IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

Automatic Street Light Control using LDR

Prof. Pagire R.R.[1], Mr. Srushti Supekar[2], Mr. Tejal Sontakke[3], Miss. Vaishnavi Hivarkar[4], Miss. Poonam Sonawane[5], Miss. Lashkare utkarsha[6], Miss. Vedika kolhe[7], Miss. Ishwari Yenare[8]

Prof, Electrical Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [1]
Students, IT Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [2,3]
Students, E&TC Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [4,5]
Students, Computer Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [6,7]

Abstract: *Monitoring of street lights and controlling is of utmost importance in developing country like India to reduce the power consumption. The paper presents a remote streetlight monitoring and controlling system based on LED and wireless sensor network. The system can be set to run in automatic mode, which control streetlight. This control can make a reasonable adjustment according to the seasonal variation. Also this system can run in controlled mode. In this mode, we can take the initiative to control streetlights through PC monitor terminal. This street light system also includes a time cut-out function, and an automatic control pattern for even more electricity conserving, namely when vehicles pass by, the light will turn on automatically, later turn off. This design can save a great amount of electricity compared to streetlamps that keep a light during nights. The design implements traffic flow magnitude statistics without adding any hardware, facilitating transportation condition information collecting. Furthermore, this system has auto-alarm function which will set off if any light is damaged and will show the serial number of the damaged light, thus it is easy to be found and repaired the damaged light. The system can be widely applied in all places which need timely control such as streets, stations, mining, schools, and electricity sectors and so on. In addition, the system integrates a digital temperature and humidity sensor, not only monitoring the streetlight but also temperature and humidity.*

Keywords: Street Light, Light Intensity, Automation, Infrared Detection

I. INTRODUCTION

In In recent years, environmental issues have gained widespread international attention, resulting in the development of energy-efficient technologies aimed at reducing energy consumption. One aspect of this evolving situation is an increasing demand for a reduction in the amount of electricity used for illumination. In particular, energy conservation for large scale illumination tasks such as street lighting is gaining considerable importance. Most outdoor illumination sources, such as street lights, use HID Lamps as light sources. Global concerns have been raised regarding the amount of power consumed by HID lamps and by extension, the amount of atmospheric co2 released due to such power consumption. Because of this LED array illumination has received attention recently as an energy reducing light source. LED road illumination requires about one third to one half of the electric power needed for HID lighting.

The lifecycle of an LED can be more than three times as long as an HID light. LED illumination could reduce the amount of time needed to exchange defective fixtures, and it is expected that an LED system would be comparatively maintenance free. This in turn, means that LED system could be considered suitable for use on isolated islands or in high mountainous regions. In such a back ground, and as a result of the significant improvements to luminescent efficiency in recent years, LED lighting can be expected to fully replace previously used light sources within our lifetimes. The anticipated development of LED illumination is shown in Figure1. Lighting systems, particularly within the public sector, are still designed per the previous standards of reliability and that they don't usually profit of latest technological developments. Recently, however, the increasing pressure associated with the raw material prices and also the increasing social sensitivity to CO2 emissions are leading to develop new techniques and technologies which

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

permit significant cost savings and larger respect for the environment. In the literature we will notice three solutions to those issues.

The first resolution, and perhaps the most revolutionary, is to use of remote management system based mostly on intelligent lampposts that send info to a central management system, simplifying the management and maintenance.

IEEE802.15.4 standard Microchip Wireless (MiWi) communication protocol is used here for implanting the wireless communication between street light unit and PC monitoring terminal The second one is, if any human or vehicle movement detected, the motion sensor triggers the microcontroller to turn the LEDs to their full brightness and it gets restored back to the dimming brightness.

The third resolution is, the survey mode. Turn on / Turn off can be controlled also manually from EB station through the same wireless medium.

II. LITERATURE SURVEY

Among [2]S.Suganya et al have proposed about Street Light Glow on detecting vehicle movement using sensor isa system that utilizes the latest technology for sources of light as LED lamps. It is also used to control the switching of street light automatically according to the light intensity to develop flow based dynamic control statistics using infrared detection technology and maintain wireless communication among lamppost and control terminal using ZigBee Wireless protocol. It also combines various technologies: a timer, a statistics of traffic flow magnitude, photodiodes, LED, power transistors.

[3]K.Santha et al have surveyed on Street Lighting System Based on Vehicle Movements. The system operates in the automatic mode which regulates the streetlight according to brightness and dimness algorithm and light intensity. The control can be made according to the seasonal variation. It includes a time cut-out function and an automatic control pattern for conserving more electricity. The whole project was implemented using a PIC microcontroller.

