AUTOMATIC METER READING

Dept. of computer, Sir Visvesvaraya Institute of Technology
A/p.: Chincholi, Tal.:Sinnar, Dist.: Nashik, Maharashtra, India-422102

Mr. Devidas Thosar
Assistant Professor
Devidas.thosar@pravara.in
Department of Computer Engineering

Daware Vaibhav
Vaibhavdaware1205@gmail.com
Department of Computer Engineering

Hinge Prasad
hingeprasad.pnh@gmail.com
Department of Computer Engineering

Avhad Shweta
Shwetaavhad29@gmail.com
Department of Computer Engineering

Hinge Shubham
shubhamhinge2410@gmail.com
Department of Computer Engineering

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ABSTRACT - Electricity is required to measure powerconsumption.A Conventional system requires anindividual and agent to physically come and takedown the readings and report to household oroffice the amount one must pay. This process isvery length and erroneous.So there is increaseddemand for Automatic Meter Reading (AMR)systems which collect meter readings electronically, and its application is expanding over industrial, commercial and utility environment.The main objective of the project is focused on the application of PLCC (Power Line Carrier Communication). The important advantageof this system is that no additional transmissioElectricity is required to measure power consumption.A Conventional system requires an individual and agent to physically come and take down the readings and report to household or office the amount one must pay. This process is very length and erroneous.So there is increased demand for Automatic Meter Reading (AMR) systems which collect meter readings electronically, and its application is expanding over industrial, commercial and utility environment.The main objective of the project is focused on the application of PLCC (Power Line Carrier Communication). The important advantage of this system is that no additional transmission line is needed for the transmission of data. It gives the useful functionality of switching the power ON or OFF to the user based on the signal sends to it from the controller corresponding to the status Also the Customers can pay their bills at home through the RFID reader. The automated EB billing procedure fulfills a set of needs for the user and the EB workers. line is needed for the transmission of data. It gives the useful functionality of switching the power ON or OFF to the user based on the signal sends to it from the controller corresponding to the status Also the Customers can pay their bills at home through the RFID reader. The automated EB billing procedure fulfills a set of needs for the user and the EB workers.

Keywords— AMR, Power Line Carrier Communication,controller,RFID reader.

INTRODUCTION

Electricity is the building block for the development of any nation. It directly affects the economic growth of the country. So it becomes necessary to monitor and control usage of electricity. As the billing is done manually the error probability and manipulations while observing will be more. Drawbacks of the present system can be eliminated and efficiency of the system can be improved through automation. A system can be developed which will monitor the energy consumption of subscriber. The system should also be able to communicate with central authority through the power line. Thus electricity theft detection system has become a necessity for most energy suppliers. The Power line communication has many services on the data transfer via power line without using extra cables Remote meter reading system is an important application in this regard due to every user connected to each other and central station through the power line. It is a technique to facilitate remote energy consumption reading. Illegal usage of electricity may indirectly affect the economic state of a country negatively. In our world, many thesauri are taking place, even though the existing electricity consumption process seems in India to be very ancient and does not meet the latest technology available. In this paper, the above-said process is totally automated and the communication is made possible entirely through the power line .In this proposed system, the meter readings in the form of digital data are transferred from the customer end to the EB office through power line, In this system, billing and so the control of the system is fully automated when a customer fails to pay his bill within a given period of time the supply automatically gets cut off to his house and the restoration is done. In the existing system, the readings are taken using an employee working at EB office. This system has come some disadvantages like erroneous readings, difficult manipulation, manual labor and time consuming. Using electric power lines as a signal transmission medium is possible as every building and home is already equipped with the power line and connected to the power grid. For providing high-

speed network access points the Power Line Carrier (PLC) systems use the existing AC (Alternating Current) electrical wiring as the network medium. In many cases, construct a PLC network using an existing AC electrical wiring is simple than other networking systems and relatively economical as well. Automated Meter Reading (AMR) is one of the most important applications of Power Line Carrier (PLC). If a PLC-based AMR is set in a power delivery system a detection for Non-Technical loss can be easily deployed.

LITURATURE SURVEY

Son et. al.[1] proposed a system based on IoT which comprises modem of mains communication, a unit of WiFi and a unit of theft detection. The whole system was divided into two individual subsystems [1, 9]. The first unit was required to be set up at the client location whereas the second one was needed to be set up at the control station of the electricity provider. Here, they proposed use of three MCUs. Two of the microcontrollers required to be set up at client's end for the purpose of theft detection and IoT while the other MCU was needed to be set up at the control station. Nevertheless, this system required utilization of two individual systems to function which is not cost-efficient.

