IMPLEMENTION OF SYSTEM FOR MONITORING AND CONTROLLING OF STREET LIGHT IN SMART CITIES BY USING CLOUD COMPUTING

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Abstract—India is one of the developing countries facing difficulties with shortage of power resources, availability of energy due to ever increasing population. Over dependency on fossil fuel can cause problems that affect the next generation to survive. In the current context, it is very important to know how to minimize the energy consumption and how to adapt various energy efficient techniques at least for power limited systems to overcome the energy crisis. Many research works are carried out and people are looking for a clean and better solution for the next generations. The new era Internet of Things has given a new dimension leads to an energy efficient management system. Internet of Things can overcome the existing energy wastage problems to a great extent. IoT is a combination of electronic devices like sensors and intelligent software applications to build an effective data exchange network. In this paper, it is proposed that smart street light design which is one of the basic ideas in reducing wastage of power as in the concept of building a flexible smart city management plan which is essential to the prosperous life of the future generations residing in city environments. This paper is tended to design an automation control and monitoring of the system based on internet of things (IoT) system to address the problems. Several sensors, microprocessor system, actuators and a software graphical user interface are utilized in this research. Based on several experiments it can be said that the proposed system able to maintain Street Lighting System more satisfaction, low maintenance system and accurate.

Keywords—street lighting system; control and monitoring; internet of thing

I.INTRODUCTION

This project presents an idea of developing an IoT based application to monitor and control street light efficiently and improve its maintenance facilities. Now-a-days, street lights are the most important aspect of the city as it leads to most of the accidents due to low light. Lighting creates large amount of load when used in offices and large complexes. The energy saving potential is often ignored. According to a study about 4400MW of power is spent in India on street lightning. Therefore, the street lamps are relatively simple but with the development of urbanization, the number of streets

increases rapidly with high traffic density. To detect the faults in the lamps at remote location, the proposed system is very much useful. The relay is used as an automatic switch and reduces almost 100 percent of the manual work. The main issue of existing electric system is the connectivity problem as most of the connections handled by different contractors are done manually. Timer settings are performed manually. Timer often requires twelve hours continuous power supply and the further timer settings may be disrupted in the absence of continuous power supply.

TABLE 1. LIGHT TECHNOLOGY COMPARED:

LIGHT TECHNOLOGY	AVERAGE LAMP LIFE IN HOURS	LUMENS PER WATT	CONSIDERATIONS
INCANDESCENT	1000-5000	11-15	Very inefficient, short lifetime
MERCURY VAPOR	12000-24000	13-48	Very inefficient, radiation and mercury
METAL HALIDE	10000-15000	60-100	High maintenance, UV radiation , mercury ,lead
HIGH PRESSURE SODIUM	12000-24000	45-130	Contains mercury and lead
LOW PRESSURE SODIUM	10000-18000	80-180	Contains mercury and lead
FLUORESCENT	10000-20000	60-100	UV radiation, mercury, prone to break, non directional light
COMPACT FLUORESCENT	12000-20000	50-72	Short life , mercury
INDUCTION	60000-100000	70-90	Higher initial cost, lead, heat problems
LED	50000-100000	70-150	Relatively higher initial cost

IOT based street light automation is a cost-effective and eco-friendly method which also eliminate the problems in disposal of incandescent lamps and power saving.

II. AIM AND OBJECTIVE

A. Aim:

In the current scenario, the maintenance and fault detection process of streetlights is completely manual. The basic aim of our proposed system is to automate this entire process to save time, energy and resources and also increase the feasibility.

- Overcome the drawbacks of the existing application.
- Alternative to traditional maintenance and control process of streetlights.

B. Objective:

The following are some more objectives of IoT based smart electric pole:

- The application would be able to detect faults easily and provide required maintenance by generating alert messages to the admin control room.
- Power optimization.
- The application will use cloud services to manage bulk database and providing alerts.
- Also the application will help avoid fatal accidents which can be caused by either tilting of the pole or excess current generation, the sensors will help keep the status of poles updated.
- The use of current sensor facilitates load detection and management, power supply control, and over current fault detection and protection will be intimated.

III. PROBLEM STATEMENT

The street light is one of the most sought after and significant aspect in a city that rules the roads during the dark hours and contributes largely to the safety and well-being of the citizens. The amount spent behind this is often neglected but extremely important, pole is huge due to sodium vapor

lamps being utilized as its luminaries that consume high power. The expense spent on the street light can be used for other development of the nation. Currently a manual system is used where the poles are lighted during the dusk and put off when dawn. In the currently existing system the workers need to manually check for faults in the streetlight or rather be intimated by a worker or a resident of that area for immediate action. This system has a huge drawback as it increases manual effort and the need of manual maintenance.

IV . LIMITATIONS OF EXISTING SYSTEM

It requires manpower to maintain and control the streetlights.

It is a time consuming process.

Until and unless there is a complaint or the maintenance personnel goes for a check there is no fault intimation.

It does not provide the feature of pole inclination detection.

The staff will not be able to initiate a repair until there is any intimation of fault.

V. SCOPE

This application can help reduce manpower by automating the traditional methods of maintenance and control and also help in detecting any kind of defects with the electric pole. We can extend this project by increasing the no. of poles connected to a circuit. Also, we can integrate solar panels so as to use solar energy in order to light the luminaries in the lamps which will in turn harvest natural resource and save conventional energy.

VI. PROPOSED SYSTEM

Our proposed system enables maintenance and control of electric poles i.e the streetlights. It will be easier to monitor and control the operation of streetlights. The system will detect faults in the streetlights to intimate the control room to take immediate action. An overview of the proposed system is stated below:

The system involves sensing various parameters of the pole in order to take necessary further action.

