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Smart Energy Meter using IOT

Harini S, Harshitha Reddy B, Akshaya R, Bhavya G

Department of Computer Science and Business Systems, R.M.D. Engineering College (An Autonomous Institution),

R.S.M Nagar, Kavaraipettai, India

ABSTRACT: This study has specifically focused to develop a IOT Based Prepaid Smart Metering System which would be able to address some of the challenges currently available in the regular digital automated metering system in Eurasia. Smart Metering with its unique performance with the Internet of Things (IoT) tend to be an efficient system for electricity management, se- cure against the intervention by third parties, and reliable for tracking and real-time remote monitoring. Hence, this project work is accomplished by analyzing available functions and journals on the existing design of Smart Metering and discussed on further preferable application. In the currently working system, electricity meter reading for electricity usage and billing is done by human workers from home to home and building to buildings. The purpose of this project is to develop a Smart Electricity meter using GSM. This can reduce human errors and helps to retrieve the real time meter value via GSM and send it to customers mobile phone through GSM. This also allows electricity board to modify the variable package price in specific duration. The administrator can analyze the customers power consumption data and generate the report from the data online. The prototype will be able to introduce the billing system to the customers, get the power consumption data from smart meter, keep the data in centralized database and generate the report.

KEYWORDS: Ardruino LCD Display, Regulated power supply , wifi module

I.INTRODUCTION

The Smart Energy Meter is a piece of IoT equipment that will help us manage our energy use. It can't save energy by itself but it can give visualization of energy that we are using at any instant of time. This may lead us to save energy, which is crucial for the present generation. The objective of this system is to monitor the amount of electricity consumed. The distributor and the consumer both will be benefitted by eventually reducing the total Power consumption. This study is related to using Arduino Uno and a WiFi module to calculate power usage and display it to the user. This will make it easier to manage power saving.

II. USECASE SCENARIO

A. Application of Project- Residential electricity meter, commercial and industrial electricity meter, smart grid and micro grids, Demand-side management programs

B. Existing System- The existing electricity metering system in Eurasia typically relies on manual meter reading and billing processes. This system is prone to human errors, delays in reporting consumption data, and difficulties in implementing variable pricing schemes.

C. Proposed system- Elimination of human errors and manual meter reading,Real-time monitoring and tracking of energy consumption

D. Automated billing and remote disconnection/reconnection services, Support for variable pricing schemes, Enhanced data security.

III. SOFTWARE SPECIFICATION

ARDUINO

Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232 is shown in figure 3. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarding, use a detachable USB-to-serial adapter board or

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cable, Bluetooth or other methods, when used with traditional microcontroller tools instead of the Arduino IDE, standard AVR in-system programming (ISP) programming issued.

Figure 3.Aurdinu

LCD display

In A liquid-crystal display (LCD) shown in figure 4, is a flatpanel display or other optical device that uses the lightmodulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as pre-set words, digits, and 7-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

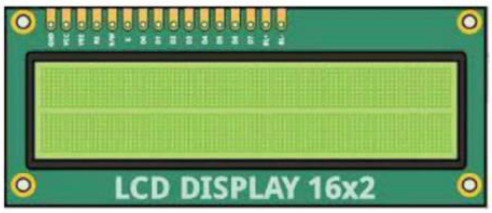

Figure 4. LCD Display

Regulated Power Supply

Today almost every electronic device needs a dc supply for its smooth operation and they need to be operated within certain power supply limits. This required dc voltage or dc supply is derived from single phase ac mains. A regulated power supply can convert unregulated an ac (alternating electric current or voltage) to a constant dc (direct electric current or voltage). A regulated power supply is used to ensure that the output remains constant even if the input changes. A regulated DC power supply is also called as a linear power supply; it is an embedded circuit and consists of various blocks. The regulated power supply will accept an ac input and give a constant dc output. Figure 5 shows a typical regulated dc power supply

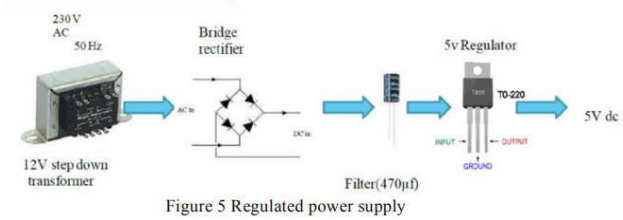

Figure 5 Regulated power supply

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Wi-Fi Module (ESP8266)

ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system is shown in figure 7. It is mostly used for development of IoT (Internet of Things) embedded applications. It employs a 32-bit RISC CPU based on the Tensilica Xtensa L106 running at 80 MHz (or over clocked to 160 MHz). It has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI.ESP8266 module is low cost standalone wireless transceiver that can be used for end- point IOT developments.To communicate with the ESP8266 module, microcontroller needs to use set of AT commands. Microcontroller communicates with ESP8266-01 module using UART having specified Baud rate.

