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Live Energy Meter and Tempered Detection using Zigbee

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ABSTRACT

Smart energy meter is the requirement of today's market. Zigbee system is utilized in today's smart system as a communication ptotocol due to advantages of high speed data rate and lower power consumption and cost. In this paper the remote wireless energy meter reading system is proposed. The aim of the sytem is to resolve the short comings of the traditional energy meter by combining the characteristics of the Zigbee technology and IEEE802.15.4 standard with AVR Microcontroller ATMega16.The hardware implementation was designed,and then analyzed the use cases for Energy Meter. This paper also focuses on implementation and analysis of the function of energy meter.

Keywords: AVR, IEEE802.15.4 , ZigBee, AMI, AMR, RF, GSM, GPRS

I. INTRODUCTION

The automatic metering system is designed to make the prevailing electricity billing system simpler and efficient. The conventional metering system is done manually. An employee of the Electricity Board will be coming to take the reading and enter in the card. 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 the payment is not paid at the right time and we have very poor servicing. The system is installed at the site of a standard utility meter and is configured for monitoring and operation by a user via keyword command programming on a data terminal or personal computer. In the Automatic System designed, the units consumed are measured at the consumer side in the form of pulses, it transmitted to the Electricity Board side where the units consumed and amount equivalent is calculated. The monetary values are displayed both at the consumer module and electricity board side.In this paper [1] they describe automatic meter reading based on zigbee.

II. LITERATURE SURVEY

ZigBee is a new global standard for wireless communications with the characteristics of low-cost, low power consumption, and low datarate. It has a good market in wireless meter reading. The design and implementation of a ZigBee-based wireless automatic meter reading system are proposed in this paper. The experimental results show that the design can meet the basic needs of automatic meter reading with flexibility and expansibility. It can act as a platform of wireless monitor system and supplies a new hardware design approach for wireless ZigBee networks.

With the rapid development of automation and measuring techniques, automatic recording of the data.

In the meter reading instrument has gradually become the target of people whose working, living, and home conditions are of increasingly high level of intelligence. Meanwhile, utilities also hope that the development of new technologies to solve the

problems they encountered in the practicalwork about cumbersome meter reading and no reliable protection of accuracy and real time; and enable both userfriendlyand improving public sector efficiency and management level. Existing wire-line meter reading system has a large number of risks. Wires are more complex, detrimental to adjustment and maintenance of the system. The long-term indoor and outdoor installation easily leads to aging, resulting in a risk of short circuit and breakage. For these reasons, it has become the industry very unresolved problem to design a remote meter reading system, with long-term reliance and convenient installation & maintenance, which not only read data automatically but also monitor operation status. With the development of wireless communication technology, in recent years there comes requirement for low cost equipment of wireless networking technology, called ZigBee. It is a short range, low-complexity, low cost, lowpower consumption, low data rate two-way wireless communication technology with high network capacity, short time delay, safety and reliance. Its main application areas include industrial controls, consumer electronics, car automation, agricultural automation, and medical equipment control. The core of this technology is established by IEEE 802.15.4 Working Group, and the ZigBee Alliance foundedin 2002 is responsible for high-level applications, interoperability testing, and marketing. Till now, the ZigBee Alliance has reached over 150 members of famous companies in the world including IBM, Ember, Mitsubishi, Motorola, and Philips, etc . Many semiconductor companies are targeting the ZigBee market. Since the standards were launched not long ago, chips in line with protocol have Been available of multi- chip solution and single-chip solution. It can be expected that ZigBee will have comprehensive applications in the field of automation. The main methods of metering at home and abroad are: manual meter reading, IC Card prepaid meter, wire-line and wireless meter reading system. Manual meter reading has Been for decades, but with the implementation of one home one meter, drawbacks of this method of reading are more and more, like difficult entrance to home, low efficiency of fee settlement, etc.In this paper[4] they describe development of a smart power meter for AMI based on zigbee communication.

AMR stands for Automatic Meter Reading. A device which remotely obtain meter readings and transmits this data to the system's computer via communication media such as phone lines, power lines, GSM, or dedicated cables for processing. AMR devices can detect outages, remotely connect and disconnect services, detects tampering as well as other uses. Economic benefits include increased cash flow, lower labor and equipment cost, increased accuracy and lower costs. Some customer satisfaction benefits include improved service quality, more customer choices and faster response time. A typical Automatic Meter Reading (AMR) set up can be conceptualized using the following block diagram.In this paper [2] they describe design and implememtation of wireless AMR system.

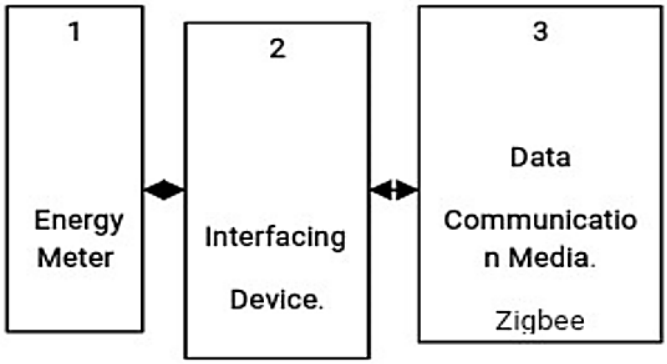

Figure 1. Block Daigram Of ARM System

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.

1. Interfacing Device: It is a device which takes out readings from meter and passes those readings to the remote pc through communication media. It also consists of a

circuit which can switch ON/OFF power supply of customer.

2. Data Communication Media: For transporting the data from the energy meter to the Host PC a communication media is necessary. Communication can be done by two ways,. Wired Communication: power lines, phone lines, dedicated lines. Wireless Communication: RF, GSM, GPRS. Service provider can use any communication media depending upon the services available to the service provider.
3. Remote 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.

III. CONCLUSION

This device will obtain meter readings and transmits this data to the system's computer via communication media such as Zig Bee (RF communication module) or dedicated cables for processing. AMR devices can detect outages, remotely connect and disconnect services, detects tampering as well as other uses. Economic benefits include increased cash flow, lower labor and equipment cost, increased accuracy and lower costs. Some customer satisfaction benefits include improved service quality, more customer choices and faster response time.

In future this can include events alarms such as tamper, leak detection, low battery, or reverse flow. Many AMR devices can also capture interval data, and log meter events. The logged data can be used to collect or control time of use or rate of use data that can be used for water or energy usage profiling, time of use billing, demand forecasting, demand response, rate of flow recording, (leak detection, flow monitoring, water and energy conservation enforcement, remote shutoff, etc.The meters in an AMI system are often referred to as smart meters, since they often can use collected data based on programmed logic.

IV. REFERENCES

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