IOT Based Automatic Reading/Billing System of Energy Meter

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ABSTRACT

One time in a month we always see a person from MSEB or electricity board comes to our home and takes the readings and submit it to the board of electricity and then according to the readings the person handover the bills to the customer. Here the person from the electricity board has to go in each and every home for clicking the photograph of the energy meter which is the biggest drawback and it is time consuming and also has many disadvantages like extra bill amount, notification from the MSEB after paying the bills , all this are the common problems. And to overcome such problems we have to eliminate the third part i.e. the person from MSEB between the customer and the service provider.

In this paper we are introducing IOT and Arduino. In this method we are using Arduino because it is efficient, consume less energy and it is fastest. In this paper the energy meters which are installed in our houses are kept as it is but only a small change is done on the installed energy meter i.e. changing the existing meters into smart meters.by using the GSM module provides a feature of notification through SMS. The customers can easily excess the working of the energy meter through webpage.

Keywords : IOT(internet of things), GSM(Global system for mobile communication), ArduinoIDE

I. INTRODUCTION

SMART energy meter has unit measuring meter. This device will be in turn connected to the main server with the help of IOT. The algorithm is such that, at the end of each month the device will generate the rate of units and send it to the user's smartphone along with the bill. The Android application which will be connected to the same server where the smart meter is connected. On the Smartphone user will get the bill on a monthly basis. The interesting feature is that the user can set his limit of consumption as per his requirement. The application will be having the option of online payments via credit cards or the specific Id card. The meter will send both units and bills to the user. The user can also check the units on a daily basis. The application will also have the option to optimize the bill based on his usage. And the user can also control the connected appliances with the webpage.

II. Existing Work

The present system only provides feedback to the customer at the end of the month. Also the meter readings are taken manually. Consumer can know the units consumed by seeing their electricity bill only.

Also huge manpower is required to take the readings. There is no protection for energy meter tampering. The consumers cannot monitor the everyday consumption or usage. The major drawback of this system management of power consumption is difficult.

In this proposed method, the consumer can manage their energy consumption by knowing their energy time to time. This method not only provides two way communication between utility and consumer byt also provides other functions that are if the consumer fails to pay the electricity bill the energy supply would be cut down from the utility side and once the bill is paid the energy supply is reconnected. Another huge advantage of this system it notifies the consumer & utility at the event of the meter tampering. By this informative the consumer and the utility can control the tampering are reduce energy crisis.
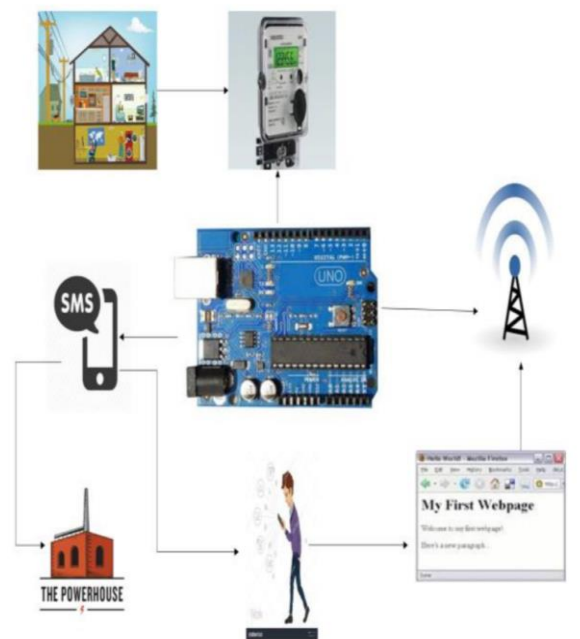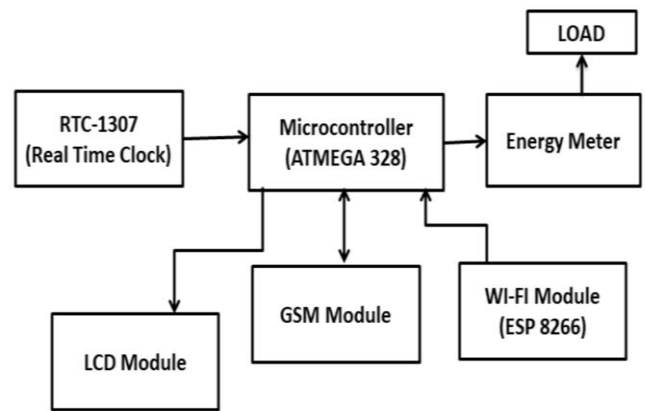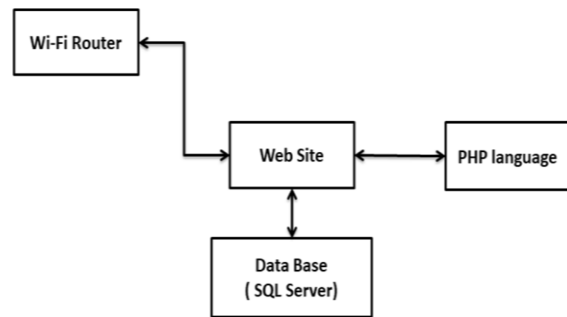
3. Architectual Model:

