

# AUTOMATIC STREET LIGHT CONTROL AND FAULT DETECTION 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.

**Keywords—** component, Internet of Things (IoT), LDR sensor, GSM

## I. 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.

## II. EXISTING SYSTEM

[1]Automated street lighting using PLC, Street light controlling using PLC is a novel concept using 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 warn 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 light-emitting diode lamps and everywhere available wireless internet connection, fast react, reliably operating, and power-conserving 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.

### III. PROPOSED SYSTEM

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.

### IV. SYSTEM DESIGN

- To create near to real time environment for working of IoT (Internet of Things) based street light control system and test performance working of that application.
- To sense the real time light intensity by the ambient lights sensor and depending upon the sensed light intensity take appropriate control action on the Street Light.
- To create library of several modules to simulate the network condition parameters.

system block architecture shown below

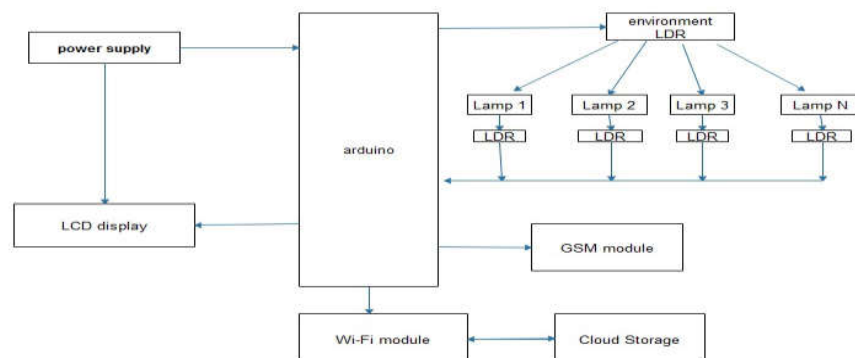


Figure 1. street light system architecture

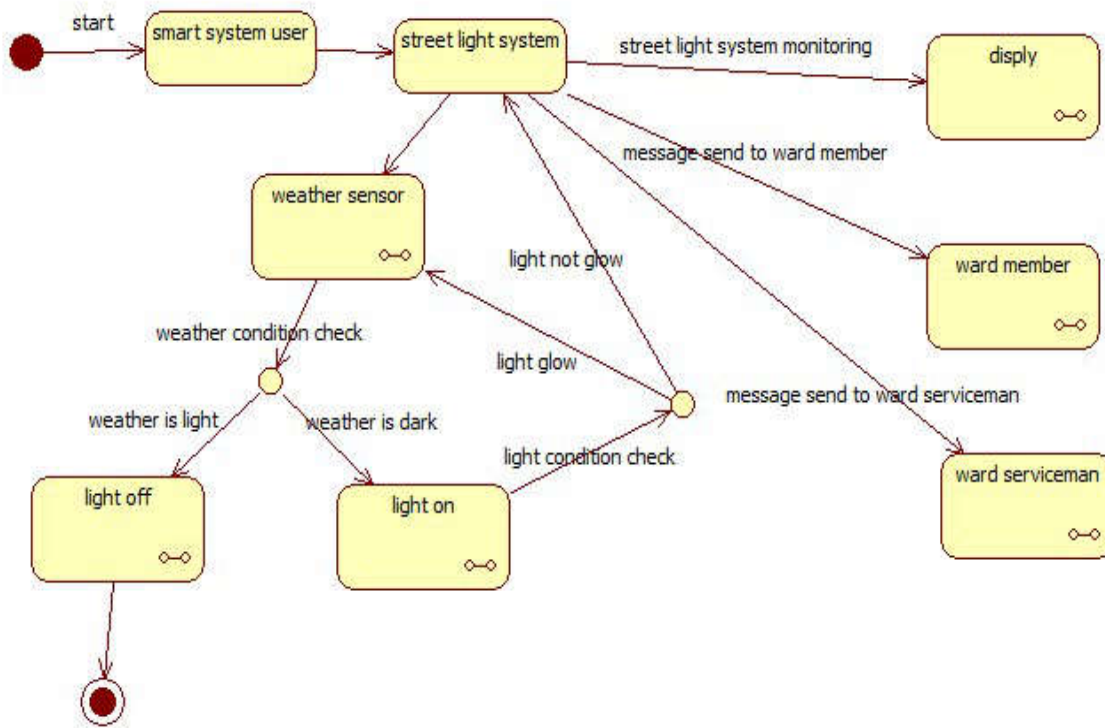


Figure 2. state diagram for street light system

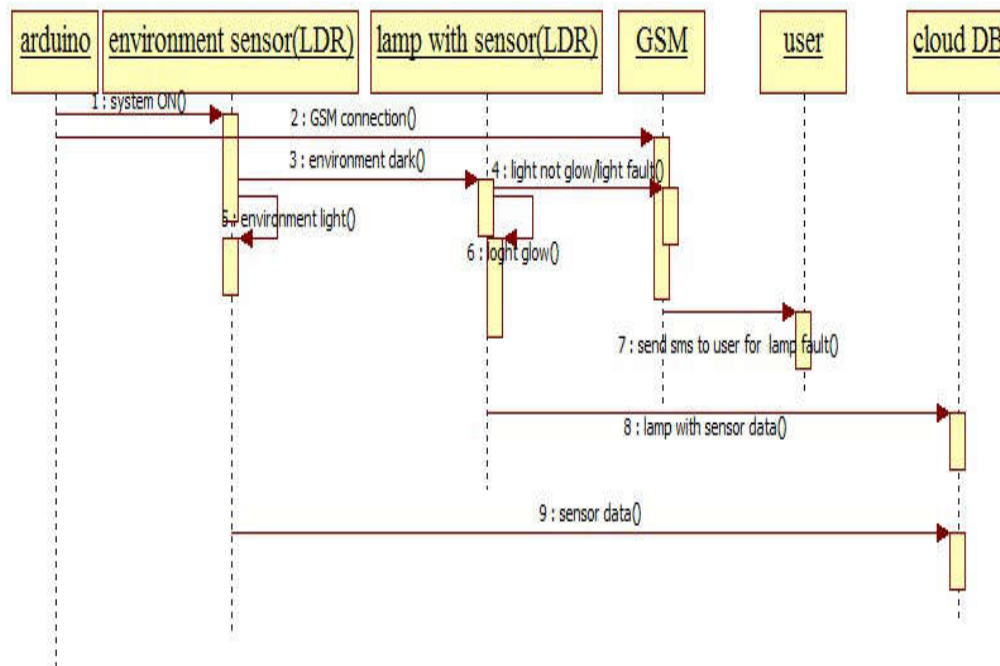


Figure 3. sequence diagram for street light system

### V. ARDUINO MICROCONTROLLER

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

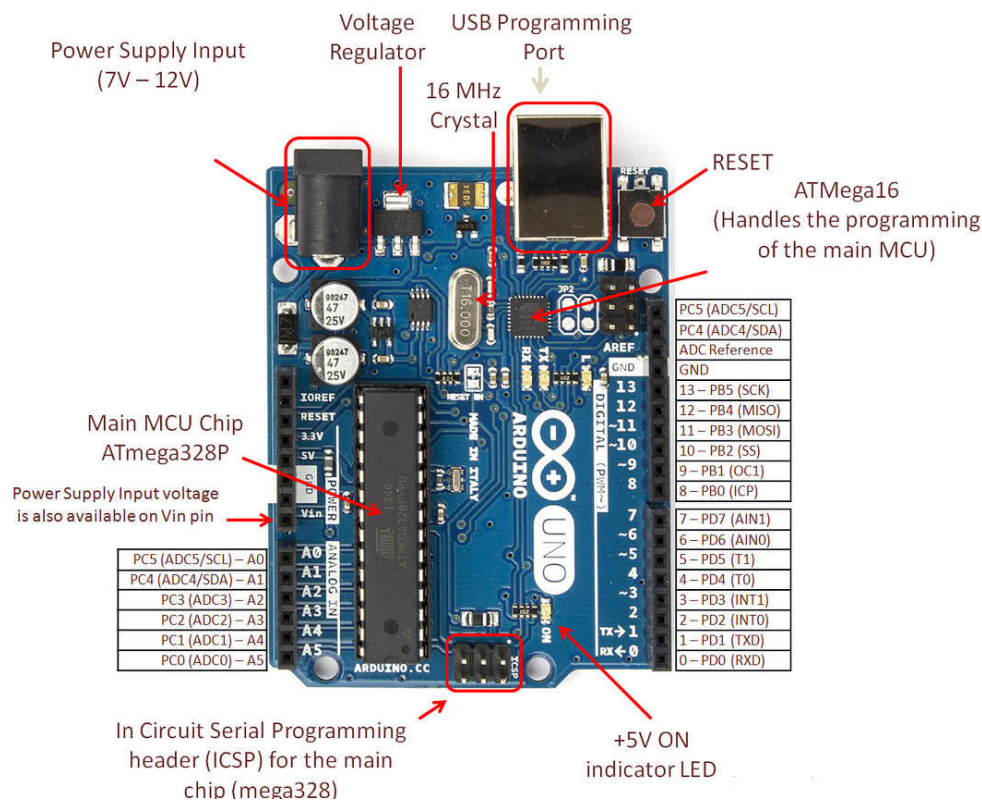


Figure 4. ARDUINO MICROCONTROLLER

Arduino is an open source electronics platform based on easy to use hardware and software. It is better than pic microcontroller because it is user friendly and easy way for programming (low level language). Ports are port B, port C, port D and 3 timers. Then have a one power supply (5v). It is also kind of micro controller.

### VI. GSM MODULE / MAX232

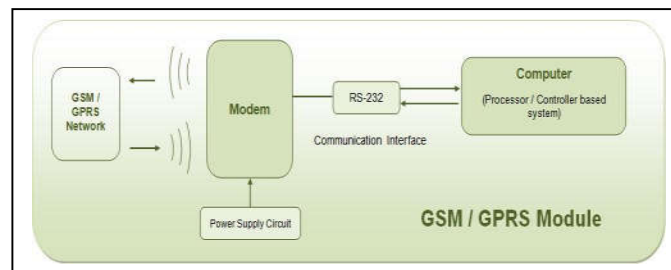
The MAX-232 IC is an integrated circuit which consists of 16 pins and it is a resourceful IC mostly used in the voltage level signal problems. Generally, the MAX-232 IC is used in the RS232 communication system for the conversion of voltage levels on TTL devices that are interfaced with the PC serial port and the Microcontroller. This

IC is used as a hardware layer converter like to communicate two systems simultaneously. The image of MAX232 is shown below.



**Figure 5. MAX232**

An interfacing is a microprocessor which is used to connect various peripherals to carry out various operations to get a preferred output. There are two different types of interfacing first one is memory interfacing and the other one is I/O interfacing. The memory interface is used for the microprocessor to access the memory which is continuously stored in the memory in the form of reading and writing data. It is used for specific register for reading and writing the data in the memory chip. I/O interfacing is done by the inputs which are keyboards and display monitors are outputs with the microprocessor.



**Figure 6. GSM/GPRS Module**

### COMPARISON WITH THE AUTOMATIC STREET LIGHT SYSTEM

- The system operates on sun rise and sun set timing – saves 8%-10% of energy.
- We can identify easily in the fault detection in exact location.
- If any complaints in the street light system we will get alert message quickly.
- We have monitoring the system anywhere and anytime through the cloud system.

### VII. 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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