

IoT Based Street Light Controller and Energy Monitoring System

Prof. Swati S. Patil¹ Nishant Kuperkar² Paresh Mali³ Sanket Shilwant⁴ Pooja Dalal⁵

^{1,2,3,4,5}Bharati Vidyapeeth College of Engineering, University of Mumbai, India

Abstract— This paper introduces a wireless street light control system and energy monitoring based on IoT. It detects on/off control of street lights and monitoring of energy on IoT platform. Street lights will work according to the brightness of light present at particular moment and presence of vehicles on streets. Energy is monitored on IoT platform ‘AdafruitIO’. This will display the power usage graphically and shows meter readings on adafruitIO page. Our aim is to control street lights from remote location and monitor meter readings on IoT, hence reducing the manpower.

Keywords: Street Lights, AdafruitIO, Energy Meter

I. INTRODUCTION

With the rapid development of the city, the road lighting system is larger and larger. It has put forward higher requirements for the road lighting. At the same time, the traditional street light system cannot adjust the brightness automatically. The cost of power consumption and maintenance is large. Monitoring and management is not easy. These shortcomings of traditional lighting system not only bring economic burden to the local financial sector, but also limit the management and maintenance of the lighting system. Significant benefits of street lighting include prevention of accidents and increase in safety. Street light monitoring & control is an automated system designed to increase the efficiency and accuracy of an enterprise by automatically timed controlled switching of street lights.

Currently, the energy management companies faces some situations of too many metering points, decentralized metering points, and so on. For a long time, they relied on getting values artificially thus there are many disadvantages like less information, slower transmission speed, longer processing cycles, more used energy, etc. Hence in our project we are doing all these things via internet.(i.e. IoT) Broadly speaking, IOT is a kind of network which not only can connect the objects, can be fully automatic, can collect, transmit and process information intelligently but also can realize the scientific management at anytime and anywhere through a variety of sensing devices and the Internet.

Based on the understanding of IoT, we designed an energy management system based on Internet of Things in order to improve the energy management levels and to do a better job in saving energy.

II. BLOCK DIAGRAM

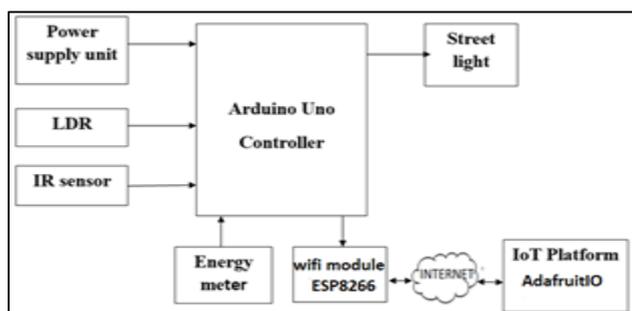


Fig. 1: Block diagram

III. METHODOLOGY

In this project, we are controlling street lights through IoT and monitoring street lights as well as household meter readings simultaneously. street light is turned on automatically at evening and turns off in the morning. It also controls the light intensity which automatically adjust according to the time and traffic. In this circuit LDR(light dependent resistor) is used, which detects the intensity of light. So according to the resistance intensity of light is controlled. When intensity of light comes under fix value the lights in street lamp turned on but, at the starting intensity of light is low. As evening progresses intensity of light also increases and again at early morning when outdoor lights are bright street lights comes to rest. IR sensor is used to detect the vehicle motion which can be very useful at nights. When amount of vehicles are less at night then light intensity will be less and when amount of vehicles are more than light intensity will be high. All these data can be monitored through remote location on IoT platform. Wi-fi module is used to communicate between devices. Household meter readings are monitored via internet, where person can monitor amount of energy consumed in specific duration of time. Both these systems are monitored and controlled through single IoT platform.

Our project work can be divided into following phases:

A. Research:

To collect information about related topics. Referring various research papers about the topic and appropriately working on defects present in previous papers.

B. Web Application:

Since our project is IoT based, we used adafruitIO as an IoT platform. On which we are aiming to show various results.

C. Application:

In our prototype we are using LED(Light Emitting Diodes) to act as street lights and normal household meter for monitoring pulse counts.

D. Arduino IDE:

The Arduino Software (IDE) is an open source software and it makes easy to the code and upload it to the board. It runs on the different plant from Windows, MAC OS, Linux. The Arduino IDE is used for nearly all Arduino based projects. The top menu bar has the standard options, including “File” (new, load save, etc.), “Edit” (font, copy, paste, etc.), “Sketch” (for compiling and programming), “Tools” (useful options for testing projects), and “Help”. The middle section of the IDE is a simple text editor where we enter the program code. The bottom section of the IDE is an output window that is used to see the status of the compilation, how much memory has been used, any errors that were found in the program, and various other useful messages.

