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ENERGY METER READING MONITORING THROUGH IOT

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ABSTRACT

A smart energy meter is proposed based on Internet of Things (loT). The proposed smart energy meter controls and calculates the energy consumption using NodeMCU microcontroller which has a in-built Wi-Fi module and uploads it to the cloud from where the consumer or producer can view the reading. Therefore, energy analyzation by the consumer becomes much easier and controllable. Thus, this smart meter helps in home automation using IoT and enabling wireless communication which is a great step towards Digital India.

The proposed system is cost effective and compact, so, installment becomes much easier. The result is uploaded at every interval into cloud space called "Blynk IOT" and monitoring can be done by consumer/customer as well as supplier/ producer.

INTRODUCTION

Smart Energy Meter has received quite a lot of acclaim across the globe in recent years. Industries are realizing the benefits of smart meters and assuming them to improve the efficiency and accuracy of utility management. There are near about 13.8 million smart and advanced meters that are operating across homes and businesses in Great Britain, by large as well as small energy suppliers. That means 8% increase in operating meters from the previous quarter. Asian countries are placing themselves as the leaders in this space: they have a goal that by 2022, 70% of all homes in the region will be connected via smart meters. Organizations have already stated investments of more than USD 62 billion for smart meter infrastructure. Traditional meters which were earlier used, measures only total consumption, whereas smart meter is an internet capable device that is able to report when and how much of resources such as water, energy and natural gas are consumed. Utility industries can use smart meters to decrease their operational costs greatly. Smart metering benefits by eliminating the hassle of monthly or quarterly meter readings. In the past, to make it simple for users to take readings, meters have been located outside of buildings or at the edge of gardens. Smart

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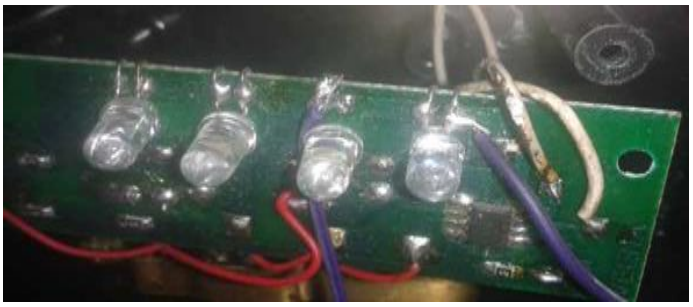
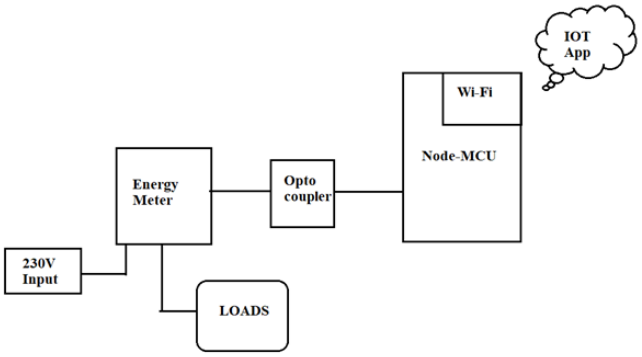
meters can, however, be located anywhere in the household. Thanks to smart meters, using real-time dashboards, homeowners and renters can keep a closer eye on their energy consumption. And most important the insights provided by smart meter infrastructure can be also used for the formation of an even more customer-centric structure. With IoT solutions for smart meter, you can support to improve customer service through actionable insights generated from meter data.

PROBLEM STATEMENT AND SOLVING

As we mentioned above several advantages of digital energy meters, but always there are chances of innovation or modification in different instruments for ease of consumer and supplier. Following are some problems observed in those energy meters which should be rectified:

1. Meter reading and other related tasks like bill payment are performed by a large number of staff i.e., large number of employees are required.
2. An expansive number of staff is utilized for meter reading and other related assignments like bill payment.
3. Billing errors due to carelessness of meter readers during meter reading and sometime billing estimation.
4. Consumer has to stand in queue for hours for bill payment.
5. Careless usage of electricity by consumer who is unaware of its cost.
6. Consumers are not bound to pay bill on time.





Efficient energy utilization plays a very vital role for the development of smart grid in power system. So, proper monitoring and controlling of energy consumption is a chief priority of the smart grid. The existing energy meter system has many problems associated to it and one of the key problem

is there is no full duplex communication. To solve this problem, a smart energy meter is proposed based on Internet of Things (loT).

The proposed smart energy meter controls and calculates the energy consumption using NodeMCU microcontroller which has a in-built Wi-Fi module and uploads it to the cloud from where the consumer or producer can view the reading. Therefore, energy analyzation by the consumer becomes much easier and controllable. Thus, this smart meter helps in home automation using IoT and enabling wireless communication which is a great step towards Digital India. The proposed system is cost effective and compact, so, installment becomes much easier. The result is uploaded at every interval into cloud space called "Blynk IOT" and monitoring can be done by consumer/customer as well as supplier/ producer.

