RESEARCH ARTICLE OPEN ACCESS

Street Light Monitoring and Control System

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Abstract:

The project "STREET LIGHT MONITORING AND CONTROL SYSTEM" is developed for automatic street lights maintenance and to reduce power consumption. 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 circuits 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.

.**Keywords: current sensor, GSM, Light Dependant Resistor [LDR], microcontroller**

I. INTRODUCTION

A well-designed, street lighting system should permit users to travel at night with good visibility, in safety and comfort, while reducing many malfunctions occurs 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 monitoring and 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.

The proposed system aim to achieve individual faults repaired within few working hours instead of taking days/even months' time spent in current system where a staff actually goes on "light patrols" six/eight times a year to check for such faulty lamps. Generally, they rely on residents or other municipal employees to report active lights (in other words, faulty street lights).

II. LITERATURE SERVEY

Automatic Street Lights [1], this project is all about to control the power consumptions at the streets and eliminating manpower. This includes controlling 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. During daytime there is no requirement of street lights so the LDR keeps the street light off until the light level 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.

Automatic Street Light Control System Using Microcontroller [2], this paper aims at designing and executing the advanced development in embedded systems for energy saving of street lights. Nowadays, 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 wastage. 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 day/night 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 developing the software to the microcontroller is C-language.

Intelligent Street Lighting System Using GSM [3], Conventional street lighting systems in areas with a low frequency of passers are by 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.

GSM based smart street light monitoring and control system[4] , 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 the server side. The client side consists of GSM modem which is further connected to the microcontroller which is further connected to the relay circuit; the server side consists of GSM modem connected to the Monitoring and Control Application.

III. PROPOSED SYSTEM

Street light is poorly designed and inadequately maintained, there are large number of burned out lamps which leads to insecurity. There is a complaint register in every zone office street light section. It is being maintained by the line inspector. The complaint received from public, councillors and corporation officials either over phone or in person being recorded in the complaint register. The complaint thus entered is being handed over to the fieldwork man so as to rectify the complaints. The field staff will have the rounds in the respective areas twice in a week and the complaints about non-burning are also being attended then and there. But this is not the immediate remedy on complaints and has many disadvantages like the repair work takes days/even months instead of taking few hours which results in delay, telephone line may be busy, sometimes no response.

IV. WORKING PRINCIPLE

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 poles 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 such as power consumption, total number of burning hours, and total

number of interruptions, tally the actual power consumption with the power supplied, details of fault detection i.e., actual location of street light.

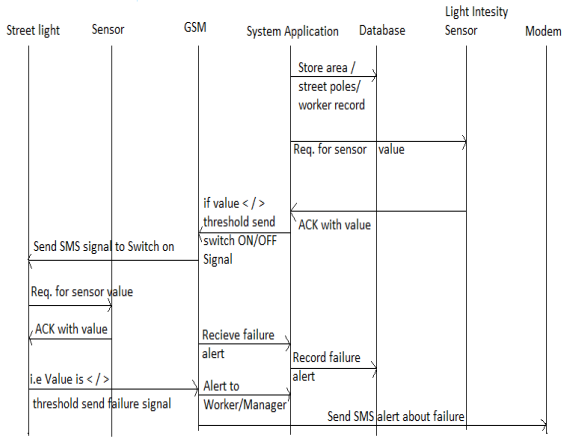


Fig.1 Sequence Diagram

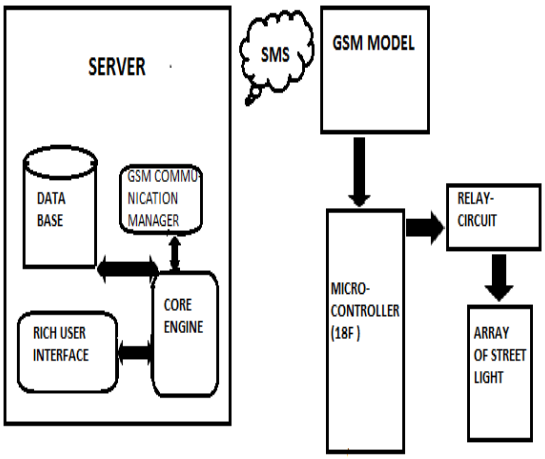
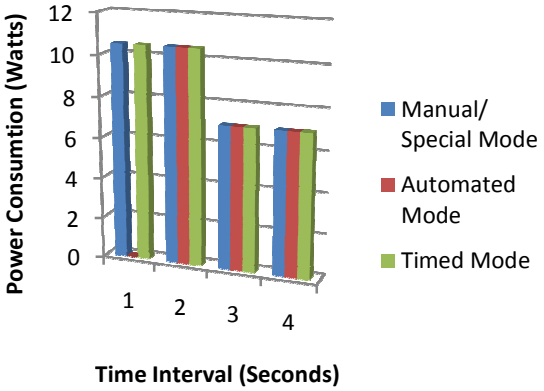


