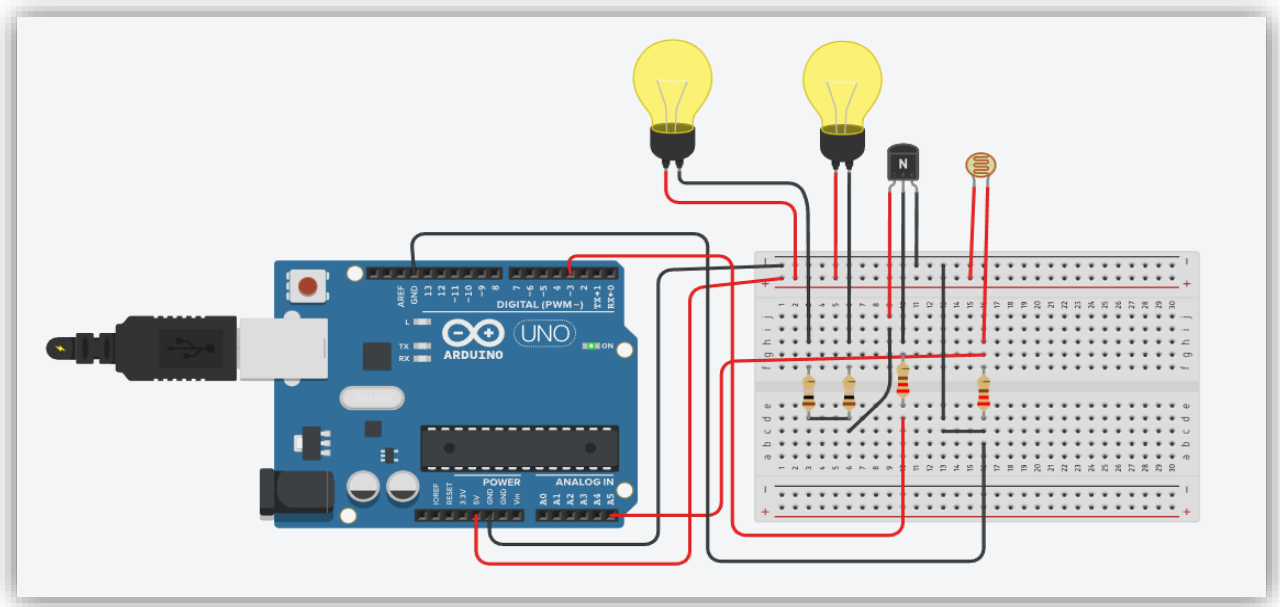
6. CIRCUIT DIAGRAM :

