



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 9, September 2018

A Survey on Smart Street Using Solar and IOT based Light Management

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ABSTRACT: The electric power in most useful of the countries in the world is utilized in lighting the streets. Currently, in the whole world, enormous electric energy is consumed by the street lights, which are automatically turn on when it becomes dark and automatically turn off when it becomes bright. The main goal of smart street light systems is that lights turn on when needed and light turn off when not required. The smart street light system contains of LED lights, brightness sensors, motion sensors, [5]arduino and short-distance communication networks. The lights turn on before pedestrians and vehicles come and turn off when there is no one. The system is programmed to automatically turn off during the hours of daylight and only operate during the night and heavy raining or bad weather. It can be operated free of cost by using automatic controlled, self-powered, efficient solar LED street light. In this paper we also added the solar concept which is use to recharge the battery to produce energy to turn on the street lights.

KEYWORDS: Arduino, Wi-Fi Module, LED lights, Solar Panel, Battery, PIR sensor, Ultra sonic sensor, LDR sensor, GPRS module, Voltage Controller, Webserver and Relay Switch.

I. INTRODUCTION

World is moving towards the smart energy management, the system will require changes of not only in the way of energy supplied but also are how the energy is consumed efficiently. Developing of the civilization includes one of the most important civilization indexes is the good transportation network and they includes street, roads and highways that has to be illuminated so that a sufficient visibility is guaranteed to safety of the people travelling on the streets. This system is based on the smart and weather adaptive automatic street lighting and management.

Nowadays, there are more than 300 million of street lights in the entire worlds, which give off 100 million of tons of carbon dioxide per year and then 40% of energy waste which the costs around 20 billion dollars. They use the latest technology, in [2]LED the source of light to restore the conventional street lamps such as HID lamps or High Pressure Sodium Lamps etc. Therefore we perform the economical operation of street lights and reducing the carbon footprints, so we are using the High efficient [2]LED which means a complete electric light unit called [2]LED luminaire with smart control of lightness level is the demand and need of time.

The adoption of [2]LED lights are because of its various type of advantages and over existing technologies like power saving due to increased current brightness efficiency, low power maintenance cost, high color rendering index, accelerated start-up, and durability. There are highly challenged of flexibility of smart street light system which as the running of manual setup based on surrounding parameter whereas the remote handling of area location is the greatest dilemma. Mistakes of manual can lead to energy wastage and lower the performance of the operation.



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The main goal of this paper is to automate the streetlights to increase the creativity, productivity and purity of the system in a cost-effective manner and also allows to permits wireless accessibility and control over the system. The energy conservation is the main motive of the system because there are many resources such as hydro, thermal, coal that we rely upon are not easily replenished, so introducing the power saving elements like LDR Relays and LEDs can lights up in a large area with also a high-intensity whenever they are needed. The automatic switch called Relays and it's reduces almost 100 percent of the manual work.

The main problem of existing electric system is the connectivity problem and most of the people there connections handled by different contractors and are done manually, so they are supporting client-server mechanism where a single user can control the overall system. The cost effective and eco-friendly method of based of street light automation which also delete the problem of disposal of incandescent lamps and power saving.

II. RELATED WORKS

In the past few years there are many change has been taken to automate the existing street light system. There are so many intelligent streetlight system, whose operate in a systematic way to increase the quality and productivity. So they are improve a more reliable system can cut major street lighting expenses and reducing the human efforts as well. But then many methods who are still operating eternal light sources, therefore the human effort are reduces obviously but there are energy waste and light pollution are still exist.

Any other improvements are automated streetlight monitoring system using GSM technology. It's consist a server microcontroller and many sensors like smoke sensor, noise sensors and light sensors etc., to measure various parameters. This system can be performing to detect surrounding temperatures, noise intensities and alerting the system for corrective. The problem is that in project the GSM model has to implement each streetlight is very costly. There are also have some connectivity issue and use a lots of hardware to control and monitor the system so it is costly.

