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IOT BASED ENERGY METER WITH TAMPERING DETECTION AND POWER SAVING

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Abstract:

The IoT based smart & many function energy meter for automatic meter reading using arduino kit. It has provision of connecting with central database maintained by energy provider using computing as well as Tampering detection of energy meters which can prevent theft detection from unregisterd users saving losses due to it. Remarkable feature of this meter is Internet of Things based implementation. According to the market requirements of Arduino meter there is use for smart Arduino meters. Now a days, the system will use wireless system for communication protocol. The wireless is used since the application need high speed data rate, need to be less powered with low cost. In this paper presenting the remote wireless arduino meter reading system. This is to resolving the shortcoming of the technology of the traditional arduino meter reading, by combining the characteristics of the wireless technology and with microcontroller ATMega16. The hardware implementation was designed, and then analysed the use cases for Arduino Meter. There are more chances of manual error,delay in processing,tampering of the meter and misusage of the electricity by other sources. It requires so many workers,one set of workers to note down the reading and other set to cut the power if payment is not paid at the right time.

Keywords- **Arduino, Microcontroller,Internet of Things,etc.**

I. INTRODUCTION

In the Internet of Things, many of the living & non-living things that encompass us will be on the internet in one form or another. Driven by the popularity of gadgets empowered by wireless technological innovation such as wireless Bluetooth, radio frequency, wireless-fidelity, embedded sensor. IoT has moved out from its beginning stage & it is actually on the edge of changing the present fixed internet into a well featured upcoming internet. Currently there are almost 9 billion inter connected gadgets & it is estimated to touch almost 50 billion gadgets by 2020. Today the world is facing such an environment that offers challenges. Energy crisis is the main problem faced by our society. A relevant system to control and monitor the power usage is one of the solutions for this problem. One approach through which today's energy crisis can be addressed is through the reduction of power usage in household. The consumers are increasing rapidly and also burden on electricity offering divisions is sharply increasing. The consumers must be facilitated by giving them an ideal solution Embedded systems and Real Time Operating systems (RTOS) are two among the several technologies that will play a major role in making these concepts possible. A large number of people are already depending on

operating systems for real time applications, these 'eyes in the sky' are now going to make an impact on our everydays in a more significant manner. Embedded systems are pre-designed without connection and operate as per the required task. But in operating systems instruction is design-oriented. These systems are basically platform-less systems. Embedded systems are the unsung heroes of much of the technology we use today the video game we play,or the CD player or the washing machines we use employ them. Without an embedded system we would not even be able to go online using modem Almost every car that rolls off the production line these days makes use of embedded technology in one form or the other; most of the embedded systems in automobiles are rugged in nature, as most of these systems are made up of a single chip. No driver clashes or 'systems busy' conditions happen in these systems. Their compact profiles enable them to fit easily under the cramped hood of a car. These systems can be used to implement features ranging from adjustment of the suspension to suit road conditions and the octane content in the fuel to antilock braking system (ABS) and security systems. Embedded systems are designed to do some specific task, rather than be a general-purpose computer for multiple tasks. Some also have real time performance constraints that must be met, for reasons such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs.

II. LITERATURE SURVEY

[1] Pooja D, Talwar PG Student, S. B. KulkarniIoT Based Energy Meter Reading International Journal Of Recent Trends In Engineering & Research (IJRTER) VOLUME-2, 2016.

This paper is described to measure energy consumption in the house &geerate its bill automatically using telemetric communication. This can help in reducing energy consumption in house as the owner is continuously being notified about the number of units that are consumed. Its objective is to generate bill automatically by checking the electricity units consumption in house & in a wat to reduce manual labour. Design & Implementation of paper is only based on ARM controller using IoT concept.

[2] BirendrakumarSahani, Tejashree Ravi, AkibjavedTamboli, Prof. R. S. Pisal "IoT BASED SMART ENERGY METER" INTERNATIONAL RESEARCH JOURNAL OF ENGINEERING & TECHNOLOGY (IRJET) VOLUME-4, APRIL 2017.

In this paper the idea of smart energy meter using IoT have been introduced. In this paper energy meter which is already installed at our houses are not replaced but a small modification on the already installed meters can change the existing meter into smart meters. The use of GSM module provides a feature of notification through SMS. One can access the meter working through web page. The propagated model is used to calculate the

