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Centralized Street Light Energy Control and Monitoring System Over IoT

G Ahmed Zeeshan, R Sundaraguru, Suresh Kothapalli

ABSTRACT--- Energy saving is very necessary need in now a days. We are introducing Energy efficient centralized energy monitoring as well as controlling automatically through Internet of things. This proposed system demonstrates energy saving street light intensity control system with low maintenance.This is done by sensing the light intensity from surroundings by LDR Depends on the LDR status street light automatically controlled. Digitization of Energy meter readings in LCD and IoT module for status monitoring. We can control the street light loads though server if in case emergency. Proposed system saves the energy in day mode and it made system is automation. Digitalization of energy meter data through server. We can monitor and control very easily, simple fast access. All input and out modules are interfaced to ARDUINO Microcontroller which process input data and provide output with help of 5V regulated power supply. In this project we used Arduino ide software to write c program and compiling.

Index Term :— ARDUINO, Energy Meter, IoT, LDR

I. INTRODUCTION

Electricity demand is increasing day by day for increasing population for need of hospitals, agriculture industrials, Household. It's very difficult to handle power distribution and maintenance. Due to that energy saving is very huge requirement in current generation. To save power or maintain we need improved technology. The proposed system Centralized energy Control Monitoring system using IOT provides better saving of energy. We can avoid this power or energy waste by implementing smart energy meters. This implemented system having smart energy meter which consume low power and current and voltage data transfer through server. We implement automated street light ON/OFF System using LDR. Due to the proposed innovative system digitalized energy meter readings, optimized, power wastage reduced and data will displayed in web page. Easy to access and control. Arduino microcontroller and arduino IDE software is used for implementation this system.

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* Correspondence Author
G Ahmed Zeeshan*, ECE, Global institute of Engineering & Technology, Moinabad, Hyderabad, Telangana, India.
Dr. R Sundaraguru, ECE, Sir M Visvesvaraya Institute of Technology, Bengaluru, Karnataka State, India.
Suresh Kothapalli, Embedded Systems, Global institute of engineering &technnology, Moinabad, Hyderabad, Telangana, India.

II. LITERATURE OVERVIEW

[1] "Landi, C.; Dipt. di Ing. dell"Inf., Seconda Univ. di Napoli, Aversa, Italy ; Merola, P. ; Ianniello, G",
"ARM-based association framework utilizing unbelievable meter and Web server",2011. He proposed that designing application using ARM7 microcontroller. By using this microcontroller its not a robustness, interfacing modules are complex and cost effective, due to complex operation of working is hanging the microcontroller. Iot is interfaced to ARM controller due to that high power consuming. an insignificant performing its having.

[2] "Garrab, A.; Bouallegue, A.; Ben Abdallah" , "another AMR approach for energy sparing in Smart Grids utilizing Smart Meter and deficient Power Line Communication", 2012.He described that increasing the energy needs, we require a continues supplying board for proper working for smart energy systems. the purpose of confinement goals of energy the board, single bearing correspondence, the need of an interoperability of the various guidelines, the security of the correspondence and the ozone debilitating substance floods, prompts raise another foundation structure. the proposed correspondence framework. This blueprint is with incredible energy for preservationist and low carbon society perspective.

[3] "B. S. Koay, S. S. Cheah, Y. H. Sng, P. H. Chong, P. Shum, Y. C. Tong, X. Y. Wang, Y. X. Zuo and H. W. Kuek" , "Structure and execution of Bluetooth energy meter", 2012. He described that energy meter data monitoring thorough wireless communication technology Bluetooth. Due to Bluetooth having very less distance of data transmitting efficiency of the system decreases, power consumption is also very high. He proposed microprocessor instead of microcontroller which is huge cost.

III. EXISTING SYSTEM

Present existing system of energy monitoring system is consuming more power. This system is controlled automatically but there is no digitalization of energy data transfer from the installation place to monitoring. Due to this existing system have many limitations that are power wasting more in day times there is no emergency mode control of system. It takes more time to transfer data to monitoring station this delay leads to may limitations. No smart metering system which deals no exact particular data of current or voltage consumed by the load.

