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AUTOMATIC METER READING FOR ELECTRICITY CONSUMPTION AND BILLING

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Abstract - Electricity 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 important advantage of this system is that no additional transmission line is needed for the transmission of data. 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, GSM module, 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 costefficient 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

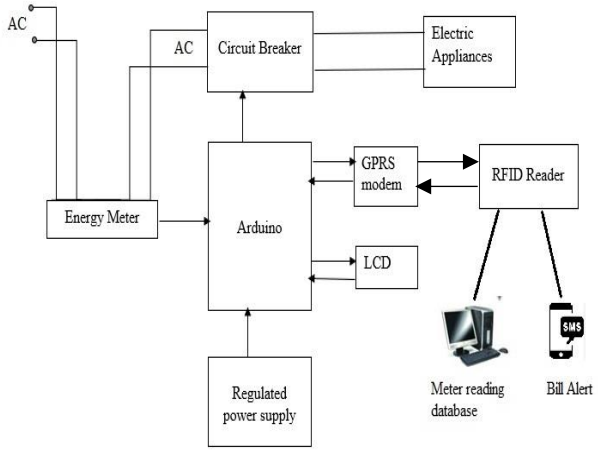
1. A smart city is focused on a smart grid that enables intelligent management of the electric grid.
2. Initiative is to create a popular chip based IoT electrical meter that will capture all meter information and transmit the required meter information to the main server.
3. requirements and compensate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

PROPOSED SYSTEM

1. We are going to implement a "Automatic Meter Reading for Electricity Consumption and Billing" using GSM module which is reliable and efficient
2. No need to take manual meter readings it will reduce labor cost.
3. 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.
4. This system is very useful based on the signal sends to it from the controller corresponding to the status of bill payment.
5. 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)



APPLICATION:

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

FUNCTIONAL & NON-FUNCTIONAL REQUIREMENTS

Functional requirements: may involve calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements; these are captured in use cases.

Nonfunctional Requirements: (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.

Functional requirements

- Registration
- Consumer Login
- Creation of database: Users Mandatory Information

Design Constraints:

1. Database
2. Operating System
3. Web-Based Non-functional Requirements

Security:

1. User Identification
2. Login ID
3. Modification

Performance Requirement:

1. Response Time
2. Capacity
3. Consumer Interface
4. Maintainability
5. Availability

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,DeepaliHiwarkar,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.Subhashree,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.