Jain et. al.[2] proposed digital prepaid meters to replace electromechanical meters. Here it was a argued that inapt meter monitoring and reading causes a significant loss of electricity revenue which can be reduced by use of their proposed prepaid system. Mobile would be used as communication medium for this system of prepaid card to stay connected with electricity supplier [10]. This proposed system was appropriate for collection of revenue from clients. However, this research did not mention the required infrastructure and module of communication clearly. Authors discovered that most systems in the reviewed literature entail high implementation costs. Thus, it is necessary to build a cost-efficient system that will establish remote energy meter controlling, monitoring and thwart tampering with the meter. We put forward a cost-effective smart energy metering system based on IoT which will be

constantly in connection with the server administered by government authorities who will supervise any problem that arises in the energy meters set up. It will help decrease corruption in the power sector of Bangladesh and enhance meter security as well.

C. Edward et.al.[3] propose a system that is composed of a camera with a timer to instruct the camera to acquire the photo of the meter reading at regular intervals of time. The system has a part for image pre-processing to convert the image to binary image, then adjust it by changing brightness and contrast, finally crop the numeric area. To detect the digits of the meter reading and segment them, Support Vector Machine learning algorithm is applied to the pre-processed image. Then to each of the segmented image, Support Vector Machine is applied again to recognize digits from 0 to 9. Finally, the output is sent to the Server along with other details such as Consumer name, consumer number, date/time etc. If the server didn't receive the meter reading within specified time, then server assumes camera failure and sends out service people to change the faulty camera.

LIMITATIONS OF EXISTING SYSTEM

- The energy meter is a continuously operating measuring device that displays, and records. Parking is not allocated.
- Low Performance.
- High Costing and not user friendly.
- Faulty meters.

AIMS & OBJECTIVES

1. A smart city is focused on a smart grid that enables intelligent management of the electric grid.
2. Initiative is to create a popular chip based IoT electrical meter that will capture all meter information and transmit the required meter information to the main server.
3. requirements and compensate for increasing electricity bills.

PROPOSED SYSTEM

We are going to implement a "Automatic Meter Reading for Electricity Consumption and Billing" using GSM module which is reliable and efficient. No need to take manual meter readings it will reduce labor cost.

The bill payment section will take place in the home itself. RFID reader will detect the smart card and the bill amount was paid through that card. This system is very useful based on the signal sends to it from the controller corresponding to the status of bill payment.

This system will notify server or service provider that where exactly power theft is happened.
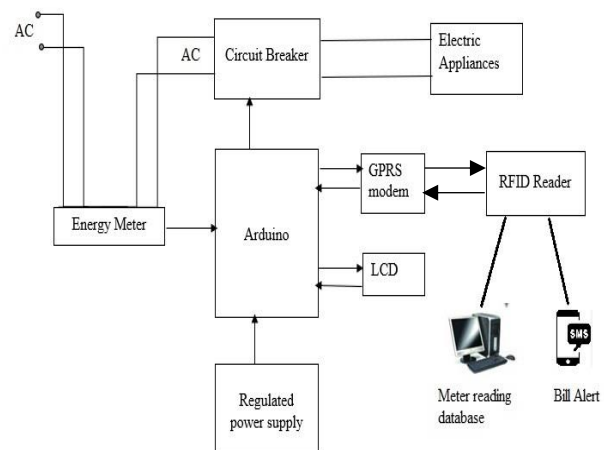
SYSTEM ARCHITECTURE

Fig -1: Flow Diagram (Automatic Meter Reading for Electricity Consumption and Billing)

MATHMATICAL MODEL:

System S= I, O, P, C. Where, I = Input

O = Output

P = Processing

C = Constraints

I = voltage

I_1 = lights

O = Detect light

$S = S_1, S_2, S_3$

$O = O_1, O_2, O_3$

P = P1,P2,P3

S1=Hardware- sensor, device

I = Voltage

Where,

f=light

value

O1 = add voltage

O2 = Get Bill

P1 = if get light then add into bill or not allowed and not bill generate.

DESCRIPTION:

A. POWER SUPPLY:

The power supply section is a essential one.A power supply is a device that providess electric power to an electrical load.It should deliver constant output regulated power supply to 5volts DC power supply and that is given to the microcontroller.

