Wireless Design for Power Theft Identification Using GSM

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ABSTRACT: Aiming at the disadvantage of current anti-theft technology, a based wireless power theft monitoring system is proposed in this project. This project describes PIC16f877a Microcontroller based design and implementation of energy meter using IoT concept. 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. Theft detection unit connected to energy meter will notify company side when meter tampering occurs in energy meter and it will send theft detect information through PLC modem and theft detected will be displayed on the terminal window of the company side. Wi-Fi unit performs the IoT operation by sending energy meter data to web page which can be accessed through IP address. The Hardware interface circuit consists of PIC16f877a Microcontroller, LCD display, theft detection unit and ESP8266 Wi-Fi module. Wi-Fi unit performs the IoT operation by sending energy meter data to web page which can be accessed through IP address. In our project determines the greatest opportunity for energy savings by continuously monitoring and controlling power theft from the electric meter by taking readings from it. This system prevents the illegal usage of electricity, which can be solved automatically without any human control .The implementation of this system will save large amount of electricity

I.INTRODUCTION

Electrical metering instrument technology has come a long way from what it was more than 100 years ago. From the original bulky meters with heavy magnets and coils there have been many innovations that have resulted in size and weight reduction in addition to improvement in features and specifications. So it is new concept in world of Electricity measurement. This concept is not only beneficial for electricity measurement but also has the capability to prevent misuse of electricity. Now a day, the energy consumption and distribution has become a big subject for discussion because of huge difference in energy consumption and energy production. At present most of the houses in INDIA has the traditional mechanical watt hour meter and the billing system is not automated. So a new system was discussed known as smart energy electronic meter which uses cloud in it.The present project Smart Energy Meter addresses the problems faced by both the consumers and the distribution companies. 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. The paper discusses comparison of Arduino and other controllers, and the application of GSM and Wi-Fi modems to introduce 'Smart' concept. With the use of GSM modem the consumer as well as service provider will get the used energy reading with the respective amount, Consumers will even get notification in the form text through GSM when they are about to reach their threshold value, that they have set. Also with the help of Wi-Fi modem the consumer can monitor his consumed reading and can set the threshold value through webpage. 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. Also there are other issues that we have to address such as power theft and meter tampering which in turn generate economic loss to the nation. Monitoring, Optimized power usage and reduction of power wastage are the major objectives that lie ahead for a better system.

II.LITERATURE REVIEW

In this manner, the framework can beat the issues of human mistake and power misfortune as far as controlling and the board. Also, it can likewise illuminate the manual control and a unit recording activity without human blunder. To accomplish this refined framework, the correspondence, and systems administration are the significant job to follow all sort of availability among the individual gadgets. The test is to fabricate the system framework with hearty, at similar time low power utilization just as reasonable. The fundamental target of our proposed framework is to actualize also, grow minimal effort Wi-Fi-based single stage advanced vitality meter with IoT s ideas.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. Also there are other issues that we have to address such as power theft and meter tampering which in turn generate economic loss to the nation. Monitoring, Optimized power usage and reduction of power wastage are the major objectives that lie ahead for a better system.

Design and Implementation of Wireless Sensor Network and Protocol for Smart Energy Meter[1]. The electricity system is one of the most important infrastructures in the modern society because it is the electrical power source of the electrical machines, e.g. motors and generators, used in the factory and also for the electrical appliances and lighting in households. Recently, an automation system has been applied to many basic infrastructures such as electricity, gas, and water systems in order to facilitate the routine work such as a manual control and a unit recording operation. Nowadays, the unit recording has to be done by human before the end of each month. Since the unit recording was done by human, the human error becomes the major problem of system. Recently, the smart meter concept has been popularly adopted by many leading electricity companies in USA and EUROPE in order to overcome the problem of human error in the unit recording as well as provide the automatic procedure to report the energy meter impairment and the tampering activity of misbehaved subscribers by using the advance wireless and wired communication technologies.

Relevance to current Research
The main objective of the system is detection of theft of electricity increases the cost paid by customers and can have serious safety consequences. Identify the theft by sending alert SMS to owner send meter reading and rate every month to the owner.

IOT Based Smart Energy Meter Monitoring and Theft Detection Using Atmega [2] this system has an additional set up of IOT which portraits the global connection environment to the user and 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 and safety.

Relevance to current Research
This paper describes PIC18F46k22 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.

IoT Based Energy Meter Reading, Theft Detection and Disconnection usingPLC modem and Power optimization[3]. Theft detection unit connected to energy meter will notify company side when meter tampering occurs in energy meter and it will send theft detect information through PLC modem and theft detected will be displayed on the terminal window of the company.