LITERATURE SURVEY

1.A paper, proposed "Smart energy meter surveillance is using IoT" about IoT, internet of things as an emerging field and IoT based devices have created a revolution in electronics and IT. The foremost objective of this project is to create awareness about energy consumption and. efficient use of home appliances for energy savings. Due to manual work, existing electricity billing system has major drawbacks. This system will give the information on meter reading, power cut when power consumption exceeds beyond the specified limit using IoT. The Arduino esp8266 micro controller is programmed toper form the objectives with the help of GSM module. It is proposed to overcome all the disadvantages in the already existing energy meter. All the details are sent to the consumer's mobile through the IoT and the GSM module and it is also displayed in the LCD. It is a time savings and it helps to eliminate the human interference using IoT. Devadhanishini et al.

2. "Smart Power Monitoring Using IoT" that energy Consumption is the very important and challenging issue. Automatic Electrical Energy meter is used in large electric energy distribution system. The integration of the Arduino WIFI and SMS provides the system as Smart Power Monitoring system. Smart energy meter provides data for optimization and lessthe power consumption. This system also includes a motion sensor such that if there is no human in house or house it will automatically turn off the power supply. Mohammed Hosseiu et al.,

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3. presented a paper titled “Design and implementation of smart meter using IoT” describing the growth of IoT and digital technology. The future energy grid needs to be implemented in a distributed topology that can dynamically absorb different energy sources. IoT can be utilized for various applications of the smart grid consisting power consumption, smart meter, electric power demand side management and various area of energy production. In this paper, the Smart Energy Metering(SEM) is explained as the main purpose of SEM is necessary for collecting information on energy consumption of household appliances and monitor the environmental parameters and provide the required services to home users. Himanshu K Patel et al.,

4. demonstrated “Arduino based smart energy meter” that removes human intervention in meter readings and bill generation thereby reducing the error that usually causes in India. The system consists the provision of sending an SMS to user for update on energy consumption along with final bill generation along with the freedom of reload via SMS. The disconnection of power supply on demand or due to pending dues was implemented using a relay. The system employs GSM for bidirectional communication. BibekKanti Barman, et al.,

HARDWARE COMPONENTS

In mains-supplied electronic systems the AC input voltage must be converted into a DC voltage with the right value and degree of stabilization. The common DC voltages that are required to power up the devices are generally in the range of 3 VDC to 30 VDC. Typically the fixed types of DC voltages are 5V, 9V, 12V, 15V and 18V DC.

Transformer

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. A step down power transformer is used to step down the AC voltage from the line voltage of 110 VAC or 220 VAC i.e, it converts higher voltage at the input side(Vin) to a lower voltage at the output (Vout).

Filtering is performed by a large value electrolytic capacitor connected across the DC supply to act as a reservoir, supplying current to the output when the varying DC voltage from the rectifier is falling. The diagram shows the unfiltered varying DC

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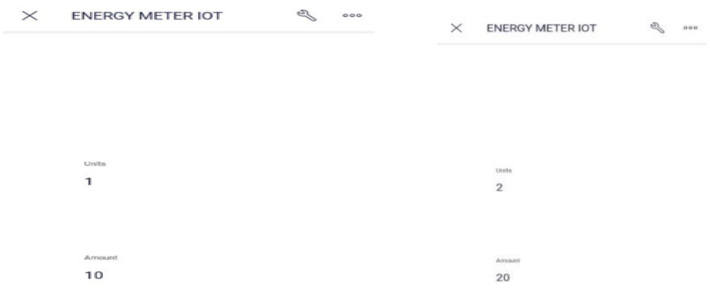
(dotted line) and the filtered DC (solid line). The capacitor charges quickly near the peak of the varying DC, and then discharges as it supplies current to the output.

It is a well-known and most common type of age-old energy meter. It comprises a rotating aluminum disc placed on a spindle between two electromagnets. The rotation speed of the disc is proportional to the power, and this power is integrated by the use of gear trains and counter mechanism. It is made of two silicon steel laminated electromagnets: shunt and series magnets.

Series magnet carries a coil which is of a few turns of thickness wire connected in series with the line; whereas the shunt magnet carries a coil with numerous turns of thin wire connected across the supply. Braking magnet is a kind of permanent magnet that applies the force opposite to the normal disc rotation to move that disc a balanced position and to stop the disc while power gets off.

RESULT



CONCLUSION

Smart energy monitoring system includes Arduino, WI-FI, energy meter. The system automatically reads the energy meter and provides home automation through an app developed and power management done through this application. The proposed system consumes less energy and it will reduce manual work.

We can receive monthly energy consumption from a remote location directly to centralize office. In this way we reduce human effort needed to record the meter reading which are till now recorded by visiting the home individually.

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