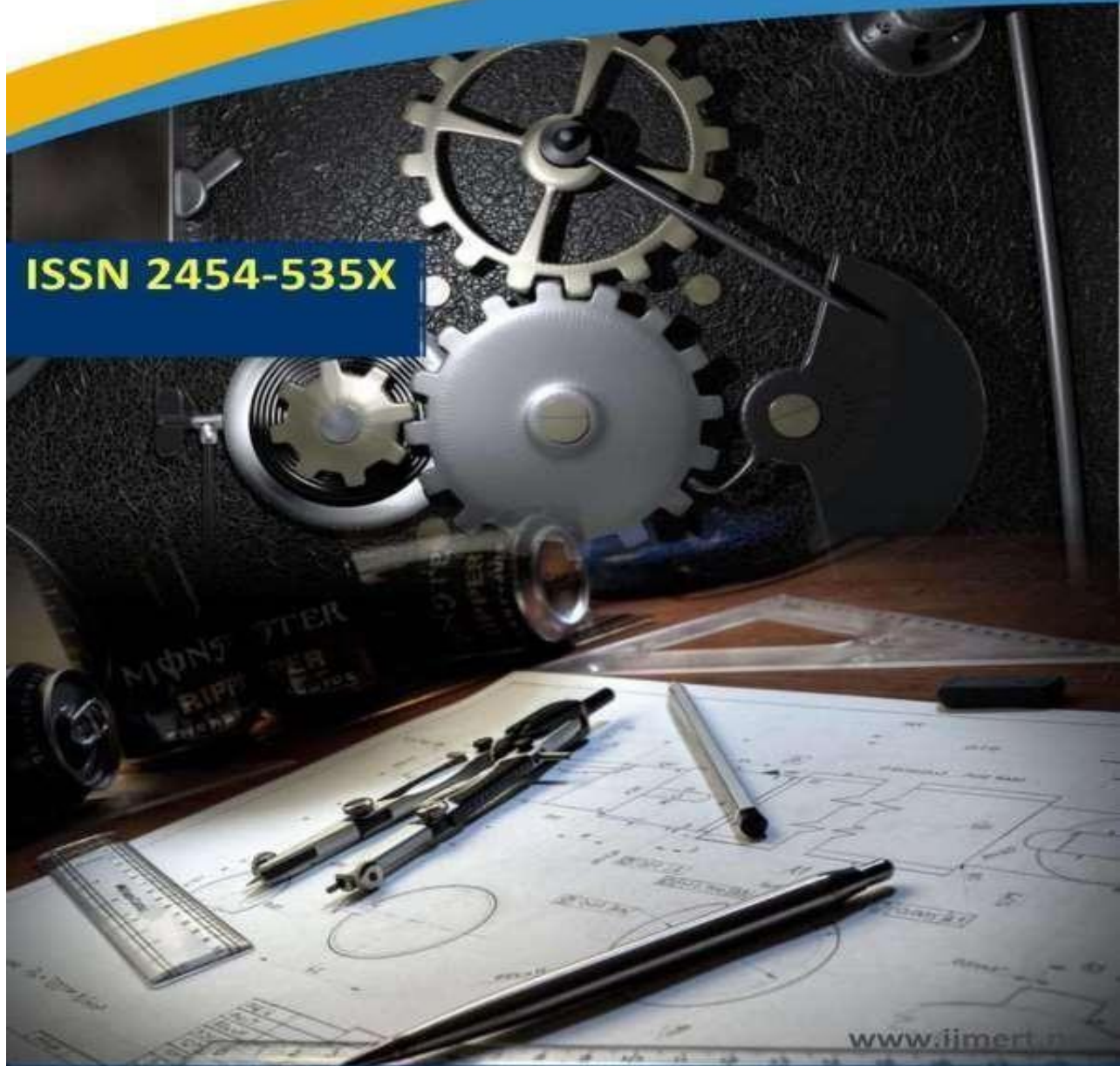




**International Journal of**  
Mechanical Engineering Research and Technology

**ISSN 2454-535X**



[www.ijmert.net](http://www.ijmert.net)

