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# LED Based Energy Efficient Wireless Street Light Control and Monitoring System

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***Abstract— 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. Use of renewable energy sources instead of typical power sources, therefore taking care of the environment is another advantage of this system. Manufacturing units working on solar-powered equipment for everyday utilities are considered sunrise industries across the world today.Currently, various street lighting control systems technology have been developed to control and maintain these systems more economically. However, most of these systems developed have contributed some drawbacks. Hence an embedded system for solar LED street lights is deployed so as to ensure a higher efficiency and overcome current drawbacks. Real time data transmission of the street light to the website is done using GPRS wherein the system will be able to detect fault and apprise the control room about it.***
***Keywords—GPRS,LED street light,renewable energy source,solar-powered equipment***

## I. INTRODUCTION

Streetlight networks are strategic assets for cities.Streetlights illuminate the roads we drive on, the pedestrian paths we walk along and the public areas where we gather. It provides us with safe roads, inviting public areas and enhanced security in our homes, businesses and city centers.Street lighting system has become an indispensable element in the development of urban road and transportation, and solar light has attracted highly attention and is widely used for the reason that it is environmentally friendly and there are no extra expenses when it is installed. While bringing electricity to all the rural areas is yet to become an immediate reality the freely available solar energy can be harnessed and put to use in these townships.At present, however, most solar light systems are controlled and managed by traditional artificial inspection tour, which leads to high workload, maintenance delay and inconvenience of management. Therefore, it is the key to provide convenient management, timely monitoring function and accurate control for spreading solar lights. In order to satisfy the demands above, an intelligent and energy efficient wireless street light controller and monitoring system that also comes with Radio frequency (RF) and General Packet Radio Service (GPRS) communication is designed and realized.

## II. DEVICES AND METHODS

The block diagram of the proposed system is depicted in figure 1. The street light controller circuit charges the battery through the day to provide the required electricity to the street light in the night. There is a standby connection to mains, to provide the MSEB supply directly during the rains, thus maximizing the use of the renewable resource. Here we employ a digital signal controller MC56F8002 so as to perform the controlling action. The digital signal controller (DSC) which combines on a single chip, the processing power of a DSP and the functionality of a microcontroller with a flexible set of peripherals to create a cost effective solutions. It acquires the data regarding the status of the battery from the solar control system, traffic using the motion detector (PIR), status of street lights using Zigbee and the data is simultaneously transmitted to the server using GPRS module The street light uses LED and LED driver in order to control the intensity of the light when the street light is not required. An LED driver acts as a power supply that has outputs matched to the electrical characteristics of array of LEDs. Drivers also offer dimming by means of pulse width modulation (PWM) circuits. Here we design a wireless node using Radiocrafts 868MHz Radio module. The wireless node will be interfaced with each street light circuit. The system is designed to maximize the use of solar energy. It also reduces the $CO_2$ emissions by using power LEDs panels. Real time data transmission of the street light to the server is done using GPRS module GL865 so that an array of street lights can be monitored and controlled via the internet. GL856 Dual is a Dual band 900/800 GSM/GPRS device in LCC castellation packaging with extremely low power consumption, extended temperature range and compact profile. It has integrated TCP/IP protocol stack, serial multiplexer and remote AT commands extend the functionality of application. The energy stored in the battery is used to drive the system. The functions of the gateway device are to simultaneously communicate with wireless units and with the GPRS network. The GPRS module will communicate with wireless card via UART terminal for obtaining the status and issuing control commands to the wireless units


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in the network.

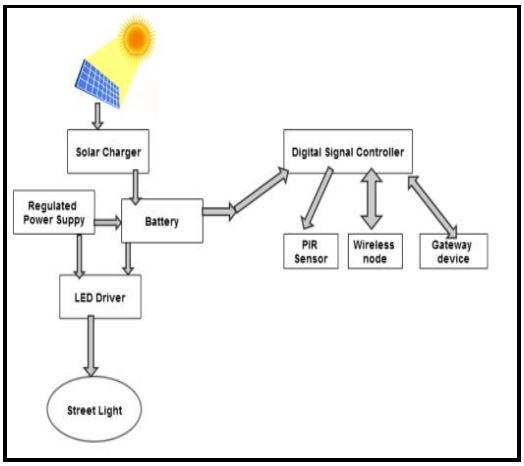


Figure 1.Individual Block Diagram

Wireless unit will contain a communication controller with embedded wireless mesh protocol software, a RF transceiver with antenna, voltage regulator, UART interface and IO ports to communicate with LED controller and sensors. Real time data transmission of the street light to the remote server i.e. website through TCP/IP is done using GPRS. A PIR module is used to monitor the amount of traffic on the respective road depending on which we will control the street light accordingly. This is a motion detector. It is basically a sensor which will determine the amount of traffic and accordingly the DSC will control the intensity of the street light.

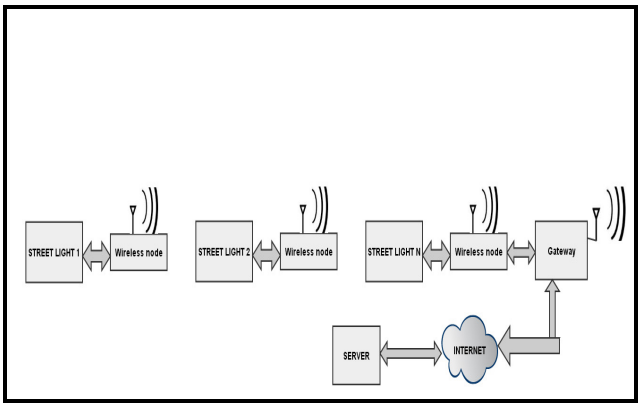


Figure 2.System block diagram

A two way communication can be established between the gateway device and the remote server via another GPRS device at the server end, or through TCP/IP to the server, if the gateway device has a static IP obtained from the service provider. The server PC will contain a wireless based networking console through which monitoring and controlling will be done.