In this project we are creating all of solved problem of the previous improvements which are called as streetlights control system using solar panels. They used [5]arduino and replaced normal bulbs into [2]LED and energy consumption was decreased by three times. The detection of the vehicle with the help of sensor to detect the movements of vehicle to instruct the operation of switch ON/OFF the lights accordingly. The lights turn ON only if presence otherwise turn OFF when there is no one there was a savage of electricity. It is so simply and easily to operate and managing all street lights to single user.

III.LITERATURE REVIEW

Automatic Street Lightning System on Indian Streets Using Arduino:

In this system we study that its used the arduino to switch OFF and ON the light depend upon the intensity of light. if the intensity of light is low then the light ON if the intensity of sunlight is high then the light is OFF.

Smart Street Lighting System: Energy Efficient Approach:

In this system on addition things is added that is effective monitoring system is used to monitor the system works. It's also measure the light intensity so that depend upon the sunlight intensity the light ON and OFF.

Smart street light system looking like usual street lights based on sensor networks:

It's just the same street light system developed before but the additional think is that its sense the pedestrians and vehicles are comes under the sensing range so that the light glows and if its crossing the range then light is OFF.

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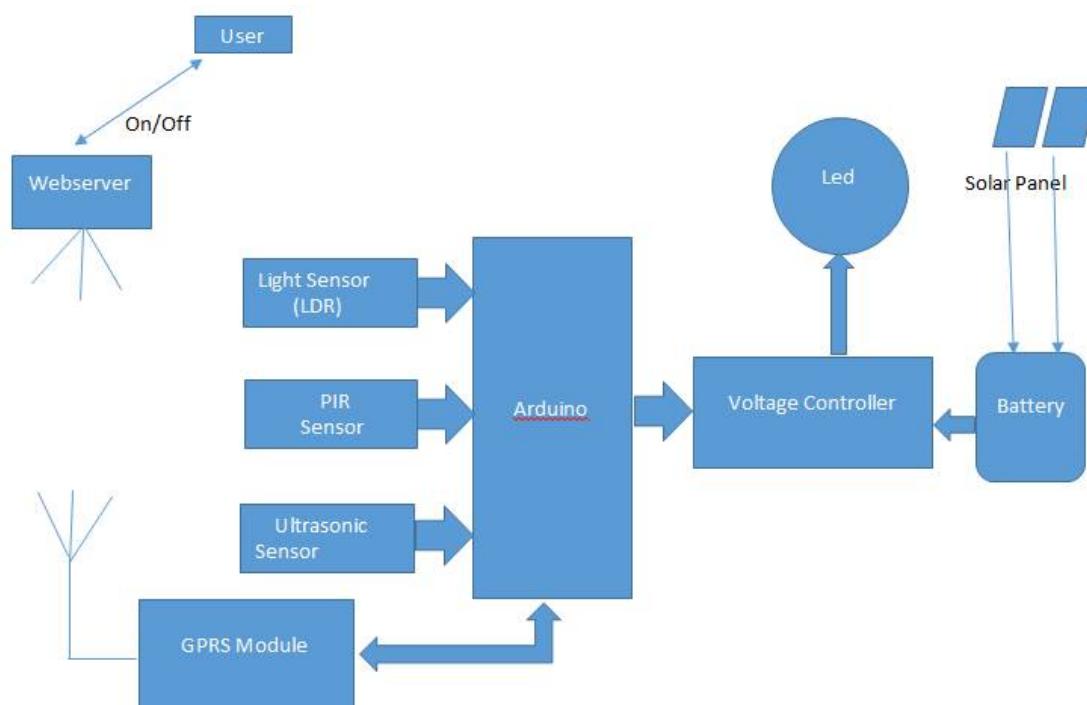
Solar LED Street Lights using Ultrasonic Sensor:

It's the same street light system which turns ON and OFF. But the additional things its represent the road light shining framework on vehicle recognizing development. And the ultrasonic sensor is used for turns ON and OFF the light.

IV. SYSTEM OVERVIEW

1. ARCHITECTURE DAIGRAM:

In system overview we will study the architecture diagram of advanced street light management system. Let us given the figure of system:-



2. EXPLANATION:

We will study the given architecture diagram are as follows:-

WEBSERVER: Web server is the program that uses the http to serve the file that forms web pages to client or user. Webservice refers to server software or hardware dedicate to running the said software, that can serve the content of World Wide Web (WWW).