[4] Proposed a ZigBee based Remote Control Automatic Street Light System. The system is designed with the help of ZigBee modules that helps in detecting the faulty lights and control the light. It also discusses about an intelligent system that takes automatic decisions for ON/OFF/DIMMING considering the vehicle movement or pedestrian and also the surrounding environment. PIR motion sensor is used to detect movement of both living and non-living things.

[5]Abhishek et al have implemented design of traffic flow based street light control system with effective utilization of solar energy in the year 2015. They used the renewable source of energy i.e. the solar power for street lighting. They have also used 8052 series microcontroller and is developed by replacing the normal bulbs with the LEDs due to which the power consumption is reduced by 3 times. Sensors are placed on either side of the road which senses the vehicle movement and sends the commands to the microcontroller to switch ON and OFF the lights. Here all the street lights remain switched off and it glows only when it senses the vehicle movement. Hence, because of the microcontroller, even when its night the lights are switched off.

[6]C.Bhuvaneshwari et al have analysed the street light with auto tracking system by which one can increase the conversion efficiency of the solar power generation. Here, the sun tracking sensor is the sensing device which senses the position of the sun time to time and gives the output to the amplifier based on light density of the sun. Sun tracking sensor is LDR, amplifier unit is used to amplify the LDR signals which converts low level signals to high level signals and the output is given to comparator. The LM324 IC is used as an amplifier. Comparator Compares the signals and gives the command to AT89C51 microcontroller.

[8].

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

III. METHOD OF DISEASE DETECTION

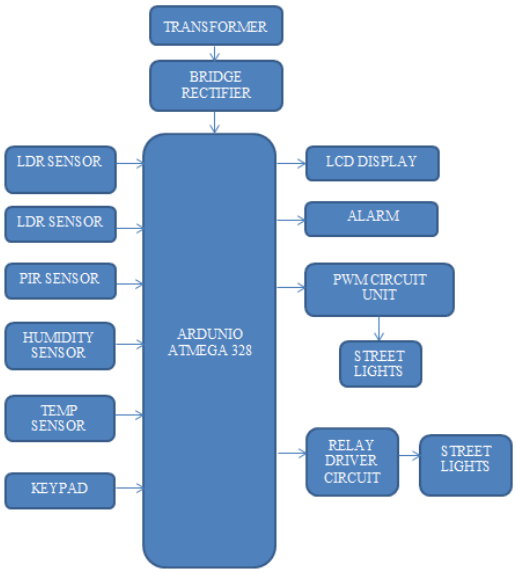

Fig. 1. Block Diagram

The block diagram of proposed street lights control system is shown in above Figure The main board consists of power supply, atmega 328, photosensitive detection circuit (Day & night sensor), infrared vehicle detector, feedback circuit, fault detection circuit, LCD display .

In our proposed system, we make use of the property of LDR, which is its resistance varies with respective to the light intensity.

In our proposed system the night and day is identified using LDR, Then during the day time the street light will be switched off and then during the night time street light will be switched on automatically, PIR sensor is used to detect the presence of vehicle in the Road, If the crowd of the vehicle is low in the street then it will be sensed using PIR sensor and light will be switched off, If the vehicle is present in the street then light will be turned on.

The automatic street light project is an innovative and eco-friendly initiative aimed at revolutionizing urban lighting systems. This cutting-edge project utilizes advanced technology, including Light-Dependent Resistors (LDRs) or photocells, and microcontrollers to create an intelligent and energy-efficient solution. The system's primary goal is to automatically control the activation and deactivation of street lights based on the surrounding ambient light conditions. During the day, when natural light is sufficient, the LDRs detect the high light intensity, triggering the microcontroller to keep the street lights off, conserving energy. As dusk descends and the natural light diminishes, the LDRs sense the decrease in light intensity, prompting the microcontroller to activate the street lights, ensuring well-lit and safe thoroughfares for pedestrians and motorists. This automatic street light project showcases the power of technology in enhancing sustainability, reducing energy consumption, and providing enhanced safety and security in our urban environments.

A. Arduino Atmega328

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB- to-serial converter.

Fig. 2. Atmega328 Arduino

B. LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

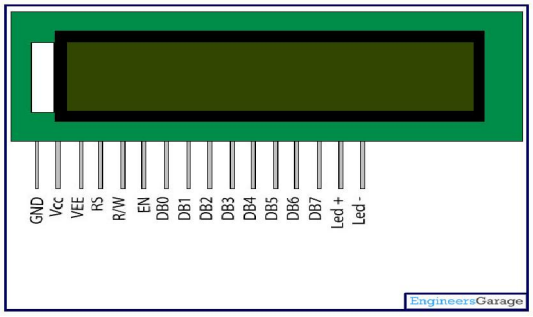

Fig. 3. LCD Display

C. LDR Sensor

The most common type of LDR has a resistance that falls with an increase in the light intensity falling upon the device (as shown in the image above). The resistance of an LDR may typically have the following resistances:

Daylight= 5000Ω

Dark= 20000000Ω You can therefore see that there is a large variation between these figures. If you plotted this variation on a graph you would get something similar to that shown by the graph shown above.