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# IOT BASED WEATHER ADAPTIVE STREET LIGHTING SYSTEM

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## ABSTRACT

The objective of the project is to provide automatic control and fault detection on street lamps. The lighting system which targets the energy and automatic operation on economical affordable for the streets and immediate information response about the street lamp fault. Moreover, errors which occur due to manual operation can also eliminate. The street light switched ON/OFF through an Internet of Things (IoT). The street light system is checking the weather for street lamp ON/OFF condition. The weather is light or dark are sense through a LDR sensor, If the weather is light, the system will OFF. If the weather is dark, the light system will ON. After the light on the light condition also check through LDR sensor for light glow or not glow status. If light is not glowing, the sensor sends the value to street light system. The street light

system will generate message and send SMS to ward member and ward serviceman mobile number through GSM. At the same time the sensor values are stored in cloud server. We can access the light system data in cloud anywhere and anytime.

## INTRODUCTION

The street lighting system is the one of the largest energy expenses for a city. A smart street light system can reduce the corporation street lighting costs. Recently however with the increasing importance for saving power and proper maintenance are leading to develop a latest techniques and technologies which permit significant power savings and larger respect for the environment and more effective management. In this system gives the solution to those problems. An automatic street light system using sensors and wireless modules for implement a system.

The LDR(light dependent resistor) sensing the environment. The system can identify the light or dark environment using LDR. The environment is dark the system allows to ON the street lights. The environment is light the system allows to OFF the street lights. Same this LDR operation is used to find the light fault detection. The GSM module is used to send the SMS to the users for the light faulty condition. At the same time we can access the street light system status from the cloud system environment through a Wi-Fi module. So, we can access the street light status in anywhere and anytime.

#### LITERATURE SURVEY

**Mr. AmeyJ.Manekar, Dr. Dr. R .V. Kshirsagar ” Design and Implementation of Automatic Street Light Controller for Energy Optimization Using FPGA”, International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 6, June 2016.**

The street lightning consume huge amount of electric power. And the cost per unit is expensive also we have limited resources for

power generation so it is always better to depend on renewable sources. Therefore the goal of the present study is to save energy in Street lighting. In the existing system, power consumption takes place due to continuous lighting throughout the night by street lights. Automatic Street Light Control System is not only easiest but also the powerful technique. It releases the manual work at most up to 100% Hence an idea is implement such system which dynamically switch ON and OFF light depending upon traffic and light intensity.. Therefore, maximum power will be saved. The proposed idea was implemented by FPGA and IR sensor.The function of street light is to provide safe environmentduring dark hours. The lights operate nearly more than 12hours. To turn ON all lights present on road indeed requirelarge electrical power. About 30% of the total electricalpower of any country is consumed in lighting the roadsand the streets.. Automation is the parameter in presentfield of technologies so that we can reduce the man powerthe help of intelligent systems. As we all know the sourcesof power are getting diminished, power saving is also haveto consider. Thus

we need a system that automatically controls and monitors the street light. So that we can lightly that part which have vehicles. The main aim of the project is to use the recent technologies to reduce power consumption and to be more accurate. So we are saving power automatically instead of doing it manually, with LDR. As all cities growing rapidly, the automation system is also growing so using automation we can save energy consumption. In a day, the traffic changes dynamically, the variable meteorological conditions and uncertain situations on the streets, the ON & OFF status of light should change according to traffic. The light on or off dynamically. The proposed system is designed to implement the power saver street light system. Here, the street lights are switched ON or OFF of the street lights depends on the output of LDR. If there is a sun light then the street lights are in OFF position, in the absence of sun light the street light status will be OFF. However, in the absence of traffic at the absence of sunlight, then also the street lights are remaining in OFF position.