In this system the light operate and monitor through a mobile and web browser for that purpose we use the web server. User can ON/OFF the street light through a mobile and web browser with the help of web server.

ARDUINO: [5]Arduino it is an open source software,hardware and content platform with a global community. The [5]arduino is use for building a digital device and interactive object can sense and control the objects in the physical and digital world.



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In our system [5]arduino having so many sensor connected to it through which this sensor sense the object presence in the particular area. If the object is presence in the particular area then the street light is ON.

LDR (Liquid Dependent Resistor) SENSOR: It's basically optically variable resistor. In this sensor resistance and light intensity are inversely proportional. When light intensity will increase, resistance decreases and vice versa. A Light Sensor is used to sense devices the illumination level of the street light and surrounding brightness of the sunlight to a microcontroller in Order to maintain the constant lighting level of the street light. Here we use two LDRs; first one is used to switch on the street light i.e., when light intensity falls on it, it turns on LDR and then the street light. One more LDR is used for fault detection i.e., if the street light intensity does not fall on LDR then there is change in resistance. This change indicates that there is some fault in the LED panel.

PIR (Passive Infrared) SENSOR: It is an electronic sensor that measures infrared light radiating from the objects in its fields of view. In this sensor any of the object in the world radiates infrared rays IR and these rays are sensed by the sensors. The operation of PIR sensor is to detect the passing of vehicle/human from pedestrians which pass from the streetlights.

ULTRA SONIC SENSOR: Ultra Sonic Sensor are also called as Ultra Sonic Transducers, these are the type of acoustic sensor divided into three board categories: **transmitters** (to detect the signal), **receivers** (to receive the signal from the senders) & **transceivers** (transmit both). Transmitters is process of converting the electrical signals into ultrasound, receivers is the process of converting back the ultrasound into electrical signals, and the transceivers perform both transmit and receive ultrasound. They are self-containing solid state devices designated for non-contact sensing of solid and liquid objects. They contains four pins such as: **VCC** (Power), **Trig** (Trigger), **Echo** (Receiver), and **GND** (Ground).

SOLAR PANEL: This performs to the absorption of the sun rays as a source of energy for generating the electricity or heating. They have photovoltaic modules use light energy from the Sun to generate electricity through the photovoltaic effect. There are many of the modules use wafer-based crystalline silicon cells or thin film cells.

V. PROCEEDING METHODOLOGY

ALGORITHMS:

Step 1: Assign analog pin A0 to LDR Pin

Step 2: Define and initialize LDR Value to 0 i.e. int LDR Value=0

Step 3: Read LDR Pin and store value in LDR Value variable

Step 4: Print LDR Value on Serial monitor

Step 5: If LDR Value is less than 10, print "Dark" on serial monitor

Step 6: If LDR Value is less than 200, print "Dim" on serial monitor

Step 7: If LDR Value is less than 500, print "Light" on serial monitor

Step 8: If LDR Value is less than 800, print "Bright" on serial monitor



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Step 9: Else print “Very Bright” on serial monitor

Step 10: Stop

VI. FUTURE SCOPE

As we are moving with the new, advanced & renewable energy sources, this system can be upgraded with the many improvements of street lighting system. They can be upgraded by replacing the ordinary LED modules with the solar LED module as compare to Sodium Vapour Street Lamps, Zigbee module and GSM modules. With make use of advanced technology and latest sensors, we should improve more problems happening in the street light and easily controlling the street lights much more effectively both by cost and manpower. The main aim of the project is to save the electricity & energy and by doing so we would be able to lighten few more houses.

VII. CONCLUSION

The over-rated amount of energy can be saved by replacing many improvements and invented of various street lighting system and replacing lamps by LED and add providing various additional information for security purposes. There are many wastages of energy/electricity, due to manual switching of street lights. It provides a smart and efficient automatic street lights which they are control to our computers and mobiles also with the help of LDR. It can reduce the maintenance of cost and reduce the energy consumption, initial cost of these system are some disadvantages of this system. They are applied in all areas i.e., Urban & Rural areas. They provide safe environment and maximum intensity light whenever they are required.

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