Fig.2 Design Methodology

V. RESULT AND DISCUSSION



In above bar graph comparison between manual/special mode, automated mode and timer mode is shown. In manual mode is operated in special cases (Govt. Functions) and the power consumption is high.

Whereas in Automated mode we are using LDR to switch ON/OFF of lights automatically and it is the best feasible solution. In Timed Mode we are switch ON/OFF light without intervention of human using time specified by the Admin. As we can see in the 3rd and 4th time interval in the bar-graph, load-shedding is taking place hence the power consumption is optimized.

VI. APPLICATION

- Corporate field.
- Street lights (KPTCL).
- Home power control system.
- Institutions/Organisation.

VII. SCOPE OF THE PROJECT

- Automatic switching off alternate lights during night time for power consumption.
- Switch on and off automatically.
- Street light false detection.
- If complaint not rectified by area wise system then information to higher level office (Zone level) based on some constraint like not rectified even after two days.
- Alert notification and automatic off for particular street light if there is any abnormal/subnormal

consumption of power to avoid short circuit or any such related problems, also message to the respective workman.

- The useful information is collected from the street light at the end of each day this information is stored in a database and based on this information charts are derived.
- Chart contains information like, Power consumption, Total number of burning hours, and Total number of interruptions.
- Wireless Communication.
- Can be deployed on any street light circuit.
- Reduces power consumption.
- Reduces human resource.
- Increases the life time of the street light.

VIII. CONCLUSION

We can conclude that using this methodology 2-way communication can be possible. Technical solution for implementation of wireless intelligent smart street lighting system is made easier. It provides a low cost infrastructure for managing street lighting system. Single point controlling of street lights is made possible. Energy consumption can be controlled making it eco-friendly in usage.

References

[1] SAKSHEE SRIVASTAVA,' AUTOMATIC STREET LIGHTS'.

[2] V.V.S.Madhuri, P.Mallikarjuna Sarma, .N.SandhyaRani, 'Automatic Street Lighting using PLC'.

[3] Prof. K.Y.Rajput, Gargeyee Khatav, Monica Pujari, Priyanka Yadav,' Intelligent Street Lighting System Using Gsm'.

[4]Omkar Natu, Prof.S.A.Chavan,'GSM based smart street light monitoring and control system'.

[5]R. Caponetto*, G. Dongola*, L. Fortuna*, 'Power Consumption Reduction in a Remote Controlled Street Lighting System', SPEEDAM 2008 International Symposium on Power Electronics, Electrical Drives, Automation and Motion

[6] A. Lay-Ekuakille, G. Vendramin,'Led-based Public Lighting System Reliability for a Reduced Impact on Environment and Energy Consumption'.

[7] R.Rubanath,T.Kavitha 'GSM Based RFID Approach To Automatic Street Lighting System'30th April 2012

[8] M. A. Wazed, N. Nafis, 'Design and Fabrication Of Automatic Street Light Control System', Engineering
e-Transaction Vol. 5, No. 1, June 2010.

[9] RadhiPriyasree; RafiyaKauser.H; Vinitha.E; Gangatharan.N,'Automatic Street Light Intensity Control and Road Safety Module Using Embedded System', (ICCCE 2012), 12 & 13 April, 2012.

[10] MeihuaXu, Yujie Zhang, Guoqin Wang,'Design of Intelligent Streetlight Monitoring System Based on STM32',2012 IEEE Symposium on Electrical & Electronics Engineering (EEESYM).

[11] Deepak Kapgate'Wireless Streetlight Control System International Journal of Computer Applications (0975 – 8887) Volume 41–No.2', March 2012.

[12] Jennic Ltd' (white paper), Sheffield UK – April, 2009

[13] MirceaPopa, CostinCepişcă, 'Energy Consumption Saving Solutions Based On Intelligent Street Lighting Control System',U.P.B. Sci.