Present existing system have less efficiency to overcome this limitations we come across with new modeled approach to save energy and centralized monitoring system.

IV. PROPOSED SYSTEM

The new approached centralized energy Monitoring and control system is Auto control of street light and energy consumption data monitoring over IoT. This proposed system we are going to control the control the street light systems automatically with the help of LDR sensors. After controlling Load we monitor the energy consumption and that data transferring through Internet by using Server management system. This system acknowledges the energy consumption in term ofreading all values.The manual mode of operation terminated and data collected in central server. This system is secure and we can predict energy tampering task easily. If any error occur in the system it will be auto replaced by comparing data which is stored in server fast. This proposed system is error free system. Live readings of the energy meter can be viewed through Android application. Also, the readings can be viewed online.

V. METHODOLOGY

The proposed centralized energy monitor and auto control over wireless network IOT is designed to find an optimal solution to the Energy saving. The design implements IoT technology using energy meter and LDR sensor, a main controlling unit (MCU), sensors to measure various parameters voltage and current. LDR sensor senses the data of light data gives to micro controller. Light sensor senses the light quantity, the status of the light sensor load will automatically glow it's indicate that day time and night time. Same thing data displays on LCD and transfer the data over IoT server. Then Energy meter read the values it will show the final energy consumption.

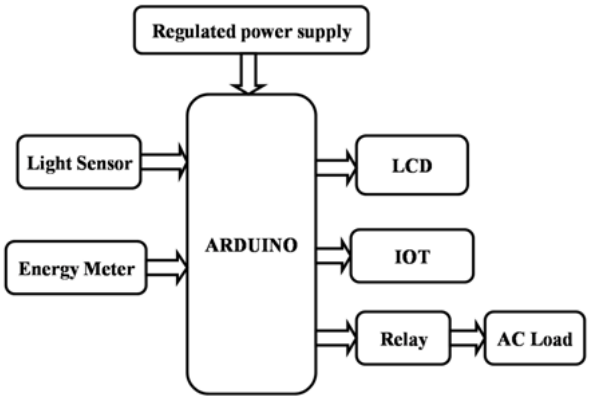

Fig. 1 Block diagram

VI. FUNCTIONAL DESCRIPTION

A. Regulated Power Supply

Regulated power supply is used to provide operating voltage to the system. The aim of RPS is covert 230v ac supply to 5v dc supply. Step down transformer used to covert high to low voltage of 12v ac,bridge rectifier converted into dc voltage and finalvoltage regulator is used to give constant 5 v.

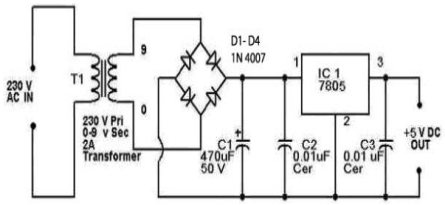

Fig. 2. Power supply.

B. ARDUINO Microcontroller

To design to the proposed system we are using ARDUINO microcontroller to interface input and output modules and as processing unit. Arduino uno is having 28 pins which are classified as analog and digital pins D0 to D13 are digital pins. All digital sensors will connect to digital port. A0 to A5 are analog port all analog sensors are connected to analog port. It is 8 bit micro controller and having 32KB memory for data and program memory. Operating frequency is 16MHz. ARDUINO development board we are using ATMEGA328 SMD IC.

Fig. 3. Arduino

C. LCD 16 × 2 Display

The proposed liquid crystal LCD display is viewed as the spotlight of this work normally shows a few information synchronously more than 16 sections and 2 columns. The fundamental capacity of the proposed LCD display is to demonstrate the data announced by the utilized sensors as a few credits so as to explain the circumstance of the framework intermittently. The association plan is proposed to be interfacing with Raspberry Pi board as indicated by the graph demonstrated inFig.4, which is set up by Frizzing program.

