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INTELLIGENT AUTOMATIC STREET-LIGHTING SYSTEM WITH ADVANCE CONTROL THROUGH GSM MODEM

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ABSTRACT

We propose an innovative wireless street lighting system with optimized management and efficiency. The system allows substantial energy savings with increased performance and maintainability. In this paper we are proposing a simpler, multipurpose, cost-effective design to control the on-off mechanism of street lights via Short Message Service (SMS). The main objective is to control the street lights (dim during dawn and dusk time as well as bright during night time)

***Keywords*: Street Lights, SMS, GSM, Microcontroller, Thyristor , Dimming.**

I INTRODUCTION

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. Now-a-day's electricity problem in India is the major issue. Then and there the wastage of electricity should be avoided. This paper explains how to save the power in the street lights, overload issues as well as power cut off. Thyristor are used for dimming and brightening the street light. With the help of Thyristor, particular time will be set to ON/OFF condition and also set the dimming and brightening of the entire street light system. Design of new street light control system does not only achieve power-saving but also extend the life span of lighting equipment. At present, street lamps control at most of the urban is only by manual control, a control switch set in each of the street lamps, it is the so called first generation of the original street light control, which is inefficient and a waste of manpower, and cumbersome to operate street light opening and closing time. In the proposed system controls and monitors the street lights using a Global System for Mobile Communication (GSM) module and a microcontroller circuit which is being controlled by sending a Short Message Service(SMS) from a mobile handset.[1]

II. RELATED WORK

In this, we review researches on wireless

Streetlight Control system. The advantages and disadvantages of these systems, as well as the reasons why we choose this topic for detection and analysis for wireless streetlight control and monitoring system. A number of Streetlight monitoring systems have been developed by researchers and developers For instance, R.Rubananth, T. Kavitha was introduced, the GSM BASED RFID APPROACH TO AUTOMATIC STREETLIGHTING SYSTEM introduced a Radio Frequency Identification Device is the use of a wireless non-contact system that uses radio frequency electromagnetic fields to transfer data from a tag attached to an data, for the aspect of automatic identification. Some tags require no battery and are powered and read at short ranges via magnetic fields. This system proposes a new way of reduced power consumption. With this system, recovering from power failure period can be reduced. Street light maintenance, load maintenance and if there is any complaints regarding power it can be intimated through GSM moreover, Abdulaziz M. Alshareef proposed a DESIGN OF AUTOMATED MONITORING AND OPERATING LIGHT SYSTEM introduced monitoring and operating light system has been designed. In this, the idea is to detect the failure of each light within a street or area. The system is designed to continuously monitor street lights during operation periods. The above two researches are particularly focused on power consumption and time taken by monitoring system for detecting the lights and correct it.

III. DESIGN PROCESS AND IMPLEMENTATION

The block diagram of proposed Power Saving Mechanism for street lights using wireless communication is shown in block diagram in Fig. 1 gives the simple working of the system.

Block diagram:

Fig. 1. It consists of power supply unit, GSM modem, RS232 (optional), microcontroller with in-built memory and a load. The main components used for power supply circuit is 1 Transformer, 2 Diodes, 1000uF Filter Capacitor, LM7805 3 PIN Voltage Regulator. [2].According to the climatic condition the user can set the time for the brightness[4]. According to the predefined time the light will be shut down. DTMF is interfaced with PIC 16F877A. Load is maintained in the street light [5], where master board is mounted on the electrical panel and slave board is mounted in the street lamp. But here the load is maintained for the transformer in the particular street [6]. Current transformer is used to send the load details continuously.

It is the receiver side of the GSM based street-light control system. The GSM modem is using the regulated voltage of 5V which is being generated by the power supply circuit. The 230V 50 Hz AC supply from the main electric line is used to feed the power supply circuit to generate 5V regulated supply for energizing the microcontroller and GSM modem. The power supply circuit consists of a center tap transformer, Rectifier made of full wave rectifier circuit and filter circuit which provides a regulated 5V supply. if the desired output voltage is 5V then a required regulator needs to be used. 7805 regulator indicates positive voltage with 5 volts as the output.