**Chaitanya Amin, Ashutosh Nerkar, Paridhi Holani, Rahul Kaul "GSM Based**

**Autonomous Street Illumination System for Efficient Power Management" International Journal of Engineering Trends and Technology Volume 4 Issue 1- 2013**

This project involves the design and implementation of an automated street light control system and an underground drainage monitoring system using GSM technology. Besides this, it can also check the status of the manhole lid. The system's low maintenance and low cost are some of its main advantages. This system can monitor the status of the street lights and manholes in real time. It can also notify the officials through a text message. An embedded system is a particular type of computer system that is primarily made to carry out several activities, including accessing, processing, storing, and controlling the data in various electronics-based systems. Embedded systems are made up of both hardware and software, with the software—often referred to as firmware—being integrated directly into the hardware. These systems' ability to provide the o/p within the allotted time is one of their most crucial qualities. Embedded systems assist in

improving the accuracy and convenience of the task. So, both basic and complex gadgets routinely use embedded systems. The principal real-world uses for embedded systems are in a variety of appliances, including microwaves, calculators, TV remote controls, home security systems, and local traffic management systems.

**Abdul Latif Saleem, Raja Sagar R, Sachin Datta N S, Sachin H S, Usha M S**  
**“Street Light Monitoring and Control System” International Journal of Engineering and Techniques - Volume 1 Issue 2, Mar – Apr 2015.**

The application is designed in such a way that we place light sensors in all street light circuits, which is responsible to switch on and off automatically. Once the lights are switched on current sensors placed at every street light circuit are responsible to report problem status to the centralized system with help of GSM module attached with the circuit. The status is available in the centralized system, the work man now can easily locate the particular light to take care which minimizes the time to search it and repair. The system also maintains

database to store useful information from each street light like power consumption, total number of burning hours, total number of interruptions, tally the actual power consumption with the power supplied and details of fault detection. Hence maintaining the system with optimal power consumption giving commercial benefits to business and the prosperity of the city as a whole. A well-designed, street lighting system should permit users to travel at night with good visibility, in safety and comfort, while reducing many malfunctions that occur during night and enhancing the appearance of the neighborhood. Conversely, poorly designed lighting systems can lead to poor visibility which may not be helpful for any pedestrian and who are passing by that street. Quite often, street lighting is poorly designed and inadequately maintained (e.g., there are large numbers of burned-out lamps), and uses obsolete lighting technology, thus consuming large amounts of energy and financial resources. Providing street lighting is one of the most important and expensive responsibilities of a city. Street lighting is a particularly critical concern for public authorities in developing



countries because of its strategic importance for economic and social stability. Our proposed plan for street light control system can provide street lighting maintenance. This maintenance can also enable municipalities to expand street lighting to additional areas, increasing access of providing street light for all the streets and also other underserved areas. In addition, improvements in lighting quality and expansion in services can improve safety conditions for both vehicle traffic and pedestrians. The application is designed in such a way that we place light sensors in all the street lights circuit and which are responsible to switch on and off automatically. Once the lights are switched on, current sensors placed at every light pole are responsible to report problem status to the centralized system with the help of GSM module attached with the circuit. With the status available in the centralized system, the workman now can easily locate the particular light to be taken care which minimizes the time to search it and repair. The system also collects useful information from each street light at the end of each day. The information is stored in the database and based on this information charts

are derived. The charts are displayed in the street light section which contains information like power consumption, total number of burning hours, total number of interruptions, tallies the actual power consumption with the power supplied, details of fault detection i.e., actual location of street light. The system is also provided with optimal sleep scheduling protocol to increase the lifetime of the street lights. This kind of proposed effective street lighting is an important way of increasing road safety at night; it improves the quality of life for residents by deterring crime and by making people feel more secure. Lighting is also used to improve the ambience of areas, which is commercially beneficial to businesses and the prosperity of the city as a whole.

