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Smart Energy Meter Auditing With Power Demand Controller Using IOT

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ABSTRACT

The smart energy meter describes Microcontroller based design and implementation of energy meter using IOT concept. The proposed system design eliminates the human involvement in Electricity maintenance. The Buyer needs to pay for the usage of electricity on schedule, in case that he couldn't pay, the electricity transmission can be turned off autonomously from the distant server. The user can monitor the energy consumption in units from a web page by providing device IP address. The energy meter will notify energy consumption and it will send information to the consumers through GSM modem

Key words: Current Transformer, Potential Transformer, Microcontroller, Internet of Things, GSM, MP3 player.

INTRODUCTION

The paper mainly deals with smart energy meter, which utilizes the features of embedded systems i.e. combination of hardware and software in order to implement desired functionality. Now-a-days the demand for electricity is increasing at a constant rate throughout the population and is being utilized for various purposes wiz, agriculture, industries, household purposes, hospitals etc. So, it is becoming more and more complicated to handle the electricity maintenance and requirements. There for there is an immediate requisite to save as much electricity as possible.As the demand from the newer generations of population for electricity is increasing, so in accordance with it the technology improvement is needed. The proposed system provides a technical twist to the normal energy meters using the IOT technology.Instead of focusing on producing more energy it is required to manage the energy consumption. To manage the energy efficiently and reduce the energy consumption. Monitoring, Optimized power usage and reduction of power wastage are the major objectives that lie ahead for a better system.

Objectives

The objective behind the introduction of 'smart' energy meters is first and fore mostly to gain insight into small-scale users' electricity consumption**.** The main objective of this project is,

- Eliminating manual meter reading.
- Monitoring the electric system more quickly.
- Providing real-time data useful for balancing electric loads and reducing power outages (blackouts).
- Enabling dynamic pricing (raising or lowering the cost of electricity based on demand).

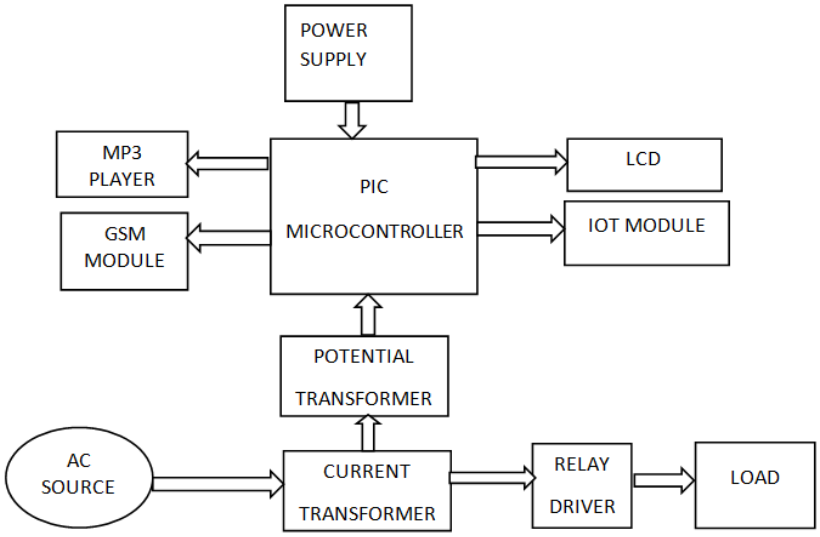

Fig.1: Smart Energy Meter Block Diagram

PROPOSED SYSTEM

This proposed system can be achieved by the use of Microcontroller that continuously monitor and records the energy meter reading in its permanent (non-volatile) memory location. This system continuously records the reading and the live meter reading can be displayed on webpage to the consumer on request. The maximum demand of energy of a consumer will be indicated in the meter used by the consumer. After exceeding the maximum demand, the GSM will gives message and call to the consumer, then MP3 player gives a voice alert to the end users. We can also monitor the power factor and how much consumers units utilized in peak hours per day. The meter and hence the connection will automatically be disconnected by an embedded system inserted in the meter itself. GSM MODULE SIM 800 is used to produce communication between load circuit and utility side. Which is shown in Fig 1. The system consists of the electricity meter which measures the electricity bill and informs the consumer about the number of units consumed and associated costs with it.