The SMS message sent by the authenticated operator of the electricity board is received by the Subscriber Identification Module (SIM) inserted in the GSM module.[7]The message is sent in text format which received and extracted and fed to microcontroller. The microcontroller uses the SMS received by GSM modem and switch the street-light ON/OFF.[2]

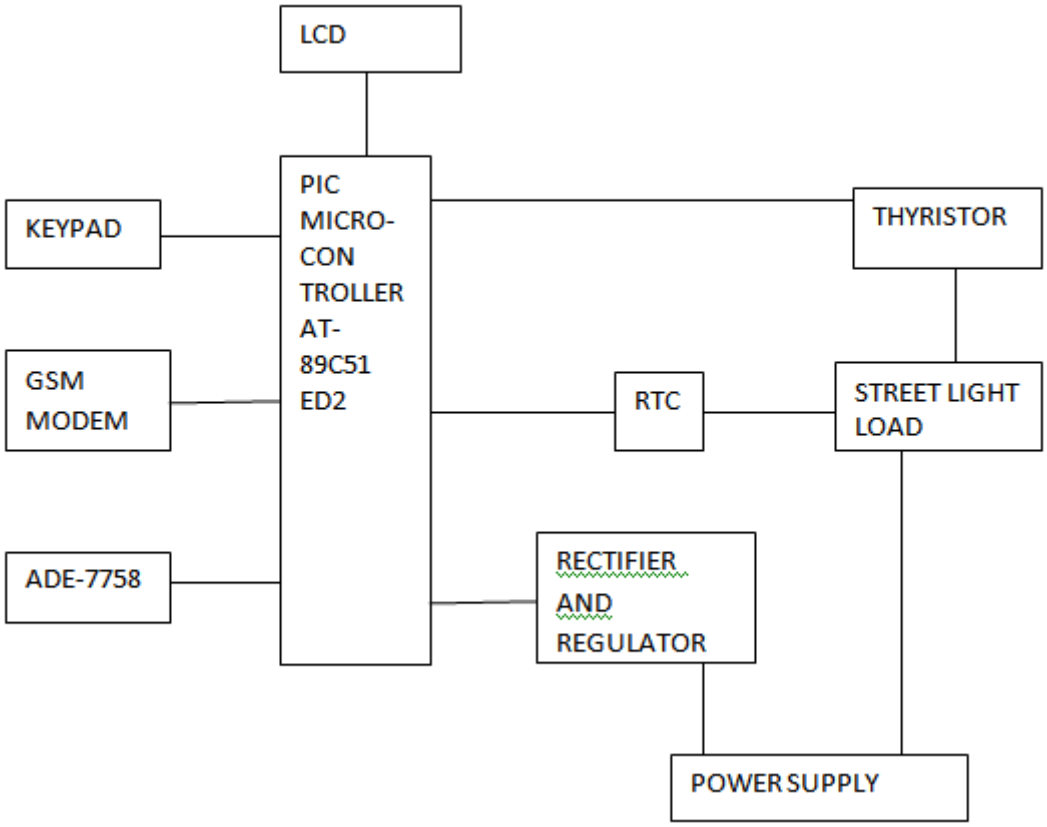


Fig.1

The microcontroller has in-built memory which is used to store the code which in turn controls the load. The microcontroller used in the receiver side helps in decoding the AT commands and taking decisions. The load which is street-light in our project is connected to microcontroller. Using solid state relay, we switch ON/OFF the street-light. The solid state relay which accepts the triggering voltage from microcontroller is separated from the 230V 50Hz AC supply by using suitable opto-isolator. The power

electronic devices like thyristors are used to implement solid state relay. The street-light is embedded with a photodiode to achieve feedback. The photodiode produces voltage according to the intensity of the street-light and informs the microcontroller whether the light is ON/OFF.