**K.Y.Rajput, Gargeyee Khatav, Monica Pujari, Priyanka Yadav” Intelligent Street Lighting System Using Gsm” International Journal of Engineering Science Invention Volume 2 Issue 3 , March, 2013.**

Conventional street lighting systems in areas with a low frequency of passersby 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, and power-conserving street lighting systems become reality. The purpose of this work is to describe the Intelligent Street Lighting (ISL) system, a first approach to accomplish the demand for flexible public lighting systems. Due to the increase of environmental concerns, lighting control systems will play an important role in the reduction of energy consumption of the lighting without impeding comfort goals. As mentioned the energy is the single most important parameter to consider when assessing the impacts of technical systems on the environment. Energy related emissions are responsible for approximately 80% of air emissions and central to the most serious global environmental impacts and hazards, including climate change, acid deposition, smog and particulates. Lighting is often the largest electrical load in offices, but the cost of lighting energy consumption

is low when compared to the personnel costs. Thus its energy saving potential is often neglected. According to study global grid based electricity consumption for lighting was about 2650 TW in 2005, which was an equivalent of 19% of total global electricity consumption. European office buildings dedicate about 50% of their electricity for lighting, whereas the share of electricity for lighting is around 20-30% in hospitals, 15% in factories, 10-15% in schools and 10% in residential buildings. Intelligent lighting control and energy management system is a perfect solution for energy saving, especially in public lighting management. It realizes remote on/off and dimming of lights, which can save energy by 40%, save lights maintenance costs by 50%, and prolong lamp life by 25%. The system application in streetlight control for each lamp will reduce in streetlight electricity and maintenance cost, and increase availability of street light. The system comprises of server, GUI to display and nodes which are micro controlled processed with embedded sensors measuring different parameters. Each node in the network is linked to the main server

via a protocol. The analog data sensed by the sensor is converted in digital form, processed by microcontroller and then sent to the server. The master controls all the slaves. The other nodes send the data to master and the master collects the data and further sends to concentrator and server where the data is monitored and on necessary alterations process it to switch On/Off the nodes devices. This scenario increases life of streetlights, reduces power consumption, ease of monitoring and controlling and less installation cost are the various advantages achieved.

**V.Sumathi, A.Krishna Sandeep, B.Tarun Kumar “Arm Based Street Lighting System with Fault Detection” International Journal of Engineering and Technology- Vol 5 No 5 Oct-Nov 2013.**

Identifying the faulty lights in big areas is a challenging process. This paper investigates the current fault light detection solutions. Then, a fault light detection and identification system is proposed to overcome current solutions' drawbacks especially in indoor facilities. The Radio Frequency Identification (RFID) is utilized

for the automatic detection and identification of light faults. It is difficult to identify and detect defects in lighting systems in public places with large areas such as airports, hospitals, and streets (Chen and Chou, 2015), (Chien, 2007), (Cho et al., 2015). Also, the need for a skilled person to inspect every light for the possibility of a defect waste time and efforts in addition to the possibility of missing near-faulty lights due to human error and eye fatigue. Therefore, there is a need for an automatic fault light detection and identification system. Unfixed faulty lights increase darkness which negatively affects human's safety. Different solutions were proposed to detect light faults. In this paper, the proposed solutions are analysed to identify drawbacks of each system. Based on the investigated solutions, a fault light detection and identification system is proposed to overcome current solution drawbacks specially in indoor facilities. This paper utilizes Radio Frequency Identification (RFID) for the automatic detection and identification of light faults.



## EXISTING SYSTEM

[1] Automated street lighting using PLC, Street light controlling using PLC is a novel concept using XD26 PLC controller. In this system manual work is not required. Automatic switch ON and OFF of light in response based on sunlight is done by using LDR, which plays a major role. Effect of seasonal variations; increased energy efficiency; low operating costs low maintenance costs are advantages of this method. The testing and analytics of this project with accurate operation of the streetlights is done involving Crouzet Millennium software.

[2] GSM based smart street light monitoring and control system, it is an automated system designed to increase the efficiency and accuracy of an industry by automatically timed controlled switching of street lights they are basically two modules which include the client side and another one is server side. The client side consists of GSM modem which is further connected to the microcontroller. The server side consists of java based web server.