The power consumption monitoring system has been implemented with the use of open standard technology, which actively monitors the voltage & current rating in current transformer and voltage transformer system. GSM means global system for mobile communication and its transfer the instruction to main circuit from operator vice versa in corresponding cloud based server using IOT (Internet of Things). We can monitor the meter readings regularly without the person visiting each house.

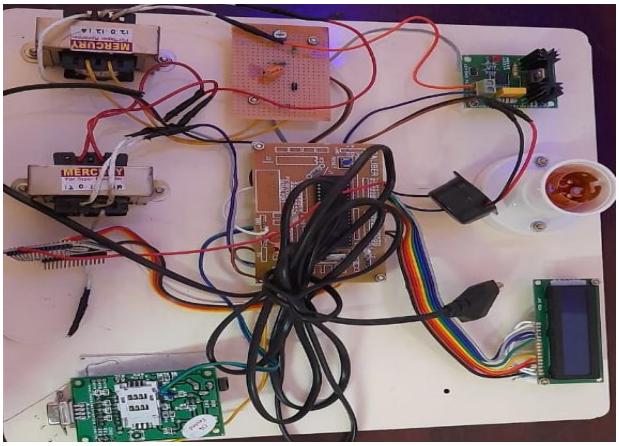

Fig 2: Hardware of smart energy meter

Current transformer, voltage transformer, GSM module and MP3 player, IOT module are interfaced with PIC 16F887A microcontroller.Which is shown in Fig 1.2

The Microcontroller commands the GSM module to transfer data using IOT on the cloud Microcontroller based power consumption monitoring system that senses parameters & shows on an LCD display.The meter readings are automatically send on Cloud generated using IOT. The main target of this system is to reduce miss communication between the user & distributor. This system will also help to bring transparency in electricity bills. It is more efficient & can be implemented in low cost.

Table 1: Specifications of smart energy meter

Specifications	**Ratings**
Rated voltage	230V
Rated power	1000 watts
Basic current	1A
Maximum current	5A

Table 2: Comparison of smart energy meters with traditional meters

Property	**Electro Mechanical Meter**	**Digital Meter**	**Smart Meter**
Accuracy	Low	High	Very high
Theft detection	Low	Possible at node level	Possible t network level
Communication	Manual reading	One way communication	Two way communication
Control	No	Limited	Full
Time wise reading	No	After a fix interval	Regularly
Day to day billing info	Not Possible	Not possible	Possible

RESULT AND ANALYSIS

The current power status is compared with the threshold value that is assigned by the IOT medium, if the value exceed from the threshold value the relay unit will trips the power unit. The entire parameters will be monitored with the LCD display along with the IOT thinks peak web page. The current status of energy consumption, voltage, current and power factor are shown in Fig 3.

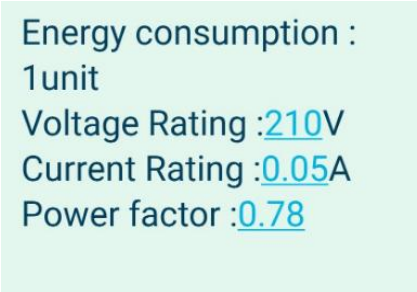

Fig.3.results Analysis for smart energy meter

CONCLUSION

This is aimed at replacing the old energy meters with an advanced implementation. It can be used for automatic power reading by which one can optimize their power usage thereby reducing the power wastage. The readings from the meter are uploaded to Thinkspeak.com where a channel with the energy usage for a particular energy meter can be viewed by

both the service end and the customer. This system will bring transparency between provider & consumer. The IOT based energy meter for calculating consumed power & displayed in LCD has been achieved. This project can therefore enlighten management about wasted time & unnecessary trips, book keeping & billing because it gives an accurate accounting of units driven.

FUTURE SCOPE

Needs to be implemented in a wireless sensor network with mobile nodes. The data aggregation need to be tested in the same wireless sensor network. Android application for smart phone users. Connect the keypad to change the mobile number.

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