

Smart Meter for Prepayment Electricity Units and Theft Controlling System

Shraddha Yadav¹, Prateeksha Pandey²

Department Of CSE, CSIT,Durg (C.G.)
shraddhayadaw@gmail.com

Department Of CSE, CSIT,Durg (C.G.)
prateekshapandey@csitdurg.in

Abstract : *In the present day scenario the energy consumption awareness pays an important role as demand for huge amount of energy generation is growing day by day. Power utilities in different countries especially in the developing ones are incurring huge losses due to electricity theft. This paper proposes a prepaid energy metering system to control electricity theft. In this system a smart energy meter is installed in every consumer unit and a server maintained at the service provider side. This system a smart energy meter is installed in every consumer unit and server is maintained at the service provider side. The aim of this project is to minimize the hassle related with electricity billing and energy wastage by taking enough date of usage amount of electricity. This papers both the server and meter is equipped with GSM module which facilitates bidirectional communication between the two ends using the existing infrastructure. here the proposed model comprises of hardware setup which includes smart meter and embedded hardware establishing. Smart meter are measured by embedded controller. The controller collects data from smart meter and then sends all data to GSM Modem. the paper proposes A conceptual approach to get both the approximate location and estimate of energy theft at that location. This paper review smart meter technology and application across residential, commercial and industrial sectors.*

Keywords: GSM modem, microcontroller, Electricity theft, prepaid meter, software tool like kill4 .

1. Introduction

The current meter reading system requires a person to read and record the energy consumption and submit the bill to the electricity billing department. A various disadvantage to suffer from manual reading is the requirement of large number of meter readers. Smart meter is required to establish two way communications between the electricity provider and the meter. Smart meter is software embedded programming based meter, accurately tracks energy consumption and perform computation. This system saves a lot of time, money and power for electricity department. Implementation of this project will be useful for better controlling and energy managing. This project provides the facility of measuring the consumption of electricity and continuously monitoring the unit of consumption of electricity by the meter and includes security theft of electricity. The Electricity theft has as a serious problem in power sectors especially in the developing countries. Electricity theft includes fortify meter to show a low meter reading, take electricity bypassing a meter, billing irregularities and unpaid bill. A huge amount of earnings is lost due to electricity theft. In some countries this is so grave that government are incurring losses instead of revenue. In some cases government has to provide allowance to fonts for investments to maintain a reasonable price of electricity. Different non technical and technical method was initiate in past to detect electricity theft non technical methods may include inspection of the customers with suspicious load profile. Although regular inspection can substantially reduce theft, such measure require large manpower and huge labor. Such effort also fails in most cases due to the dishonesty of the staffs. Some of the technical ways to detect theft are use of central observer meter at dishonesty of the staffs .some of technical ways to detect meter tempering e are use of central observer meter at secondary terminal of distribution transformer, harmonic generator, genetic support vector

,achiness,, extreme learning machine and power line impedance technique. Electricity meter are typically calibrated in billing units, the most common one being the Kilowatt hour[kHz]. Periodic readings of electric meters establish billing cycles and energy used during a cycle, the cycle generally extending for a month.

2.Related Work

A paper proposed by Yadav,B.R. *et. al*(2015),. says that to create an efficient metering system, that benefits both the service provider and consumer. Hiware,R.B.,*et.al.* (2013) says that the system consists of wireless meter and the server. The wireless meter placed in homes, company and the buildings which have exchange the information using the GSM network through SMS. Smart meter enable two way communication between the meter and the central system S, Ezhilarsu.,*et.al.*(2015). If the available credit is exhausted then the electricity supply is cutoff by a relay. Readings made by human operators are prone to errors. This project addresses the above mentioned problems. Jubi,k.,& john, M.(2013) The development of GSM infrastructure in past two decades made meter reading system wireless Rezaul,M., *et.al.*(2015) say that develop the EDU, we are using Microcontroller Atmega32. The Atmega32 is programmed such that power supply will be switched off by using relay when the recharged amount gets used up Power line communication used high frequency carriers to send information overpower lines. Meter 1 sends a signal to meter 2.Meter 2 acknowledge and send it to central station. Md.U.H & Jayesh G.Priolkar(2015) Adjacent energy meter communicate through PLC signal Meter detect such unaccounted theft, an observer meter is used in the proposed system. Meter detect theft it will isolate the affected part the incoming power line and will SMS to the household meter to disconnect their corresponding loads.

R.Deepakumar, & S.Latha(2015).

4. AT Commands For GSM Modem

A GSM modem is a wireless modem that works with a wireless network a wireless modem behaves like a dialup modem.

There are two types of AT commands-

1.Basic commands are AT commands that do not start with "+". For example, D (Dial), A (Answer), H

(Hook control), and O (Return to online data state) are basic commands.

2.Extended commands are AT commands that start with "+". All GSM AT commands are extended commands. For example, +CMGS (Send SMS message), +CMGL (List SMS messages), and +CMGR (Read SMS messages) are extended commands.[7]

- AT (Attention Command)
- AT+CMGL (List message)
- AT+CMGF (Selecting messaging mode)
- AT+CMGS (Send message)
- AT+CMGR (Read message)
- AT+CMGD (Delete message)

5. Way of Electricity Theft

- Tampering with energy meter
- Bypassing electric meter
- Evading payment
- Magnets, reversing the current direction by changing the terminals were used in analog disc type energy meter.
- Radio frequency device employed to temp electronic meter
- Intermitted and opportunistic theft by well off [9]

6.Working Scheme: In this system we developed a smart meter and prepaid scheme using GSM modem. user first for pay a electricity bill then consumption of electricity power. the system consist of energy meter RD2 microcontroller GSM SIM900 module. microcontroller to connected on EEPROM,LCD display and GSM module.

