DESIGN AND IMPLEMENTATION OF SMART ENERGY METER USING IOT

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Abstract - *Energy meter reading is a tedious and an expensive affair. The meter reader has to go and take the reading manually to issue the bill, which will later be entered in the software to automate the billing and payment system. This paper proposes a new technology for energy meter reading by IOT technology and web server along with the existing meters. An IOT modem will be integrated with electronic energy meter to read the parameter such as voltage, current, frequency and uploaded on server or website. Energy meter deliver the reading details and it is uploaded on the website instantly. This communication system is further useful for electricity regional/sub-regional office, who can monitor the power consumption, and they can identify the problems such as overload and power theft. Moreover, this problem is identified by using same website which is used for monitoring. In this project each customer is differentiated using address or ID, this ID are used for identification by the consumer and as well as by office to monitor the reading and payment details. An additional feature is provided to the user for controlling the power supply during in terms of emergency case.*

Key Words: **Automatic meter reader, Internet of Things, Energy meter, WI-FI, Arduino Uno, LCD, etc**

1.INTRODUCTION

Electricity is the driving force behind the development of any country. The rapid increase in residential, commercial, and industrial consumers of electricity throughout the world, it has now become imperative for utilities companies to plan better, environmentally-safe techniques of gauging utilities consumption .so that correct bills can be generated and invoiced.   The Internet of Things (IOT) model is implemented to automate the meter reading and uploaded in a web server. The process is carried out using WIFI module and embedded sensors, IoT has moved out from its beginning stage and it is actually on the edge of changing the present fixed inter-net into a well featured upcoming Internet. We propose a system that collects the energy consumption from residential as well as corporate zones and send it directly to the web server in daily basis where processing is done on that data for preparation of bills. SMR system can be used to collect a power consumption data from a meter. In existing system for collection of energy consumption data is that the

representatives of TNEB monthly comes and visit every residential, take the snap shot and corporate and manually reads the consumption data from the meter. This collected data is recorded on a piece of paper along with a snap shot of the meter and finally submitted to the local TNEB office. There after the official's read the snap shot and meter readings and then gives it to the local software for bill calculations and generation of bill. We as a consumer then make the payment for the received bill. This process is so much hectic process. Man made mistakes can be countless. Human resources wasted and many other problems do occur. We finally thought of building a system that will do the above process automatically. Microcontroller is attached with our traditional energy meters that will scan the meter reading every 60 seconds and wirelessly, these meters reading will transmitted to the web server along with their unique meter number. This data will be used to identify the power theft, overload usage, reduction in power factor etc.

1.1 LITERATURE SURVEY

In the year of May 2012, the authors Abhinandan Jain, Dilip Kumar, Jyoti Kedia presented a paper titled "SMART & INTELLIGENT GSM BASED AMR SYSTEM". This paper represents the development of fully automated energy meter which is having capabilities like remote monitoring & controlling energy meter. It saves huge human labour.

In the year of November 2016, the authors S. V. Anushree T. Shanthi presented a paper titled "IOT BASED SMART ENERGY METER MONITORRING & THEFT DETECTION USING ATMEGA". The main objective of the system is detection of theft of electricity increases the cost paid by customers & can have serious safety consequences. Identify the theft by sending alert SMS to owner send meter reading & rate every month to the owner. This system has an additional set up of IOT which portraits the global connection environment to the user & allow them to view the status of meter reading from anywhere at any time theft of electricity as a material impact on customers in terms of cost & safety.

In the year of June 2014, the authors O. Homa Kesav, B. Abdul Rahim presented a paper titled "AUTOMATED WIRELESS METER READING SYSTEM FOR MONITORING &

CONTROLLING POWER CONSUMPTION. In this paper the design presents new method for avoiding high construction & maintenance cost in the existing system. The system is designed in such a way that if the consumer is unable to pay the bill the power connection maybe disconnected automatically from remote server. The ARM 7 based hardware system consist of a processor core board & the peripheral board. The embedded C language is used as programming language in this system.

1.2 EXISTING SYSTEM

In existing system, human power is used to note the energy meter reading for each house and enter the system of regional office. This system is too complicate and need more human power to read the energy meter of each and every house. In this system human cannot know the reading until the date of bill payment. Overload and power theft cannot be identified by a human while take reading.
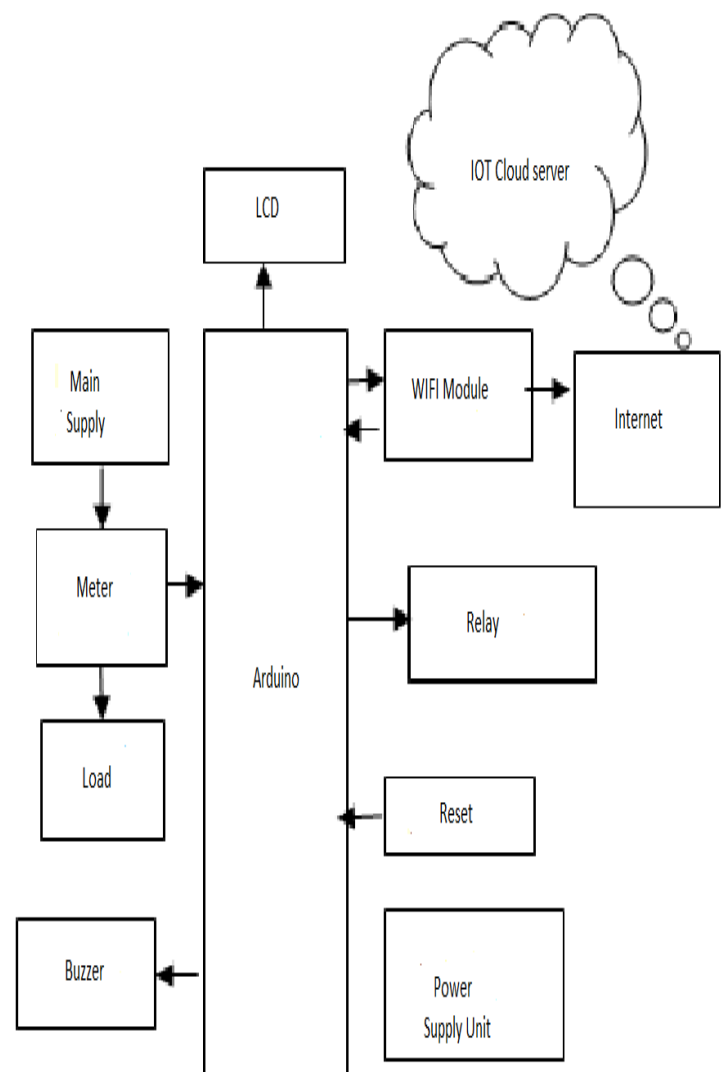
2. PROPOSED SYSTEM