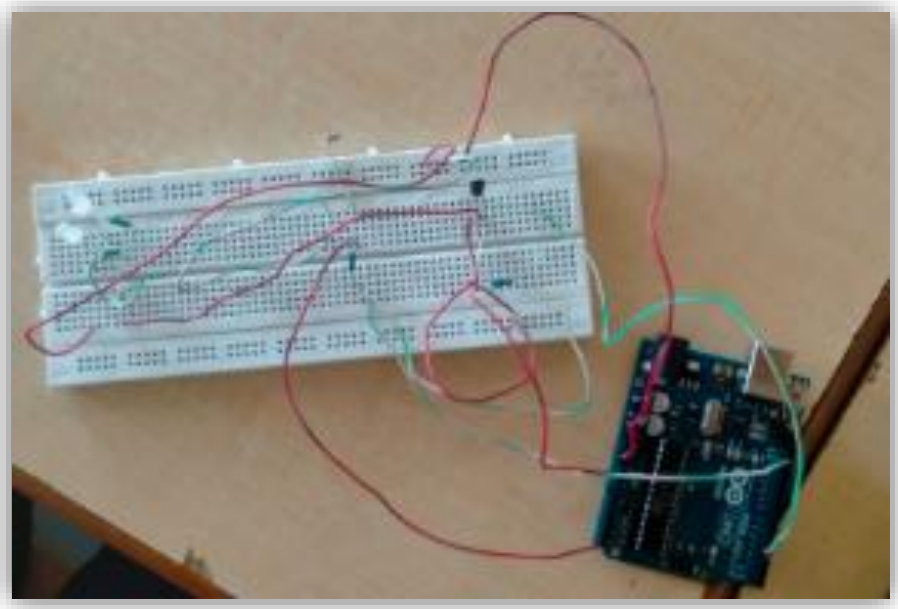


Working points :-

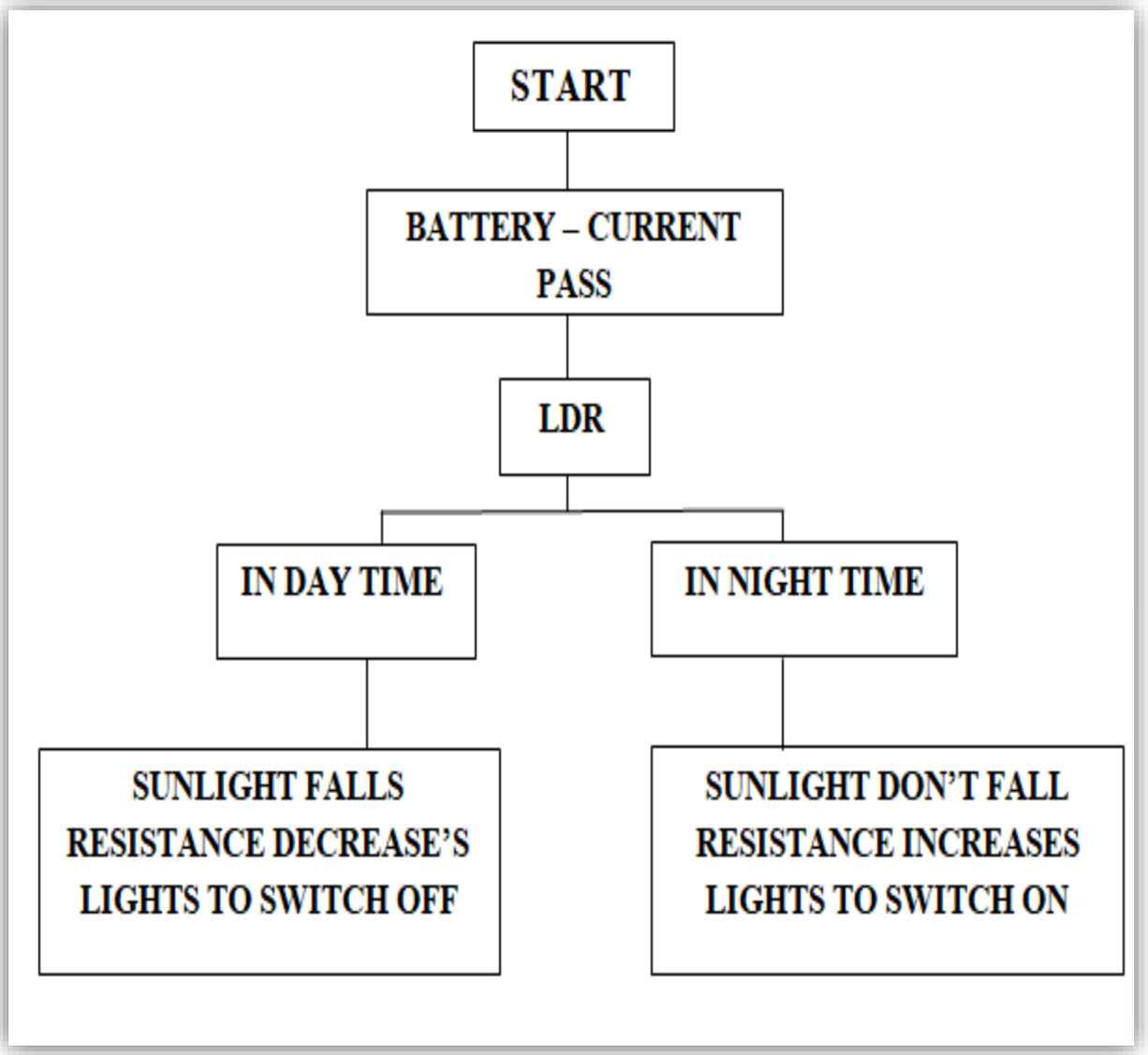
- In the arduino UNO, we provide supply from Vcc which is connected to the one end of all the LEDs, resistor and LDR
- The A5 pin of arduino is connected to the LDR and Resistor R3
- The NPN Transistor (collector) One end is connected to resistor 5 and resistor 6 other is (base) connected with resistor 2 and its one end with D3
- The R5 one terminal is connected with LED 3 and R6 one end with LED1 end other is with NPN ones terminal (collector)
- And the NPN transistor (emitter) and also R3 is connect in GND (ground).

7. CIRCUIT PERFORM IN TINKERCAD :





8. WORKING :


START
BATTERY – CURRENT PASS
LDR
IN DAY TIME
IN NIGHT TIME
SUNLIGHT FALLS RESISTANCE DECREASE'S LIGHTS TO SWITCH OFF
SUNLIGHT DON'T FALL RESISTANCE INCREASES LIGHTS TO SWITCH ON

9. CODE :

```
// C++ code
//
intldr = A5;
intldr_value;
int light =3;
void setup()
{
pinMode(light, OUTPUT);
pinMode(ldr,INPUT);
}
void loop()
{
ldr_value = analogRead (ldr);
if (ldr_value>100)
digitalWrite(light, LOW);
else
digitalWrite(light, HIGH);
}
```

10.RESULTS :

The project aims were to reduce the side effects of the current lighting system and find asolution to save power. In this project, the first thing to do is to prepare the inputs and outputs ofthe system to control the lights.

The lights have been successfully controlled by a microcontroller. With commands from the controller, thelights will be ON in the places of the movement when it's dark. Finally, this control circuit can be used in various by using this automatic system for street light control. we can reduce energy consumption because the manually operated street lights are not switched off properly even the sunlight comes and Also not switched on earlier before sunset.

11. CONCLUSION -

The proposed streetlight automation system is cost-effective and has the safety to reduce power consumption. It helps us to get rid of today's world problems of manual switching and most importantly, primary cost and maintenance can be decreased easily. The LED consumes less energy with cool-white light emission and has a better life than high energy-consumingamps. Moving to the new & renewable energy sources, this system can be upgraded by replacing conventional LED modules with solar-based LED modules. With these efficient reasons, this presented work has more advantages which can overcome the present limitations. Keep in mind that the switch e long-term benefits; the starting cost would never be a problem because the return time of investment is very less. This system can be easily implemented in street lights, smart cities, home automation, agriculture field monitoring, timely automated lights, parking lights of hospitals, malls, airports, universities and industries etc.

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