IV. EXPERIMENTAL RESULT

Following Table1 shows how power we can save by dimming the street light in different percentages. We are shown here power consume at normal mode, 20%dimming, 30 %dimming and 50% dimming. That gives information about how much power we save by using different power saving mode.[3] First power saving mode

at 30% dimming light and second power saving mode at 50% These Power saving modes we are using at mid night from 1.00 A.M. to 5.00 A.M.

TABLE: 1

% of Dimming	Voltage (V)	Current (A)	Power (Watt)	Power saving /day (watts/day)	Power saving/year (watts/year)
Normal condition (zero dimming)	244.04	0.26	63.45w	------	-----
20%	243.22	0.25	60.80w	2.65w	967.25w
30%	244.97	0.23	56.34w	7.11w	2595.15w
50%	244.53	0.12	29.34w	34.11w	12450.15w

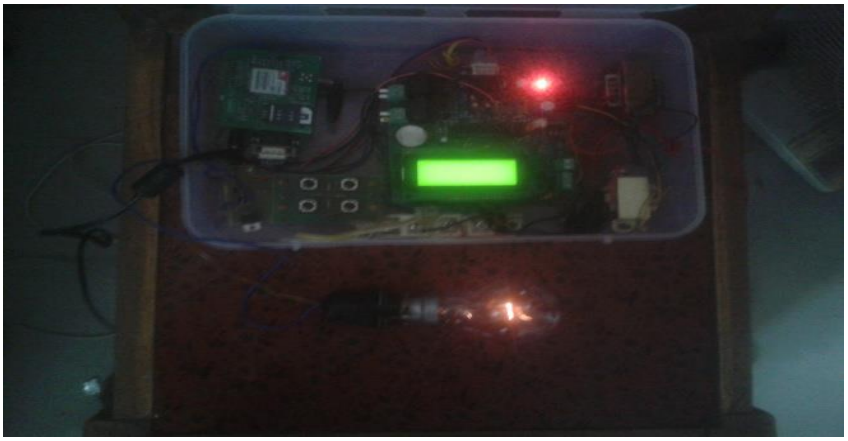
V IMAGES OF STREET LIGHT AT DIFFERENT STAGES OF POWER SAVING MODES, NORMAL MODE, POWER SAVING MODE:1, POWER SAVING MODE; 2

5.1 Image1-Normal condition brightness of light

Normal condition street light is operating its normal mode that why it consume more power whole night. There is not power saving. In that case light intensity of lamp shown in Image 1. In normal condition it consume 0.26A current and voltage is 244.04v Hence it consume 63.45watt. There is not power saving.

5.2 Image2-30% dimming of light brightness(Power saving mode 1)

This image of lamp shows first Power saving mode. In that case light intensity of lamp shown in Image 2. In power saving mode1 condition it consume 0.23A current and voltage is 244.97V Hence it consume 56.34watt. In comparison with normal it save 7.1watt per day and 2595.15 per year.



5.3 Image3-50% dimming of light brightness(Power saving mode 2)

This image of lamp shows Second Power saving mode. In that case light intensity of lamp shown in Image 3. In power saving mode 2 condition it consume 0.12A current and voltage is 244.53V Hence it consume 29.34watt. In comparison with normal it save 34.11 watt per day and 12450.15 per year.

VI CONCLUSION

Proposed system is power saving mechanism for street lights using wireless communication. It is a low cost, remote controlling and monitoring of the street-lights. It turns out most reliable and time efficient way to switch ON/OFF street-lights. It provides an effective measure to save energy by preventing unnecessary wastage of electricity, caused due to manual switching or lighting of street-lights when it is not required. With the help of Thyristor, particular time will be set to ON/OFF condition and also set the dimming and brightening of the entire street light system. In this way ,we will designed an efficient and less power consumed wireless streetlight control and monitoring system using for developed countries.

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