Prepaid Smart Energy Meter with IOT based Advanced Metering and Billing system

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Abstract:- In this project we are going to propose a system to develop the energy metering in residential & industrial areas. Now we calculate and monitor the energy consumption by using Smart energy meter. We are going to propose the method to provide credit card based energy recharging and monitoring the energy usage in smart manner by using the technology called Internet of things. And also going to control the Electronic Home appliances remotely by using a web application.

Keywords:-Smart Energy meter, Internet of things, sensors, monitoring, billing, Ethernet.

1. INTRODUCTION

Energy Conservation is an important resource for all the livings on the earth. In that, some people are not getting sufficient amount of Energy because of unequal distribution. We can use this approach so that everyone gets the equal amount of Energy. It is also used to avoid the wastage of Power during the distribution period. In the previous method, the employee will go to that place and take the reading for a particular duration, then again the employee will go to the same place and take the reading, it is waste of time. The proposed system is fully automated. Here human work and time are saved.In this project, we will implement the design of IOT based advanced metering and billing system that monitors the quality of energy in real time. This system consists some sensors which measure the amount of energy parameter The current system of energy metering is un-useful and can cost a major waste of power. The paper is innovative step to digitalize the power supply system throughout the city as well as villages.The real-time monitoring of readings& consuming the wastage of Power information. It will be benefit of the Electricity generation department and the public. To ensure the safe measurement of meter reading and the system should be monitored in real time for that purpose new approach IOT (Internet of Things) based energy monitoring has been proposed. In this project, we will implement the design of IOT base Continuous and real time monitoring of energy in IOT platform. Internet of things is nothing but the network of physical objects embedded with electronics, sensors, software, and network connectivity. Monitoring can be done from anywhere as central office. Using free sever data continuously pushed on cloud so we can see data in real time operation. Using different sensors with controller and valve as Mini computer can monitor data and also control operation from cloud with efficient
Client server communication

2. LITREATURE SURVEY

1. V.Preethi and G. Harish –Design and implementation of smart energy meter,may 2014 .

The author proposed that the human error can open an opportunity for corruption done by the human meter reader in the Electronic energy meter. So the problem which arises in the billing system can become inaccurate and inefficient. Smart Energy meter replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider.

2. Jordan Rel Orillaza, Angelico Angeles and Arnulfo Barra – Distribution Utility survey on electricity prepaid metering,sep,2015

Distribution Utility (DU) were improved customer service, improved cash flow, reduced cost of meter reading and ease of controlling. The role of Advanced Metering Infrastructure, including Prepaid Metering in reducing technical and non-technical losses in the distribution system.

3. Ravi Ramakrishnan and Loveleen Gaur – Smart electricity distribution in residential areas :Internet of things(IOT) based advanced metering infrastructure and cloud analystics,jan 2016

A prepaid energy smart meter records consumption of electrical power and uploads the data through GSM or Wireless networks at regular intervals to a central control unit.The smart meter records the consumed electrical power and uploads the data through wireless network that means IOT.

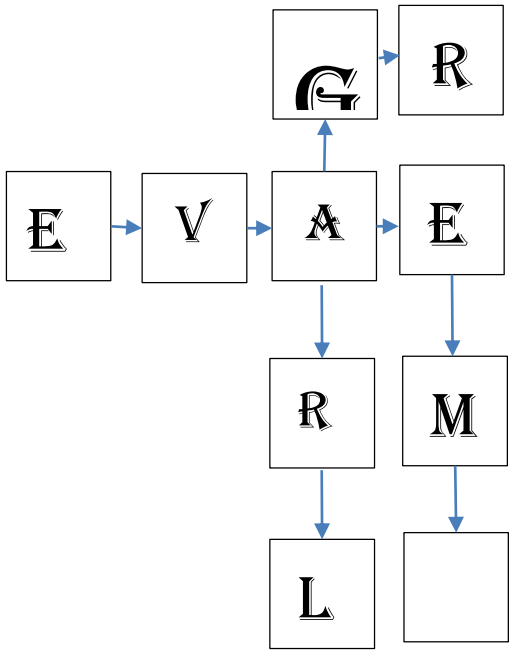
3. EXISTING SYSTEM

Electronic energy meter is capable of taking readings and can store it into its memory.Taking energy meter reading is time consuming and an expensive task.
Taking long distance and take the reading manually to prepare the bill.Consumers have to go to the billing office, stand in a long line and submit the bill. This is a boring job and time consuming also.

4. PROPOSED SYSTEM

The proposed system replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider. Also they can monitor the meter readings regularly without the person visiting each house. This project describes the study about Automatic Meter Reading (AMR) in indoor environments, implementing a WSN (Wireless Sensor Network) .