The consumer to purchase a scratch card and enter its scratch card number and meter id in your mobile. the scratch card number and meter id will be transmitted through SMS for electricity provider or service provide. If meter and scratch card number is valid than successful recharge or provide electricity of the consumer and send the SMS consumer side. the meter calculated the energy and its according to provide the electricity in form of unit.

Some feature provide through a service provider

- The every thing is controlled by microcontroller over the GSM module even no need for electricity officials to visit the spot to disconnection the connection and reading the electricity power.
- the meter can be connected to GSM module and all the information related to electricity consumption can be transmitted over GSM network and bill can be automatically issued through SMS particular consumer.

- The GSM communication module is used to send a SMS to the consumer mobile about the units of power consumption and their balance.
- provide this project the continuously records the reading through microcontroller based system. in this system emphasizes the that if reduce human power and save a lot of time

7.Test and Result

This is complete setup of meter side including GSM modem ,LCD and microcontroller

Show a figure2 LCD to show if meter recharge successfully recharge

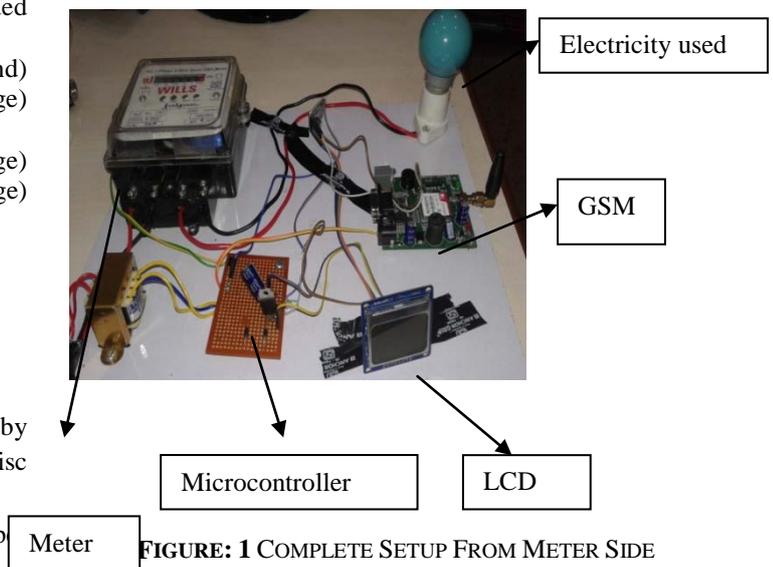


Figure:2 Acknowledge for user through LCD



Figure: 3 show electricity consumption



Figure:4 Receive a SMS from user side

Conclusion

In this paper, we have proposed a prepaid energy meter which takes advantage of the GSM network that has virtually access to every household and area across various countries. The GSM communication not only implements the idea of prepaid consumption of electricity but also facilitates the utilities to control energy theft using our smart energy meter. In this system, the information of electricity theft is directly report to the central authority. This paper presents conceptual approach for theft identification, theft location and determining magnitude of theft by using by power line communication and advanced metering infrastructure for smart distribution system.

References

- [1] Yadav,B.R.,& Sharma,J.V.(2015) Smart Electricity Meter, Prepaid Electricity Distribution System:International Journal of Engineering Development and Research,Volume 3,Issue 2.
- [2] Jubi,K.,& John,M.(2013) Prepaid Energy Meter with GSM Technology:American International Journal of Research in Science,Technology,Engineering & Mathematics,13-271
- [3] Ezhilarasu.S.,& Rijju,K.,& Venkatesh,k.,&Varatharaj,M.(2013) An Enhancement of Prepaid Energy Meter Using Smart Card And GSM Module Techniques:International Journal of Research in Electronics,Volume-02 Issue.
- [4] Islam,M.R.& Mamun,H.L .(2015) Energy Understanding Device (EUD): An Innovative Energy Metering and Monitoring Solution:Perspective Bangladesh: Journal of Modern Science and Technology: Vol. 3. No. 1, Pp.47-63
- [5] Hiware,R.B.,& Bhasker,P.,& Bombole,U.,& Kumar,N.Advance.(2013) Low Cost Electricity Billing System using GSM:International Journal of Advanced Engineering Technology,vol.-4,Oct-Des.,/51-53

- [6] <http://www.codeproject.com/Articles/85636/Introduction-to-AT-commands-and-its-uses>
- [7] Dr.M.J.C.Prasad & Yeligati Kiran.(2014) Prepayment of Electricity withTheft Controlling System: International Journal of Research Studies in Science,Engineering and Technology,Volume 1,Issue 4,July 2014, PP 42-48
- [8] Md. Umar Hashmi & Jayesh G.Priolkar.(2015) Anti-theft Energy Metering for Smart Electrical Distribution System: International Conference on Industrial Instrumentation and control(ICIC) Collage of Engineering Pune,India May 28-30,2015
- [9] R.Deepakumar & S.Latha.,(2015) A Shipshape Prepaid Energy Metering Organism:International Journal of Engineering Trends and Application,Volume 2 Issue 2,Mar-Apr2015