Online Electricity Meter Bill Reading

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ABSTRACT:This paper proposed and demonstrated a smart bill reading energy meter that the users will be able to monitor their current power consumption (bill). Internet of things (IOT) concept enables us to connect the normal day to day device with each other over the internet. The current energy meter does not provide any provision to monitor continuous reading about our electricity consumption. This project presents an advance internet of things (IOT) based system for intelligent energy management. A proposed system provides the communication between the electricity board section and the consumer section using Internet of things (IOT) for transmitting the consumer electricity consumption and bill information that is calculated using the Arduino UNO micro-controller. This project explains the modelling and working of an different unit of the system. The advantage of this project is, it helps to reduce the human errors in the billing system. Also, this system makes consumer smart enough to predict the electricity consumption.
KEYWORDS: Internet of Things (IOT).

I. INTRODUCTION

Electricity usage management and billing system using IOT are used to overcome the problems of the consumer. Now a day, automated meter reading (AMR) is heavily used in the abroad for collecting reading and billing purpose. Most of the time the owner gives some extra money to the meter reader person to have less meter reading. As a result, corruptions occur, and actual payment is not received by the service provider. Automated meter reading (AMR), is the technology of automatically collecting data from energy meter or water metering devices and transferring that data to a central database for billing and analysing.

The Internet of things concept enables us to connect the normal day to day devices with each other over the internet. The devices connected through IOT concept can be controlled and analysed. The IOT concept provides the basic infrastructure and opportunities to form a connection between the physical world and computer-based systems. The power and billing information is continuously transmitted by the use of Internet of Things and monitored by the Electricity Board section.

Whenever there is power theft identified can be sent from the Electricity Board section to cut the supply to the customer. The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. "Things," in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors. 1 The Internet of things concept enables us to connect the normal day to day devices with each other over the internet. Recently, there have been several issues over the internet.

This system provide communication between the electricity board section and the consumer section using Internet of Things (IOT). Electricity usage management and billing system used for transmitting the customer's electricity consumption and bill information that is calculated using Arduino UNO microcontroller.

II. LITRATURE REVIEW

Swati Khokale, Patil Kaveri, discussed that the Smart meter can be install at each and energy house, where the state electricity department going to supply the conventional energy. With the help of project work lot of manpower can be reduced and power supply can be controlled. According to the author, proposed a system which measures the current consumption unit through IR sensor unit.[1]

According to Author *Syed Assra Shah, Electricity is the driving force behind the development of any country. Thus, it has to be made sure that electricity that is generated by virtue of immense expenditure, hard work, labor is supplied to the consumers in an equally judicious way & by the aid of latest technology available. [2]

Author A. Subba Rao, Sri Vidya Garige discussed that in the conventional electro-mechanical and computerized metering framework, electric vitality is reviewed by individual and regularly they arranged the bill through suspicion dependent on his history of power utilization.[3]

In Smart Electricity Meter using Wi-Fi Shaik Salman siddiq 1, Shaik Reshma 2, K. Anuja 3, P.Priyanka 4, Ch. Karuna pravaha5 (Asst. Prof.)

discussed that the digitization of energy meter Readings Over the internet. The proposed system design eliminates the human involvement in Electricity Maintenance. The buyer will be able to 6pay for the usage of electricity on schedule. The user can monitor energy consumption in watts from a webpage by providing a channel id for the meter.[4]

In Automatic Electricity Bill Generating System N. Rajathi,N.Suganthi, Shilpa R. discussed About the traditional way of reading energy meter is an expensive work where the reader of the Meter has to go in person to each meter and take the meter reading manually.[5]

III. OVERVIEW OF THE SYSTEM

Our project consists of hardware and software part. The block diagram shows that the customer can check their home electricity usage anywhere and anytime. As for the software part, Arduino Uno will have all the programs using c language. ArduinoUno consists as the main source of operation. Arduino Uno connect with energy meter, RS-485 Transceiver breakout board that's why they can communicate each device. And Arduino UNO canoperate all devices after we upload a program into it.
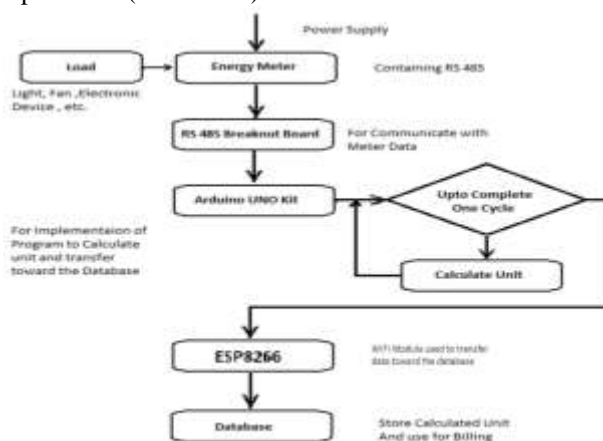
IV. HARDWARE SYSTEM

Automatic Meter Reading system (AMR) continuous operate the energy meter and it also sends data toward the database. The data which received from an energy meter, has been stored in database server, which was located at the electricity Board station using an WIFI system. Automatic meter reading system helps energy service provider and customer to access the proper and updated data from the energy meter. It saves more human labour. AMR System can send energy consumption in

monthly cycled on request. These data are stored into the database server for processing and recording. This data is sent toward the central system for billing and troubleshooting.