The smart meter system consists of an external circuit for collect meter reading and communicates through the IOT, along with an external hardware circuit. Meter readings are passed through the IOT module connected to the smart meter. The external circuit is used to collect data such as voltage, current, power factor, power consumption and it is displayed in the LCD Display and Web server. A pulse counting is used to collect a data from the energy meter. It consists of WIFI module to upload a data in a web server Another feature is theft detection, which helps to detect unauthorized power consumption from home or commercial buildings. This theft detection was done by the help of buffer, this buffer is a part of the external hardware circuit. By operating this buffer, the relay control unit starts working. Any theft was detected with the help of IOT, TNEB officer get notifications also it provides an option to alert both the consumer and service provider. Smart Meters are advanced sophisticated meters that collect the energy utilization data more accurate than the traditional electric meters and communicate that information back to the utility providers for monitoring, controlling and billing purposes.

ADVANTAGES OF PROPOSED SYSTEM

- Consumes less power and high efficiency.

- If any user uses more electricity, indication will be sent and web server gives alert

- Voltage and Current sensor are used for measuring the voltage and current state of the EB meter

- we can avoid the wastage of power and power saving will takes place

- A Web server facility is provided for monitoring and control using PC

- No man power need for taking current readings.

- Avoid high usage of electricity.

- Can identify the high electricity used industries easily

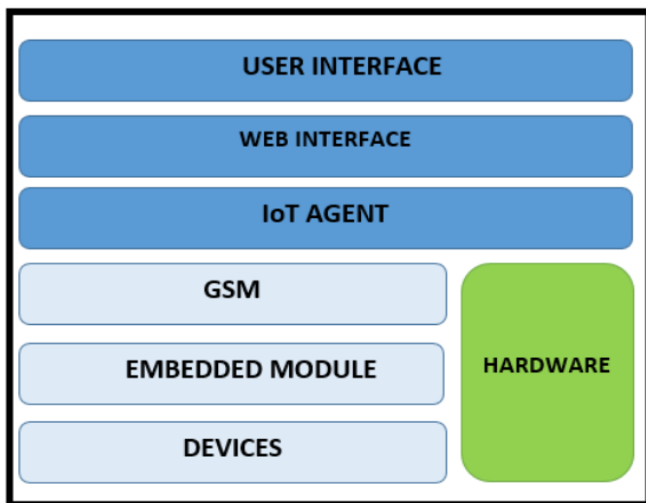**Fig -1:** Block diagram of smart meter

Fig -2: Block diagram of IOT

The meter calculates the power consumption with a help of a pulse count technique and reading showed in a display, the proposed system uses a controller and it takes the input from the pulse count unit as an analog input and it process the data and displays the output in LCD Display and also it is transmitted to the web server through the internet. It uses a WIFI module to communicate between the meter and the web server. It displays the parameter such as voltage, current, power factor, frequency in LCD display and web server.

Fig 3: Web server output

3. CONCLUSIONS

In this paper, an attempt has been made to design and implement practical model of Internet of Things based Smart Energy Meter. The proposed model is used to measure the energy consumption of the household, and displayed in a LCD display and also in a web server. Hence it reduces the wastage of energy and reduce overload usage of consumer, reduces power theft and it brings awareness among all. It will also deduct the manual intervention and will make the system smart and reliable.

REFERENCES

[1] Chunchi Gu, Hao Zhang, Qijun Chen, "Design and Implementation of energy data collection system using wireless fidelity (WIFI) module and current transformer"

[2] J. Kwac, J. Flora, R. Rajagopal, "Household energy consumption segmentation using hourly data"

[3] B. Karimi, V. Namboodiri, M. Jadliwala, "On the scalable collection of metering data in smart grids through message concatenation"

[4] M. Zeifman, "System and Method of Prediction of Household Enrollment in Energy Saving"

[5] Jennifer Bray and Charles F. Sturman, "Bluetooth 1.1 Connect Without Cables"

[6] L. Tim "The Supply Chain: Changing at the Speed of Technology"

[7] E. Yaniv, "A vision for ubiquitous sequencing"

[8] Wigmore I, "Internet of Things (IoT)", TechTarget, 2014.

[9] N. La D. Guido, W. Ian, "Contracting for the 'Internet of Things': Looking into the Nest"

[10] O. B. Sezer, E. Dogdu, A. M. Ozbayoglu, "Context-Aware Computing, Learning, and Big Data in Internet of Things

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