[3] Automatic Street Light Control System Using Microcontroller, This paper aims at designing and executing the advanced development in embedded systems for energy saving of street light system. These days, human has become too busy, and is unable to find time even to switch the lights wherever not necessary. This paper gives the best solution for electrical power expenditure. Also the manual operation of the lighting system is completely eliminated. In this paper the two sensors are used which are Light Dependent Resistor LDR sensor to indicate a light or dark time and the photoelectric sensors to detect the movement on the street. The microcontroller PIC16F877A is used as brain to control the street light system, where the programming language used for implementing the software to the microcontroller is C language.

[4] GSM based RFID approach to automatic street lighting system; this system proposes a new way of reduced power utilization. With this system, recovering from power failure period can be reduced. Street light maintenance, load maintenance and if there is any complaints concerning power it can be

warm through GSM. In future the Electricity department can adopt this system in order to save power as well as time. This system can be extended in such a way that time in use for processing any new power connection request can be minimized by using RFID.

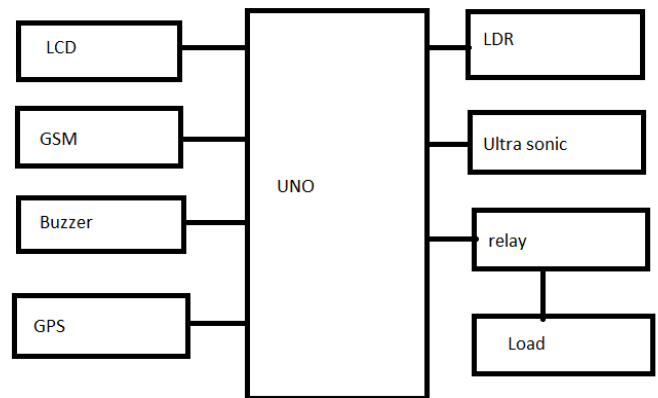
[5] Automatic Street Lights, This project is all about to control the power consumptions at the streets and eliminating manpower. This includes scheming a circuit of street lights with specific Sensors, LDR and Microcontrollers during day and night. This requires three basic components i.e. LDR, Sensors and microcontroller. For the duration of daytime there is no requirement of street lights so the LDR keeps the street light off until the light point is low or the frequency of light is low 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.

6] Intelligent Street Lighting System Using GSM, Conventional street lighting systems in areas with a low frequency of passersby are online most of the night without purpose. The consequence is that a large amount of power is wasted uselessly. With the wide

availability of flexible-lighting technology like lightemitting diode lamps and everywhere available wireless internet connection, fast react, reliably operating, and powerconserving street lighting systems become actuality. The purpose of this work is to describe the Intelligent Street Lighting (ISL) system, a first approach to accomplish the demand for flexible public lighting systems.

## IMPLEMENTATION

### BLOCK DIAGRAM



The street light control and fault detection with cloud storage system is implemented through an arduino program. Nowadays, the street lamps are operated manually. But, the street light control and fault detection with cloud storage system operates the street

lamps ON/OFF and find the fault in the street lamps automatically. The system checks the weather condition for the street lamp ON/OFF. The LDR (light dependent resistor) is used to check the weather condition. If weather is light/dark check through a LDR. If weather is bright the system identifies it as the day time. If the weather is dark the system finds it as the night time. So, the system allows to switching ON the street lights. The street lights are ON condition. But, some faulty lights are not glowing. At the time the system find the lights are not glow. So, some fault occurs in the light we can knowing through the LDR values. So, the system sends the alert message to the ward member and ward service man mobile numbers through GSM module. At the same time, we can access system status through the cloud storage in anywhere and anytime. Because, the street light system connecting with cloud storage through the Wi-Fi module. The Wi-Fi module is using to store the sensors data in the cloud storage. So, we can access easily the street light system data in the cloud storage.

## CONCLUSION

An automatic street light control and fault detection system with cloud storage in this paper, control the street light ON/OFF automatically depends on the environment situation and we can easily identify the light faults in this system easily and also the system sends alert message to the authorized person's mobile numbers. We can monitor the system anywhere and anytime via cloud storage system. This system is very useful to Municipal Corporation. In, Future we will find the sensor's faults and power supply faults in the system and also we will control the light power adjustment depends on the environment.

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