B. TRANSFORMER:

A transformer that transfers electrical energy from one circuit to another circuit through the conductors which are inductively coupled,i.e the transformer's coils or windings. Transformer is used to step down the voltage which is suitable for the low voltage components. The transformer used here is a 230/ (5V-0-5V) step down transformer. The primary and secondary coils of the transformer is used to step down the voltage,so that the secondary coil of the transformer is designed to contain less number of turns. The power supply of AC voltage arrives at 230v.Step down electrical device is meant in such how that the input is 230V and output of 5V. Another factor is that electronic circuits operate in DC wherever as accessible output of electrical device is AC of 5V. So the rectifier circuit is employed to convert AC to DC.

C. ANALOG METER:

The meter which is used for measuring the energy utilities by the electric load is known as the energy meter. The energy is the total power consumed and utilized by the load at a particular interval of time. It is used in domestic and industrial AC circuit for measuring the power consumption. The meter is less expensive and accurate.

D. PLCC MODEM:

Power line Carrier Communication Modem is used to send and receive serial data over existing AC main power lines of the building. The PLCC modem is ready to use circuit module.It has a baud rate of 9600 which uses bi-directional data communication. Because of its small size, it can be integrated It has high immunity to electrical noise which presents in the power line and built-in error checking so it will never give a corrupted data.PLCC can directly interface with the microcontroller device.
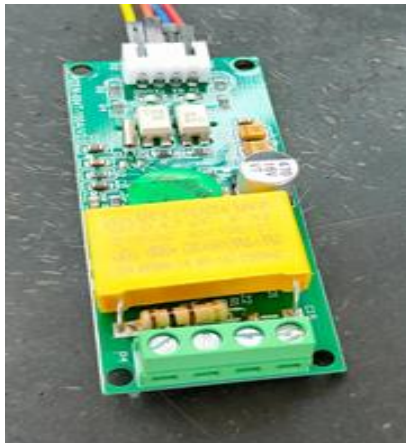
E. ESP8266 Wi-Fi Module:

The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

APPLICATION:

1. Companies.
2. Publically.
3. Big Industries.
4. Home Meter.

CONCLUSION

A low-cost intelligent energy metering system was designed and constructed in this work. At first, there were deliberations about the importance and implementation of the smart grid. This paper emphasizes the satisfactory performance of this method by providing acceptable calibrated values from the smart energy meter. This work also presents a well-designed web-based meter monitoring system that is beneficial for both consumers and utilities.

REFERENCES

1) Park, B.S, Hyun, D.H, Cho, S.K. "Implementation of AMR system using power line communication". Conference and Exhibition 2002: Asia Pacific. IEEE/PES Vol. 1, Oct. 2002, pp. 18- 21.
2) Raja, G.T. "Electricity consumption and automatic billing through power line", Power Engineering Conference, 2007, PP. 1411 – 1415, 2007.
3) Bharath, P "Wireless automated digital energy meter", Sustainable energy technologies, International conference, 2008, PP. 564 – 567,2008.
4) Park, B.S, Hyun, D.H, Cho, S.K. "Implementation of AMR system using power line communication". Conference and Exhibition 2002: Asia Pacific. IEEE/PES, Vol. 1, Oct. 2002, pp. 18- 21
5) Raja, G.T. "Electricity consumption and automatic billing through power line", Power Engineering Conference, 2007, PP. 1411 – 1415, 2007.
6) Bharath, P "Wireless automated digital energy meter", Sustainable energy technologies, International conference, 2008, PP. 564 – 567,2008.
7) TasfinMohaimeenHaq "Application of Power Line Carrier (PLC) in Automated Meter Reading (AMR)and Evaluating Non-Technical Loss (NTL)" International Journal of Research and Technology ,Vol 2,Issue 8,August 2013.

8) PoonamBorle,AnkitaSaswadkar,DeepaliHi warkar,RupaliS.K ad "Automatic Metre Reading For Electricity Using Powerline Communication" International Journal of Advanced Research in Electrical and Instrumentation EngineeringVol2.,Issue 3,March2013.

9) Mr.VishalKashinathOvhal,Dr.U.L.Bombale "Power Line Communication Based Automatic Electrical Billing Meter and Power Supply Control Using Frequency Shift Keying Modulation"International Journal of Modern Trends in Engineering and Research vol.2, Issue 4,April2015

10) G.Sujatha, D.Murali, R,Ram Kishore "Automated EB Billing and Supply Control using PowerLineCommunication" vol.45-NO 7,May 2015

11) V.Manimala,S.K.M.Sangeetha,R.Subhashre e,T.V.K.Surekha "Design and Implementation of Automatic Metre Reading using PLC Modem"South Asian Journal of Engineering and Technology,Vol-3-NO 6,201.