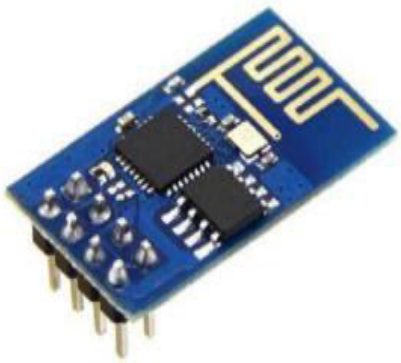

Figure 6 WiFi Module

IV. PROJECT DESCRIPTION

This mechanism requires the consumers to pay for the electricity before its consumption. On that way, users hold credit and then use the electricity until the credit is ended. If the available credit is ended then the electricity supply is cutoff by a relay. Readings made by operators are prone to errors. This project shows the above mentioned problems. These system will first register the user. For making recharge the consumer must have to login to the system. The username and password must create to login then it will check for the user is valid or not through server. It can able to recharge through user phone app only if the user is authorized user. As recharge ends it will cut off the electricity.

A.STATIC ENERGY METER

Energy Meter or Watt-Hour Meter is an electrical instrument that measures the amount of electrical energy used by the consumers.

B. FEATURES

Reverse current & earth load tampering protection.

- Accurate energy measurement even in case of phase reversal and/or the load is earthed.
- LED indication for meter functioning.
- Intelligent electronic circuit to ensure no 'creepage' of meter.
- True R.M.S. meter to ensure good performance even for distorted waveforms.
- Sealed electromagnetic impulse counter for additional security.
- Accurate reading even at rapidly fluctuating load current.
- No effect of high voltage fluctuations.

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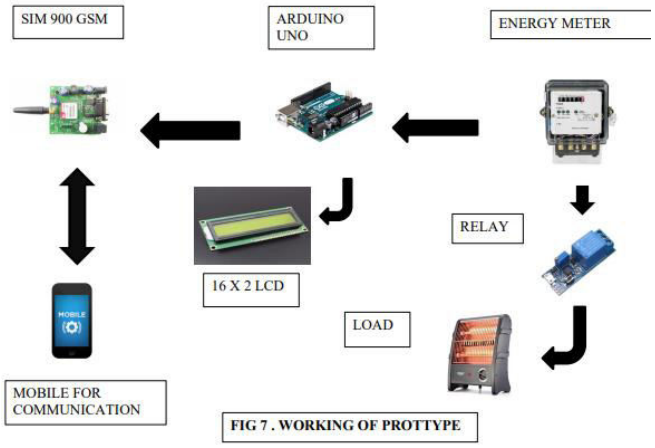
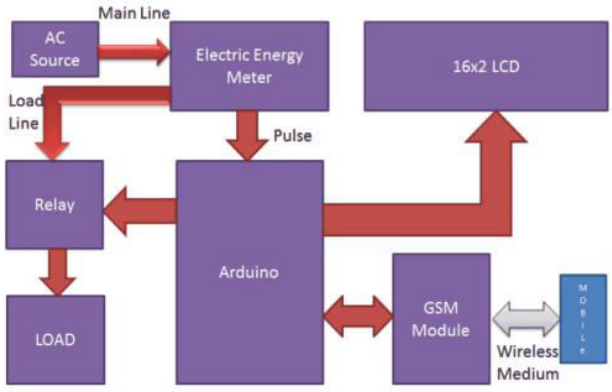


FIG 7 . WORKING OF PROTTYPE

V. FUTURE WORK

This is 21st century and there is no space for errors or faults either in any technical system or in general applications. Prepaid energy meter is a beneficial concept for the future. It's facilitates the remission from electricity bills. Electricity vouchers will be available at nearby shops. The word prepaid means "pay before use" one of the beneficial feature of this concept prepaid energy meter is used to prepaid the current supply of electricity to homes, offices etc.



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