In this circuit the LDR and the other Resistor form a simple 'Potential Divider' circuit, where the centre point of the Potential Divider is fed to the Base of the NPN Transistor. When the light level decreases, the resistance of the LDR increases. As this resistance increases in relation to the other Resistor, which has a fixed resistance, it causes the voltage dropped across the LDR to also increase. When this voltage is large enough (0.7V for a typical NPN

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

Transistor), it will cause the Transistor to turn on. The value of the fixed resistor will depend on the LDR used, the transistor used and the supply voltage.

Fig. 4. LDR Sensor

D. DHT11 Temp & Humidity Sensor

The DHT11 is a commonly used Temperature and humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data.

1) DHT11 Specifications

- Operating Voltage: 3.5V to 5.5V
- Operating current: 0.3mA (measuring) 60uA (standby)
- Output: Serial data
- Temperature Range: 0°C to 50°C
- Humidity Range: 20% to 90%

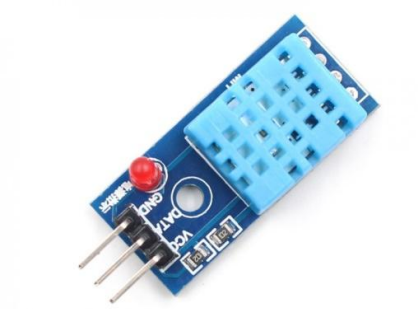

Fig. 5. DHT11 Temp Sensor

IV. CONCLUSION

In the above-mentioned system, we have developed an Arduino-based street light. The proposed system should illuminate the streets in remote and urban areas. The proposed system reduces energy consumption and human effort. The current picture is similar to that, street lights will be switched on at night before sunset, and will be replaced the next morning after there are enough lights on the streets. An obstacle to the apparatus is that a person sets the manual operation of a robot that requires staff. On sunny and rainy days, time and rest are significantly different which is one of the major obstacles to today's systems.) and organization Remote web is accessible, fast response, reliable operation and traffic light measuring panels are achievable. The purpose of this work is to introduce the Smart Street Lighting framework, the first way to meet the interest of flexible smart lighting systems. The purpose of the company is to set up an automated lighting board that focuses on energy saving; build a smart energy-saving light panel with built-in sensors and control; defining a smart lighting framework with a specific methodological system, which makes adaptation, expansion and configuration of the framework into a smart lighting framework that is similar to flexibility with other commercial products and automated system, which can include more than one lighting panel.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

ACKNOWLEDGMENT

It gives us great pleasure in presenting the paper on "Automatic Street Light Control using LDR". We would like to take this opportunity to thank our guide, Prof. Pagire R.R. Professor, Department of Electrical Engineering Department, Adsul's Technical Campus, Ahilyanagar, for giving us all the help and guidance we needed. We are grateful to him for his kind support, and valuable suggestions were very helpful.

REFERENCES

[1]. http://opensourceecology.org/wiki/Automation

[2].S. Suganya, R. Sinduja, T. Sowmiya & S. Senthilkumar, Street light glow on detecting vehicle movement using sensor

[3]. K.Santha Sheela,S.Padmadevi, Survey on Street Lighting System Based On Vehicle Movements

[4]. Srikanth M, Sudhakar K N,ZigBee Based Remote Control Automatic Street Light System

[5]. M.Abhishek, Syed ajram shah, K.Chetan, K,Arun Kumar, Design and implementation of traffic flow based street light control system with effective utilization of solar energy, International journal of Science Engineering and Advance Technology, IJSEAT, Vol 3, Issue 9, September -2015

[6]. C.Bhuvaneshwari, R.Rajeswari, C.Kalaiarasan, Analysis of Solar energy based street light with auto tracking system, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol 2, Issue 7, July 2013

[7]. Steve Chadwick,"Street Light Monitoring – a Practical Solution magazine" November/December 2002

[8]. "Intelligent Street Lighting System Using Gsm" International Journal of Engineering Science Invention ISSN (Online): 2319 – 6734,

[9] Archana. G, Aishwarya N, Anitha J "Intelligent Street Light System" International Journal of Recent Advances in Engineering & Technology, Vol-3, Issue-4, 2015.