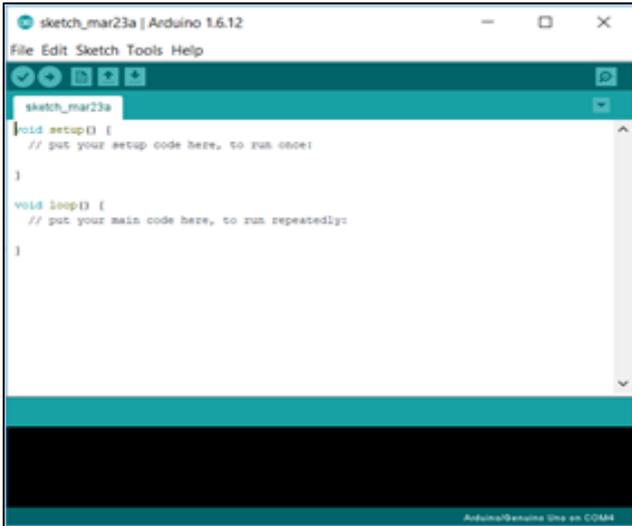


Fig. 2: Arduino IDE

E. AdafruitIO:

An IoT platform used for monitoring status of street lights and household energy meters. It is an open source web storage application. This platform works with various internet enabled devices like ESP8266, raspberry pi etc.

We can design custom dashboard on it and send commands on internet. We can able to send notification to and from gmail, twitter, messages etc.

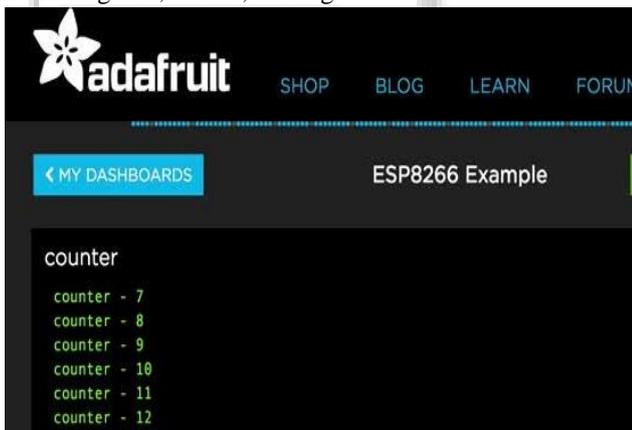


Fig. 3: Web page of adafruitIO

IV. RESULT



Fig. 4: Results on webpage

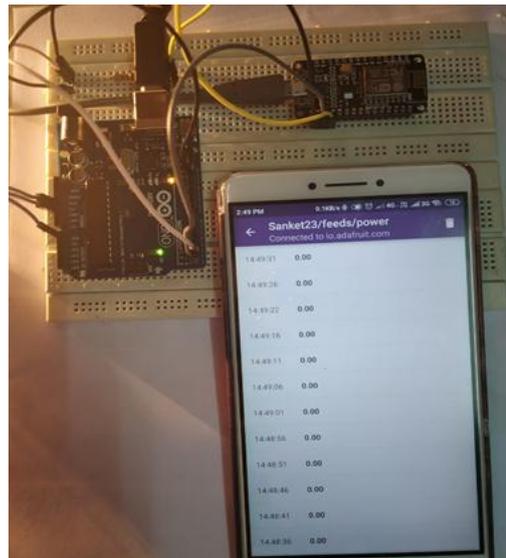


Fig. 5: Energy meter reading on IoT

Fig.4 shows the energy meter readings on IoT platform graphically and in the form of gauge. Fig.5 shows the live meter readings an adafruitIO page.

V. CONCLUSION

The aim of this project is to present smart street lights to work appropriately according to the surrounding conditions and to read household meter readings without any human support. Thus reducing errors while taking meter readings. The components used in the project, like Arduino and sensors are slowly becoming part of our daily routines. So, it is only fitting that we use them to improve efficiency in our life. Keeping in mind the urgent need for energy conservation, Street Light System with IoT is an excellent and effective solution. Apart from all this, inclusion of LED bulbs on street lights will also become the feasible option despite their initial cost but they can help in power consumption in a better way. Energy monitoring using IoT is too a better way to reduce the human errors in calculating energy meter readings. Since in most areas still the meter readings are captured manually thus increasing the errors. So idea of IoT based energy monitoring becomes a better option which reduces human power as well as human errors.

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