## III. DISCUSSION

The street lighting system in this project is reflected by three different cases which includes healthy, unhealthy and Faulty. In a healthy condition, the street light operates in a Normal working condition by turning ON and OFF automatically for night and day light respectively. However, in an unhealthy condition the street light does not turn ON or OFF and in return sends a feedback message to the control Room to notify the host. Following parameters such as solar electricity availability, battery condition and street light ON/OFF

Are obtained, monitored and evaluated by the controller used. With the use of wireless networking protocol at the host computer, the host is able to turn ON or OFF the street light located a distance away manually and wirelessly. The host is notified and further actions are taken to carry out repair works if needed later. Compared to the conventional street lighting system, wireless based street lighting system offers high reliability and low maintenance with the deployment of feedback system. The feedback system allows the street light to communicate or respond with the control room reporting its daily status and condition.



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## IV. CONCLUSION

To control and maintain complex street lighting system more economically, various street light control systems are developed. Nevertheless most of developed systems have some drawbacks. This paper describes a new intelligent street lighting system which integrates new technologies available on the market to offer higher efficiency and considerable savings. With worldwide electrical lighting using 19 percent of all electricity, the use of energy-efficient lighting will significantly reduce energy consumption around the world and thereby cut back harmful carbon dioxide emissions.This can be achieved using the highly efficient LED technology supplied by renewable energy of solar panels, for which the cost of energy is independent from the power supplier prices.Another advantage of this system is that we will be sending all the real time logged data to the website or remote server which will reduce the manual efforts. The system maintenance can be easily and efficiently planned from the central station, allowing additional savings.

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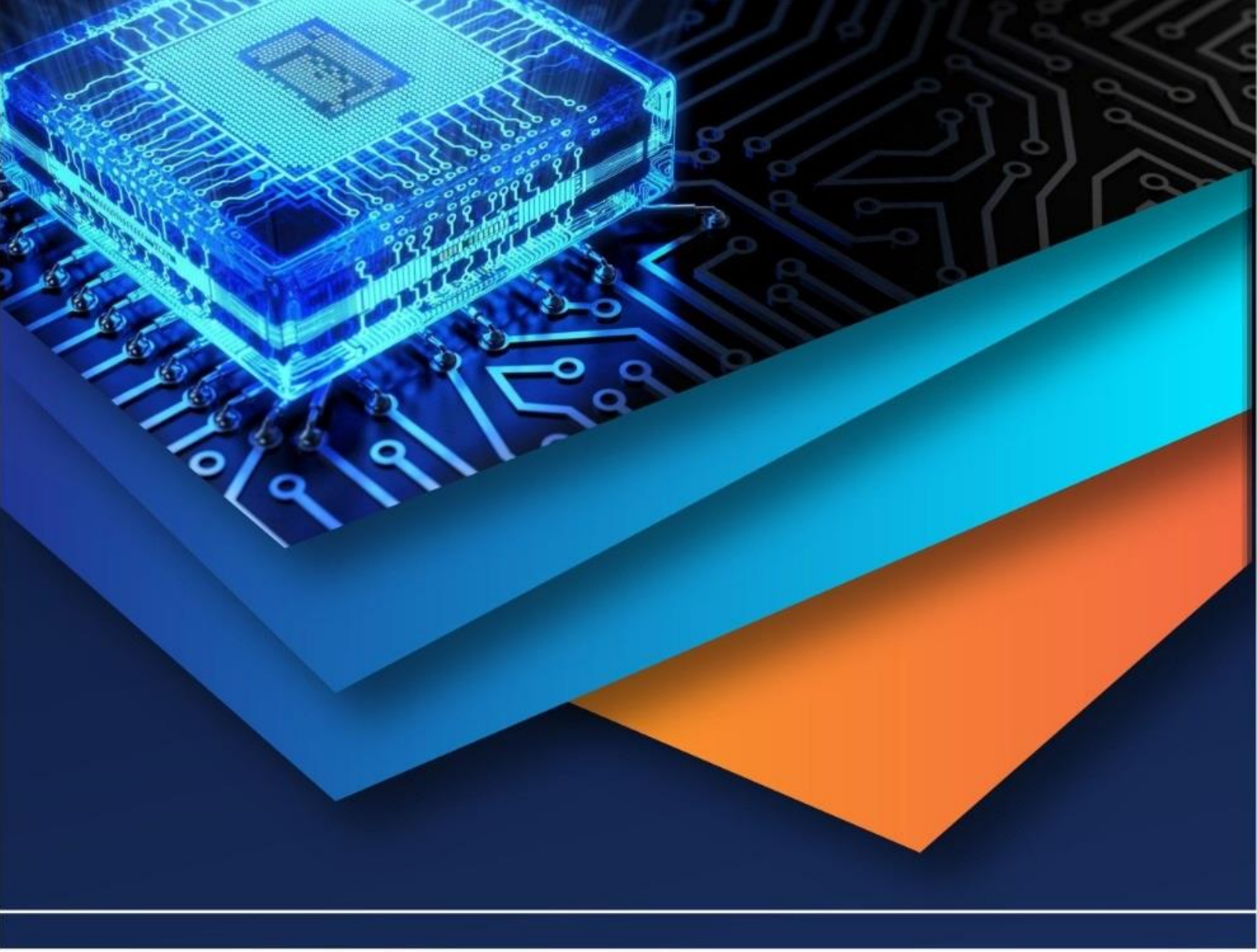

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