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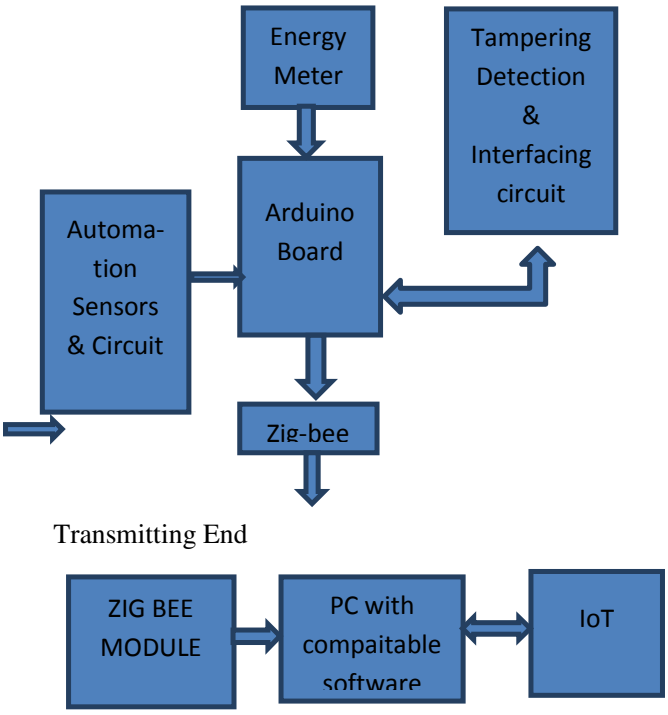
energy consumption of the household & even make energy unit reading to be handy.

[3] Md. MASUDUR Rahman, Noor-E-Jannat, Mohd. Ohidul Islam, Md. SerazusSalakin "Arduino& GSM Based Smart Energy Meter for Advanced Metering & Billing System" IEEE 2015 978-1-4673-6676-2115.

Every management system is trying to make automatic, portable and remote control. This work presents a novel smart energy meter for an automatic and superior metering and billing system. The integration of the Arduino and GSM Short Message Service (SMS) provide the meter reading system with some automatic functions that are predefined. Firstly, we have simulated the project in PROTEUS 8.0 then successfully implemented on the circuit board in laboratory. The proposed energy meter system can incorporate with embedded controller and GSM modem to transmit the data like consumed energy in kWh, generated bill, security services (line Cut/On) over GSM mobile network such as data can be then fed and integrated into existing energy management systems located at power companies or organizations to provide the services among the customers without man-power. Our implemented project is able to provide all required services remotely for metering and billing with high fidelity.

III. BLOCK DIAGRAM

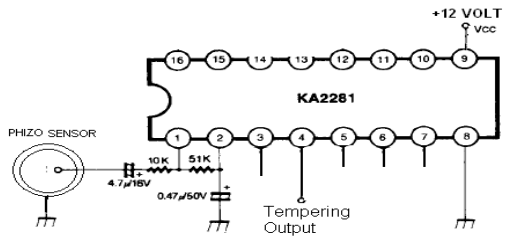


IV. METHODOLOGY

1.Energy Meter: Energy meter is a device which is used to measure the energy consumed by the customer. Basically energy meter is of two types Electro-Mechanical meter and Digital meter. Now a days digital meter are used because they are having high accuracy, with limited control and theft detection capability at nodes.

2.Interfacing Circuit & Tampering Detection: It is a device which takes out readings from meter and passes those readings to the pc through communication media. It also consists of a circuit which can switch ON/OFF power supply of customer. Basically it is a IOT based system which is operated according to program which is stored in a

microcontroller of arduino board.Piezo sensor is used for tampering detection. Piezosensor have a property to sense vibration and according to that provide output voltage. This output voltage is very low approximately 3to 4 mv. We are giving this signal to the Dot bar IC KA2281.



3.Data Communication Media: For transportingthe data from the energy meter to the Host PC a communication media is necessary. Communication can be done by two ways: (a) Wired Communication: power lines, phone lines, dedicated lines.(b) Wireless Communication: RF, GSM, GPRS.Service provider can use any communication media depending upon the services available to the service provider. In our project we are giving a concept of IOT medium. The Internet of things (IoT) is the inter-networking physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.Typically, IOT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine to machine communications and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities.

4. PC with compatible software: The heart of the meter reading station is the Meter Reading Software which resides in the PC at the Meter Reading Station. It is a standalone system which is responsible for collecting meter reading, storing them to the data base, calculation of bills, switching ON/OFF of power supply, and providing analysis facility.

V. COMPONENT USED

A.HARDWARE USED

- Arduino kit
- Energy Meter
- Zig-Bee
- LCD's

B.SOFTWARE USED

- C#

VI. CONCLUSION

This paper is mainly concentrated on IOT network. First point is we converting energy meter which is about the project there are electromagnetic into a digital meter. We are doing automatic reading and also connection and disconnection of meters using wireless module. Then meter reading has come faster.

It is available for the customers. The peoples will be using the information as per their requirements and they will be having freedom to check the bill, tampering, when the meter has been connected and disconnected before the due date. So concluding that we are successfully monitored the tampering seal tampering and we have read the meter bills which also be uploaded on the website using IOT concept. Overall the new things we are worked with in our project are controller coupled with Arduino controller and the IOT model. Metering Meter Reading is a unique solution for problems in existing manual system.Metering Meter Reading is self assured automation system. Implementation of metering Meter Reading with the help of standalone system is an innovative idea. There are more chances of manual error, delay in processing, tampering of the meter and misusage of the Electricity by other sources but with the help of metering Meter Reading, we can easily overcome this.

VII. REFRENCES

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