This technology reduces the labour cost and the reading collection time. Because of this system, it increases data improved customer service, security and reduced revenue losses. This system provides freedom for electricity companies to take action against vacuous customers who have outstanding dues, otherwise companies can

disconnect the power of customer. The energy meter suitable for this project is single phase meter, because it contains blinking LED indicator for 1Wh pulse and it also have direct pulse output connection that compatible to the Arduino. To make sure the pulse taken accurately, the output pulse from LED blinking is more suitable. This meter use 240V AC current. This meter count 1Wh per pulse. The 1 units of lamps 100W and 25W was connected to this meter to count the pulse.

The circuit contain meter, Arduino UNO Kit and RS-485 Breakout Bord. The material is fixed on wooden board, covered with paper and 1 lamp can be used as the load. Lamp can give load for 100W for 1 hours. It must be well arranged without the socket close to the Energy meter.

The energy meter has the aluminium disc whose rotation determines the power consumption of the load. The disc is placed between the air gap of the series and sunt electromagnet. The sunt magnet has the pressure oil, and the series magnet has the current coil. The pressure coil reacts the magnetic field because of the supply voltage, and the coil produces it because of the current.RS-485 Transceiver allows to transmit data by RS-485 connection at speed of up to 10 MBPS all with a 3.3 V power supply. It makes strong data communication in devices. It makes flexible communication between meter and Arduino UNO Microcontroller. The most important advantage with Arduino the programs can be directly loaded to the devices without requiring any hardware programmer to run the program. This is done because of the presence of the 2.5 kb of boost loader which allows the program to runed into the circuit. All we have to do is to download the Arduino Software and the code.

A microcontroller is an integrated circuit that contains processor core, memory and programmable input and output peripherals. It also known as small computer that designed for embedded applications. On the other hand, the microcontroller incorporates all the features that founds in microprocessor. However, it has also added features to make a complete microcomputer system on its own. The microcontroller has built-in ROM, RAM parallel I/O, serial I/O, counters and clock circuit. The project use Arduino UNO for the microcontroller, the host processor for the Arduino UNO is the Atmel Atmega328. The '328' is the 28-bit microcontroller. The architecture is based on Reduced Instruction Set Computer concept which allows the processor to complete 20 million instructions per seconds operating at 20MHz. The ATmega328 is equipped with three main memory section which is flash programmable read only memory (EEPROM), Static random-access memory (SRAM) and byte-addressable EEPROM for data storage.

Arduino Uno is the 'standard' Arduino board and the most readily available. It is having 32KB of flash memory, 2KB of SRAM and 1KB of EEPROM memory. With a total of 14 digital, I/O pins and 6 analog I/O pins, this is a very capable device, able to run most programs. The DS1307 serial real-time-clock (RTC) is low power, full binary-coded decimal (BCD) clock / calendar plus 56 bytes. It communicates to Arduino over I2C connection. A real time clock just acts like watch, it uses 3V battery and keep time even when no current [12]. Real time clock was used in this project to get the real time counting and storing the bill in the EEPROM. With the real time clock, the bill can be reset at 1st date for every month. It used battery 3V to maintain their life even no current flow.

Arduino IDE is an opensource platform used for building electronics projects. Arduino consist physical programable circuit board (often referred to as a microcontroller) which help to monitor other devices or some other operational purpose and also consist a software, or IDE

(integrated development environment) that runs your computer, used to write and upload computer code to the physical board.

The ESP 8266 Wi-Fi module is a low-cost component with which manufacturers are making wirelessly networkable microcontroller module. ESP 8266 Wi-Fi module is a system-on-a-chip with capabilities for 2.4GHz range. It employs a 32-bit RISC CPU running at 80 MHz It is based on the TCP/IP (Transfer control protocol). It is the most important component in the system as it performs the IOT operation. It has 64 kb boot ROM, 64 kb instruction RAM, 96 kb data RAM. WIFI unit performs IOT operation by sending energy meter data to webpage which can be accessed through IP address. The TX, RX pins are connected to the 7 and 8 pins of the Arduino microcontroller.

V. SOFTWARE SYSTEM

Output On Serial Screen

VII. CONCLUSION

The designed smart meter is accurate and suitable for practical usages and not only as a home appliances or device where it experimented with various types of loads and it proved its worth and reliability. The practical results obtained demonstrate the accuracy, the flexibility, and the usefulness of the presented system.

The system very helpful for reduction in energy wastage and prevention in electric storage. The Electricity usage management and billing system is providing secure and efficient way for electricity measurements. The main focus of this research work is design and development of a framework for people to determine electricity uses and how to predict weekly and monthly Electricity bill

Program used in the project, developed in C language with the Arduino syntax in the Arduino IDE. The software is also used for loading the program code into Arduino board. In this project, the Arduino IDE was used to program, create, debug and upload the coding into the microcontroller. There are parts that need to be program which are digital write input/output. Each program needs to include the libraries of the coding such asModbusMaster.h, and EEPROM.h other type of libraries but it depends on the coding requirement.

VI. RESULT

The following are the results obtained when we are tested the code on serial screen of Arduino UNO Software.

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