Relevance to current Research
In this paper the Aiming the disadvantage of current antitheft technology a novel smart grid based wireless power theft monitoring system is proposed in this paper.
Wireless design for power theft monitoring[4] The proposed architecture is design for single phase electricity distribution system and this design can be implemented for three phase system of electricity distribution with minor modification.
This system consist of

1. Wireless transformer sensor node

2. Smart controlling station

3. Smart transmission line sensor node

4. Smart wireless consumer sensor node

Relevance to current Research

This paper represents the wireless electricity power theft detection using zigbee technology present and efficient and less costly way to adulterate the wireless technique in this research paper. This wireless system is use to overcome the theft of electricity via bypassing the energy meter and hence it also control the revenue losses and utility of the electricity authorized agency. Mainly this system consists of microcontroller, energy meter zigbee module to check for the theft of electricity and send a message to the authorized agency.Wireless Electricity Theft Detection using zigbeetechnology[5]

III.METHODOLOGY OF PROPOSED SURVEY

The proposed system is to detect and monitor the theft of electricity by using GSM. In this area of electricity consumers is divided into sections and for each section IoT based Energy meter is installed to monitor all the parameter of the sections. This smart energy meter we monitor the energy or power usage by a remote technology using IOT. Since it doesn't have any physical contact with the equipment. The degree of accuracy in the way of measuring the energy is very high. The proposed system consists of current transformer and potential transformer, PIC microcontroller, IOT and relay. The block diagram of the project consists of controller part, theft detection part and wifi unit. Controller part consists of PIC microcontroller. WIFI ESP8266 for the IOT operation. LCD, Relay these are other components present in the system. Microcontroller is the core component of the project that connects input and outputs of the devices. Microcontroller based power consumption monitoring system that senses parameters and shows on an LCD display. The meter readings are automatically send on Cloud generated using IOT.

Also the information is sent to the web server through wifi which is attached to NodeMCU. The information uploaded on the internet is accessed through a webpage. And the programming of the whole system is done using embedded 'c'. The data from energy meter by the help of current and potential transformer will be transmitted to cloud by PIC microcontroller. The stored data can recognize by authorized persons of electricity board and customer can be monitor. Data from the controller will be sending to the GSM module, it will be send to consumer's registered mobile number every day. And one master unit is provided at near distribution pole site to monitor all the sections data.

To show the all the parameters of the system we are going to use Think Speak website to display all the parameters in graphically well as digit format. Here at the Think Speak site MATLAB simulation and visualization is provided to analyze data. At every time interval all the data of the systems is automatically stored in one excel sheet so there is no need to write & note any readings. When someone hooks the line in any section, data of all the sections is stored in Think Speak cloud and data get analyzed. In this analyzing process the master unit data is compared with the sum of all sections data and if both the data gets matched it means the there is no any theft. And if there is theft condition available both data did not get matched and Think Speak shows theft condition on website page.
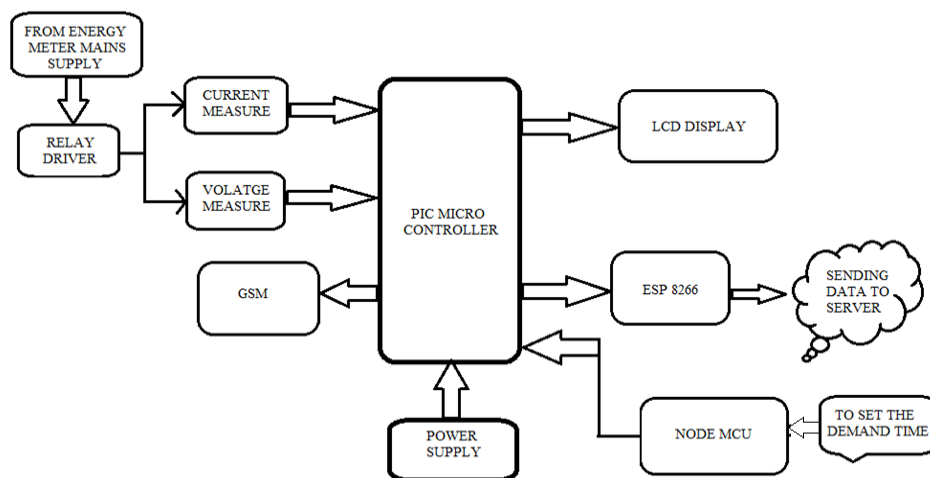
Figure.1 Block Diagram of Wireless Power Theft Monitoring System

ENERGY METER

Energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Energy meters are typically calibrated in billing units, the most common one being the kilowatt hour (kWh).

Energy meters operate by continuously measuring the instantaneous voltage (volts) and current (amperes) and finding the product of these to give instantaneous electrical power (watts) which is then integrated against time to give energy used (joules, kilowatt-hours etc.). Meters for smaller services (such as small residential customers) can be connected directly in-line between source and customer. For larger loads, more than about 200 ampere of load, current transformers are used, so that the meter can be located other than in line with the service conductors. The meters fall into two basic categories, electromechanical and electronic.

PIC MICROCONTROLLER

PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller" now it is "PIC" only.

PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

IV.CONCLUSION AND FUTURE WORK

In this project, Energy theft monitoring using IoT is an innovative application of internet of things developed to control the power theft remotely over the cloud from anywhere in the world. We started this project with a basic idea of building a wireless technology. We can operate this project in any home to substation from power theft by using GSM technology. The system would provide a simple way to detect an electrical power theft without any human interface. The system updates the information in every 10 to 12 seconds on the Think Speak cloud using internet. This system is basically made for the reduce the Electricity theft issue to reduce the commercial losses, direct hooking on power line this issues can be also eliminated by using this system. In the present system, energy load consumption is accessed using Wi-Fi and it will help consumers to avoid unwanted use of electricity.
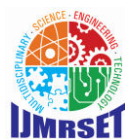
This project does have more advantages for power stations finally we succeeded in building a wireless technology. Our paper not only indicates the place of power theft but also the amount of energy being stolen that is, it gives the best of the expected results. Finally, we are successfully finished our project.

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