Fig 1. Architectual Model

Block Diagram
1. Transmitting Side

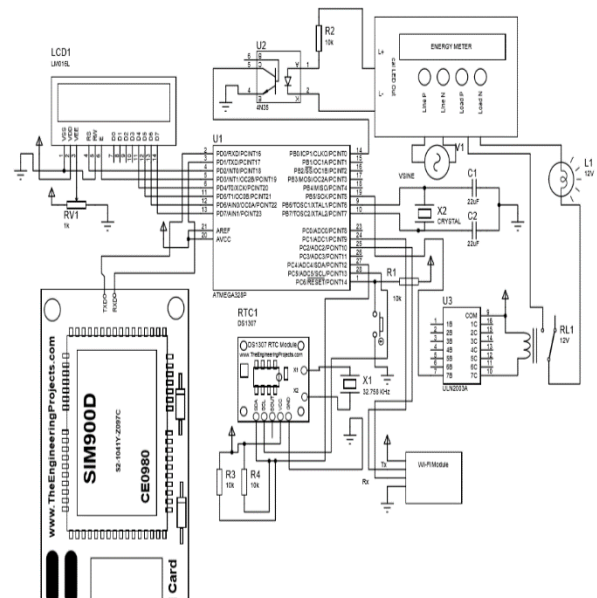### 2. Receiving End

4. Circuit Diagram:

Fig 2. Connection of all Components.

4.1 Energy Meter:

An energy meter is a device that measures the amount of electric energy consumed by a residence, a business or an electrically powered device. Electric utilities use electric meters installed at customer's premises for billing purposes. They are typically calibrated in billing units, the kilowatt hour (kWh). They are usually read once each billing time. When energy saving during certain periods are desired, some meters may measure demand, the maximum use of power in some interval. "Time of day" metering allows electric rates to be changed during a day, to record usage during peak high-cost periods and off-peaks, lower-cost, periods.

4.2 GSM Module:

GSM (Global System for Mobile Communications, originally Group Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI).

It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones and is now the default global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories.

4.3 LCD Module:

We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

4.4 Wi-Fi Module:

The ESP8266 WiFi Module is a self- contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

4.5 Arduino:

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

4.6 RTC Module:

DS3231 RTC is Precise Real-Time Clock Module with 32Kbit EEPROM and a built-in 10-bit temperature sensor having a resolution of 0.25C.

The DS3231 RTC module Precise Real-Time Clock Module is a low-cost, extremely accurate I²C real-time clock (RTC) with an integrated temperature-compensated crystal oscillator (TCXO) and crystal. The device incorporates a battery input and maintains accurate timekeeping when main power to the device is interrupted.

The integration of the crystal resonator enhances the long-term accuracy of the device as well as reduces the piece-part count in a manufacturing line. The ds3231 Arduino is available in commercial and industrial temperature ranges and is offered in a 16-pin, 300-mil SO package.

4.7 Xampp Server:

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends,[2] consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages. Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server possible.

Officially , XAMPP's designers intended it for use only as a development tool, to allow website designers and programmers to test their work on their own computers without any access to the Internet. To make this as easy as possible, many important security features are disabled by default. XAMPP has the ability to serve web pages on the World Wide Web. A special tool is provided to password-protect the most important parts of the package.

III. Conclusion

An attempt has been made to make a practical model of 'IOT Based Smart Energy Meter.' The propagated model is used to calculate the energy consumption of the household, and even make the energy unit reading to be handy. Hence it reduces the wastage of energy and bring awareness among all. Even it will deduct the manual intervention.

IV. REFERENCES

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