Fig. 4. LCD module

D. Energy Meter

Energy meter used to measure the consumed current and voltage by the load. This energy meter consisting of opt coupler which is used as isolation purpose? The measure data is given to the micro controller with the help of counter in MC. The micro controller displays the data in LCD and Local server IOT.

Fig. 5. Energy meter

E. Relay

A relay is Electromagnetic device used as switch and interfacing module between load and micro controller. In our system we used 5V relay to switches load pump motor on and off. We will take 230v for pump from externally. Operating mode of relay is normally closed. Edit when input high relay become short circuit and input low relay become open circuit.

Fig. 6. Relay

F. LDR Sensor

Light Dependent Resister is observing light intensity. LDR module is light quality converted to electrical quantity. That generated voltage give to the micro controller analog pins. Controller triggers the output devices. Roles of the LDR module in the project which is detect light quantity as low or high depends on that we conclude that weather condition is day or night

Fig. 7. LDR module

G. ElectricalLoad

Electrical load is 230V tungsten filament bulb. Which is used to glow represent as normal load in home appliances? The load consumed voltage and current gives to the microcontroller depends on the threshold data relay may be trigger ON/OFF which is done by the micro controller.

Fig. 8. Electrial Load

H. WI-FI Module

To transfer the data from different places Wireless communication is mandatory. One of the advanced wireless communications done by using IOT. Internet of things. The concept of IOT is done with the Help of Wireless Hardware Module Called ESP8266. It is operated by wireless frequency of 5GHz. It's having transmitter and receiver to send and receive the data trough wirelessly. Operating voltage of modem is 3.3V and consuming current is 100 mA. It's having 8 pins in that 2 GPIO pins. It has 512KB flash memory for data storage. The main role IOT module in the project is that micro controller sends data to ESP8266 module. It sends the humidity, temperature, and light parameter data to local server which is created by ESP8266. User can access the data when he opened same server at receiving end.

Fig. 9 Wifi module

I. Software

Embedded system deals both Software and Hardware. Software is very important module to develop programming code. To implement proposed methodology we used ARDUINO IDE Software for Embedded c language editing, compiling and dumping. Simulation is very important tool to design project virtually, before hardware implementation. We used proteus Software to simulation of complete project. Express SCH software used to design schematic diagram of project.

VII. RESULT AND DISCUSSION

We successfully interfaced all input and output modules to microcontroller. Controller performed and executed results as per the requirement. We obtained Energy meter parameter in LCD and IOT. Controlled street light using LDR depends on light status and controlled the load through IOT.

Fig. 1. Output result

VIII. CONCLUSION AND FUTURE WORK

In this project Centralized energy control monitoring system designed and implemented successfully by using Energy meter inbuilt has voltage and current sensor, LDR which detect light and automatic load on off.This system reduces Energy wastage and prevention of electrical shortage. By using this we designed new real time billing system for Electrical usage. With this proposed methodology electricity consuming monitor on IOT and auto controls of misusing of energy. We implemented energy efficient energy monitoring and control system and executed output successfully.

In future we will GSM and GPS included system. If any Energy case by using GSM we can control the street light and Energy meter and also will find the location of the street light pole and location also.

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AUTHORS PROFILE

G Ahmed Zeeshan is Life Member of ISTE and working as Assistant Professor and Head in the Department of Electronics and Communication Engineering at Global Institute of Engineering and Technology, Moinabad, R R Dist., Telangana State, India.Email:ahmedzeeshan_eng87@yahoo.com.

Dr. R Sundaraguru is working as Professor and Head in the Department of Electronics and Communication Engineering at Sir M Visvesvaraya Institute of Technology, Bengaluru, Karnataka State, India. **Email:** sugursg@gmail.com

Suresh Kothapalli is pursuing M.Tech in Embedded Systems at Global institute of engineering & technnology, Moinabad, Hyderabad, Telangana, India. Email: sureshkothapalli51@gmail.com