5. BLOCK DIAGRAM



6. RELATION WITH IOT

In past, the living of individuals has been changed due to the Internet. The IOT has been became an emerging research area because of need of an establishment for connecting things, sensors and other smart technologies. IOT is known as internet's advanced version. Information related to physical objects can be immediately accessed by IOT and results into novel system having high efficiency and outputs. In IOT, a number of main technologies are there like ubiquitous computing, RFIP, wireless sensor network, cloud computing. Cloud computing, a large-scale, low cost processing unit and also an IP based connection mostly used for calculation and storage purpose. The water quality monitoring application contains many distributed monitoring sensors' array and a wide distribution network. Separate monitoring system is also required in it as told in paper. This paper introduces cloud computing techniques for screening values on the internet.

7. HARDWARE&SOFTWARE

7.1 Smart energy meter: An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. A possible solution is a wireless energy meter(WEM) which is able to send its data via wireless. Communication to a PC or a remote device where monitoring Analysis of the data will be easily made the Measurement system is aimed to be used in measuring energy related quantities such as units consumed, consumed power, active load etc. of a house.

Fig 7.1 Smart energy meter.

7.2 The Arduino Uno R3: It is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery.

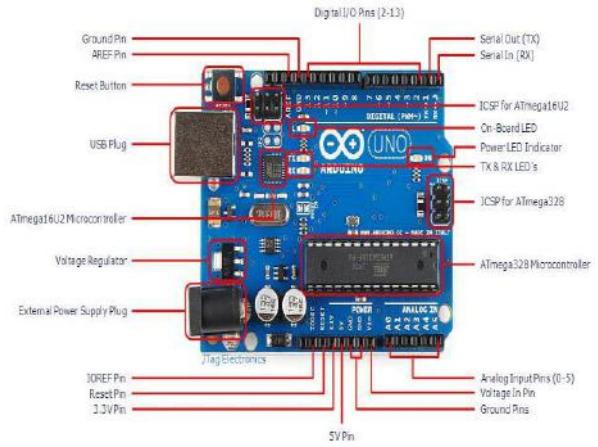


Fig 7.2 Arduino uno r3.

7.3 Relay: The Relay can be used to control a circuit. It is used in places where signal can be used to control a lot of circuits like motors, fan and 230v Bulb. The applications of channel relays require high power to be driven by electric motors and so on. Such relays are called contactors. Relays are simple switches which are worked. Switch based Relays consist of an

electromagnet and also a set of contacts. The switching mechanism is continued with the help of the electromagnet. But they differ according to their applications.

Fig 7.3 Relay

7.4 Motor: A DC motor is any of a class of electrical and electronic machines that converts DC electrical power into mechanical power. The most common types relay on the forces produced by magnetic fields. Domestic energy consumption is the total amount of energy used in a house for household work. The amount of energy used per household varies widely depending on the standard of living of the country, the climate, and the age and type of residence.

Fig 7.4 D.C.Motor

7.5 Result and Discussion: It shows that the simulation circuit for our proposed system. We believe that the right blend of data and advancements can give a proper answer for the train following framework to clear and improve the effectiveness The arrangement we propose includes Voltage sensor, microcontroller, Ethernet Shield and IOT . In proposed system, we replaced the traditional meter by metering module. Consist of metering IC and microcontroller which scans the energy meter automatically. Every month and transmits this collected data to the remote station through the IOT network. After receiving this data is stored in the database and process on it for the creation of bills.

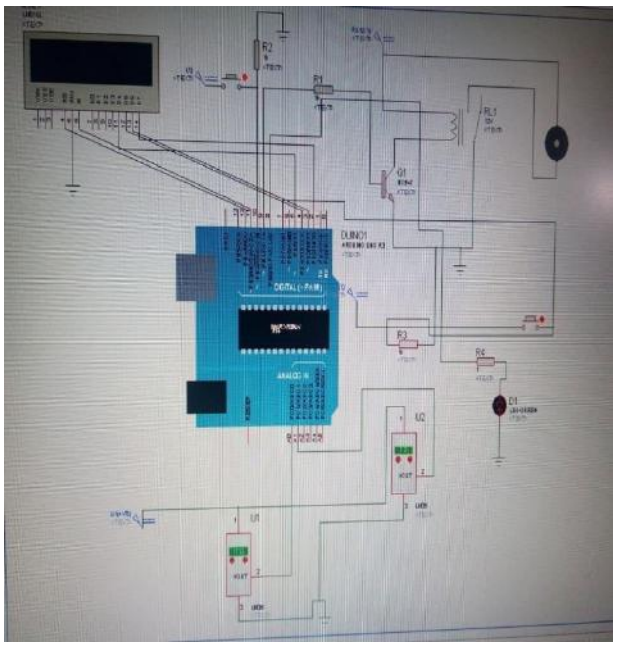


Fig 7.5 Smart energy meter circuit.

8. CONCLUSION

In this project, an energy consumption calculation based on the counting of calibration pulses is designed and implemented using ARDUINO UNO in embedded system domain. In the proposed work, IOT based meter reading system is designed to continuously monitor the meter reading. Service provider can disconnect the power source whenever the customer does not pay the monthly bill and also it eliminates the human involvement, delivers

effective meter reading, prevent the billing mistake. Due to database, it is possible to monitor the whole system from central office and produce daily, monthly and yearly reports for quantitative analysis of supply.

9. REFERENCES

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