INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 4, Issue 5)
Available online at: www.ijariit.com

Automatic street lighting system using LDR

Kothamasu Saikumar
kothamasusaikumarcredits@gmail.com
SRM Institute of Science and Technology, Chennai, Tamil Nadu

D. Vaibhav
gopinathv8@gmail.com
SRM Institute of Science and Technology, Chennai, Tamil Nadu

V. Rrochish
rrochish2372@gmail.com
SRM Institute of Science and Technology, Chennai, Tamil Nadu

ABSTRACT

Automatic Street lighting System is a simple, yet powerful concept, which uses LDR sensor as a switch. By using this system we can eradicate manual work at 100%. It automatically switches the lights ON when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes visible to the sensor. By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even after the sunlight comes visible and also switching ON earlier before sunset. In this project no need of manual operation like ON time and OFF time setting. This project clearly demonstrates the working of the transistor in a saturation region and cut-off region. The working of the relay is also known. Implementation of this project encourages digital work. Light-dependent resistor, a photoconductive device has been used as the transducer to convert light energy into electrical energy. The central dogma of the circuit is that the change in voltage drop across the light dependent resistor on illumination or darkness switches the transistor between the cut-off region or saturation region and switches OFF or ON the LED.

Keywords— *Arduino Uno, LDR Module, Relay module, Microcontroller*

1. INTRODUCTION

This is the design and implementation of Automatic Street lighting System using Light Dependent Resistor. This system was designed to detect the light automatically and switch on's light. The design makes use of a microcontroller to control the outputs when it receives input from the resistor. This design can be used in different areas like Street lights, Public parks, and lights outside of houses. A report was made to present an efficient street lighting system with reduced power consumption in comparison to other normal lighting systems by knowing on this LED's are more efficient than any other diodes or bulbs.

2. LITERATURE SURVEY

Ravi Kishore kodali and Subbachary Yerroju presented a paper on Energy efficient smart street light [1]. over Singh, IEEE Sr. member has used an automatic microprocessor with solar cell [2]. Bilam Roy has proposed a street light optimizer [3]. Prakash developed an Intelligent Street Lighting system for smart city based on IoT [4]. Dhiraj sunehra has presented an Automatic Street Light Control system using Wireless Sensor Networks [5].

3. PROPOSED SYSTEM

We proposed a way based on that Automatic Street Lighting System on/off doesn't depend upon the vehicle or objects. It depends upon the Intensity of light. Through this process, 15-20 % of the city's power can be saved. Similarly, manual power reduces. It uses a Sensor named LDR sensor, which is a light-dependent variant. Which means depends on light intensity.

3.1 LDR Sensor

An LDR or photocell, photoconductor. It is one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. These resistors have a variety of functions and resistance. For instance, when the LDR is in darkness, then it can be used to turn ON a light or to turn OFF a light when it is in the light. A typical light dependent resistor has a resistance in the darkness of 1Mohm and in the brightness a resistance of a couple of Kohm. It is connected to the A0 pin of Arduino UNO in resistive voltage divider circuit.

Fig. 1: LDR sensor

3.2 Arduino UNO

The Arduino UNO board is a microcontroller based on the AT mega 328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack, and a reset button. This contains all the required support needed for

the microcontroller. In order to get started, they are simply connected to a computer with a USB cable or with an AC-to-DC adapter or battery. Arduino UNO Board varies from all other boards and they will not use the FTDI USB-to-serial driver chip in them. It is featured by the ATmega16U2 programmed as a USB-to-serial converter.

Fig. 2: Arduino UNO

3.3 Microcontroller

A Microcontroller has all the necessary components which a microprocessor possesses and invariably it poses ROM, RAM, Serial Port, timers, interrupts Input-Output ports, and a clock circuit. The microcontroller always focus on the chip facility and it is more prominent in the case of serial ports, analog-to-digital converters, timers, counters, read-only memory, parallel input, interrupt control, random access memory, and output ports. The concept of the 8051 microcontroller arises from here and here we will discuss in depth about the various aspects, uses, programming and other features of 8051 microcontrollers.

Fig. 3: Microcontroller

3.4 Relay module

The relay module is an electrically operated switch that allows you to turn on or off a circuit using voltage and/or current much higher than a microcontroller could handle. The relay protects each circuit from each other. Controlling a relay with the Arduino is as simple as controlling an output such as an LED.