A cloud service will be incorporated to store huge database according to specific areas, and will send intimations to the admin.

The accelerometer sensor will repeat this but will check for threshold value constraint of angle of inclination of pole.

The current sensor will repeat this process using threshold values for current and power and generate intimations accordingly.

A web portal at the admin end will be used to receive messages from cloud and will be accessible to the admin and staff.

The LDR sensor will sense the intensity of light of the pole. The admin will then send for maintenance of the poles.

VII. METHODOLOGY

The design of hardware and software required will be explained in this section by showing the block diagram of the street light automation system that will be created and the flow chart program of the system. A. Internet of Things (IoT) is studied from various perspectives, thus there exist manifold definitions. The reason for seeming fuzziness of the definition stems from the fact that it is syntactically composed of two terms - Internet and things. The first one drives towards a network focused on a vision of IoT, while the second tries to move the focus on generic objects to be integrated into a common framework. Definitions oriented from perspective of Things, Internet and semantics are summarized. In Things perspective, it focuses on how to integrate generic "objects" or "Things" into a common framework. The perspective of "Internet"

pushes towards a network oriented Definition In Semantic perspective indicates "a worldwide network of interconnected objects uniquely addressable based on standard communication protocols".

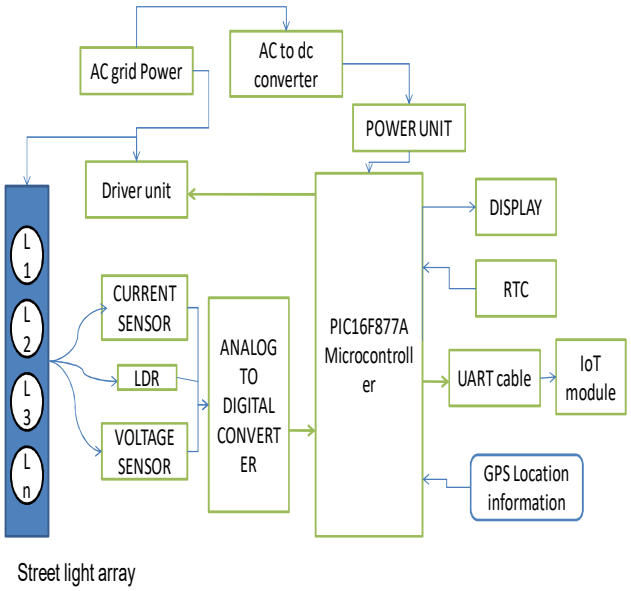

Fig. 1. Block diagram of the proposed system

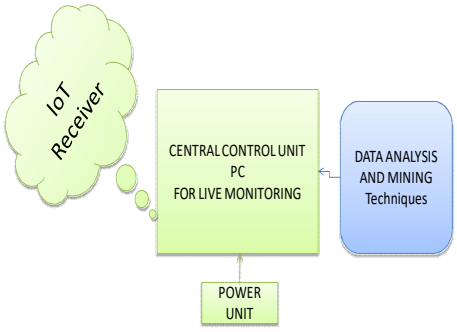

Fig. 2. Block diagram of the Receiver side

VIII. SOFTWARE ASPECTS

A. Software Tools:

- Development tool – MPLAB IDE v7.42
- Hardware Compiler - HI-Tech PIC C
- Programmer - PIC Flash
- Hardware Simulation tool - Proteus v7.6Sp0

- Full linker, with overlaying of local variables to minimize RAM usage
- Comprehensive C library with all source code provided
- Includes support for 24-bit and 32-bit IEEE floating point and 32-bit long data types
- Mixed C and assembler programming
- Unlimited number of source files
- Listings showing generated assembler Unlimited number of source files
- Listings showing generated assembler
- Compatible - integrates into the MPLAB IDE, MPLAB ICD and most 3rd-party development tools
- Runs on multiple platforms: Windows, Linux, UNIX, Mac OS X, Solaris Full linker, with overlaying of local variables to minimize RAM usage
- Comprehensive C library with all source code provided

C.MPLAB INTEGRATION:

MPLAB Integrated Development Environment (IDE) is a free, integrated toolset for the development of embedded applications employing Microchip's PIC micro and dsPIC microcontrollers. MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for

additional Microchip and third party software and hardware development tools. Moving between tools is a snap, and upgrading from the free simulator to MPLAB ICD 2 or the MPLAB ICE emulator is done in a flash because MPLAB IDE has the same user interface for all tools.

This environment allows you to manage all of your PIC projects. You can compile, assemble and link your embedded application with a single step. Optionally, the compiler may be run directly from the command line, allowing you to compile, assemble and link using one command. This enables the compiler to be integrated into third party development environments, such as Microchip's MPLAB IDE.

XI. CONCLUSION

The design of public street lighting system has been done. Generally, the system works well according to the design plan.. The system in control zone can control four lamps to turn on or off manually or automatically via internet. In control zone also able to monitor and check lamps condition is good or not good. Data on the results of monitoring the lights condition sent via the Internet to the cloud server to be accessible to users via the internet have average delay time for data transmission of 1 second. The average delay time for the process of microcontroller connection to the internet in the first time is 1 second. An enormous amount of energy can be saved by replacing sodium vapour lamps by LED and adding an additional feature for security purposes. It prevents unnecessary wastage of electricity, due to manual switching of streetlights. It provides an efficient and smart automatic street light control system with the help of LDR. It can reduce the energy consumption and maintenance the cost. It can be applied in urban as well as rural areas. The system is extendable and totally adjustable to the needs of the user. It creates a safe. The need of the system is to reduce the maintenance cost and to increase the lifespan of the system. Initial cost and maintenance are some disadvantages of this system.

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