Fig. 4: Relay Module

4. SYSTEM ARCHITECTURE

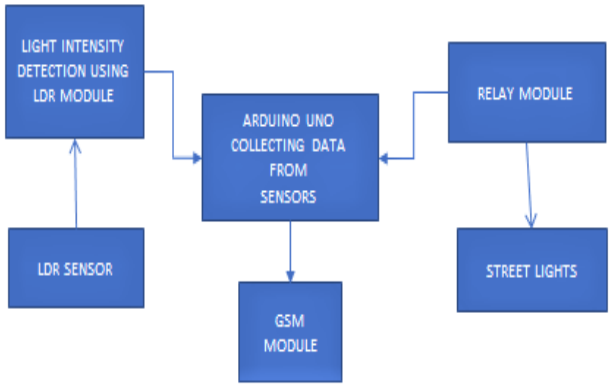


Fig. 4: System architecture

5. EXPERIMENTAL RESULTS

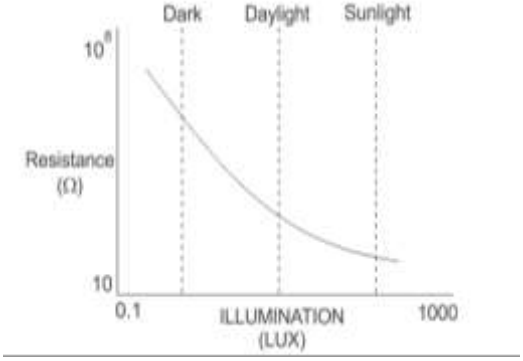


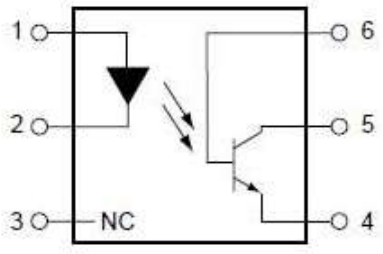
Fig. 5: Illumination vs. resistance

The resistance of the LDR sensor drops down with more light it receives. The sensor is connected in a voltage divider circuit to the Arduino. Therefore when light intensity falls, the resistance of the LDR sensor increases and more voltage is provided by the sensor at the Arduino pin.

Illuminance is a measure of how much Luminous flux is spread over a given area. One can think of luminous flux (measured in lumens) as a measure of the total "amount" of the visible light present, and the illuminance as a measure of the intensity of illumination on a surface. A given amount of light will illuminate a surface more dimly if it is spread over a larger area, so illuminance is inversely proportional to the area when the luminous flux is held constant.

One lux is equal to one lumen per square meter:

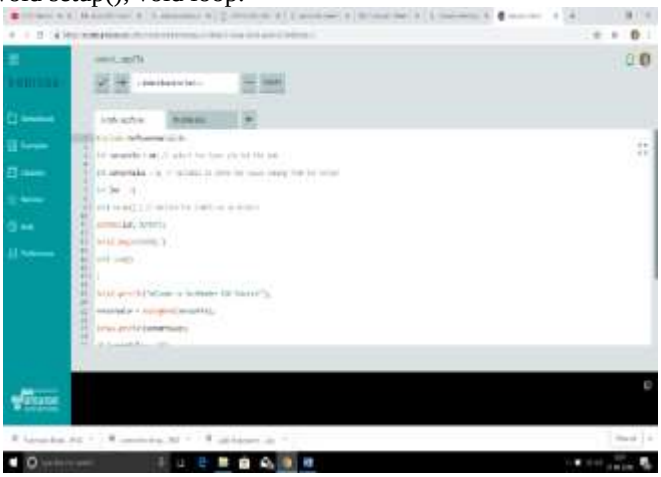
$$1\ \text{lx} = 1\ \text{lm/m}^2 = 1\ \underline{\text{cd}}\cdot\underline{\text{sr}}/\text{m}^2.$$



PIN 1. ANODE
2. CATHODE
3. NO CONNECTION
4. EMITTER
5. COLLECTOR
6. BASE

Fig. 6: Functional block diagram

PROGRAMMING CODE: Arduino programming consists of void setup(), void loop.



6. CONCLUSION

This is the design and implementation of Automatic Streetlight /Light System. This system was designed to automatically detect Light and switch one's light. The design makes use of a microcontroller to control the outputs when it receives input from the resistor. This design can be used in different areas like Streetlights, Public parks, and lights outside of houses etc.

By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even after the sunlight comes visible and also switching ON earlier before sunset. In this project no need of region and cut-off region. The working manual operation like ON time and OFF time setting. This project clearly demonstrates the working of the transistor in saturation of relay is also known. Implementation of this project encourages digital work.

7. FUTURE ENHANCEMENT

a. Pole damage detection with the addition of a suitable sensor.
b. If the system has traffic speed sensors then this information could be used to manage traffic speed via the dimming of the street lights. if the average traffic speed is to fast during evening and night hours, this could be used to trigger slight dimming of the street lights the level of dimming would be imperceptible to motorists but they would slow down regardless, in response to the slightly diminished lighting. A five-person light reduction slows traffic but this is not noticeable to motorists. With added intelligence in the lamp, you can add further features to increase HID lamp life, such as softer and startup and production against reigniting and already hot HID lamp, since this shortens the lamp life.

8. REFERENCES

[1] Energy efficient Smart Street Light, IEEE conference 2017, Ravi kishorekodali and Subbachary Yerroju, Department of Electronics and Communication Engineering, National Institute of Technology, Warangal.
[2] Solar LED street light system with Automatic Scheme-2017, Omveer Singh, IEEE SR.Member, Electrical Engineering Department, Greater Buddha University, Tushar Singh Sisodia Electrical Department, Greater Noida.
[3] A smart street light intensity optimizer, IEEE Conference/ 2017, Bilam Roy and Jayita Datta, Department of Applied Electronics and Instrumentation Engineering, Guru Nanak Institute of Technology, Kolkata, W.B., India.
[4] Internet of Things Based Intelligence Street Lighting System for Smart city, IJIRSET, May 2016, Parkash, Prabhu V, Dandu Rajendra
[5] Automatic Street Light Control System using Wireless Sensor Networks, IEEE-2017. Dhiraj Sunehra, SMIEEE, JNTU college of Engineering, Department of Electronics and Communication Engineering, Telangana, India.

