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A RESEARCH PAPER ON AUTOMATIC ENERGY METER READING SYSTEM

Neha Yadav[1], Sonia Rana[2], Nitesh Rawat[3], Bhuvesh Yadav[4]

[1,2,3,4] *Electronics and Computer Engineering*

Dronacharya College of Engineering, Gurgaon (India)

ABSTRACT

The purpose of this project is to remote monitoring and control of the Domestic Energy meter. This system enables the Electricity Department to read the meter readings regularly without the person visiting each house. This can be achieved by the use of Microcontroller unit that continuously monitors and records the Energy Meter readings in its permanent (non-volatile) memory location. This system also makes use of a GSM modem for remote monitoring and control of Energy Meter. The Microcontroller based system continuously records the readings and the live meter reading can be sent to the Electricity department on request. This system also can be used to disconnect the power supply to the house in case of non-payment of electricity bills. A dedicated GSM modem with SIM card is required for each energy meter.

Keywords: Microcontroller, SIM Card, Monitoring, Power Supply, Digital Meter

The major building blocks of this project are

- Microcontroller based control system with regulated power supply.
- GSM Modem for remote communication
- Electromagnetic Relay and Relay Driver for Power Supply Control.
- Digital Energy Meter.
- LCD Display to display the meter readings

I.INTRODUCTION

At present, most of the houses in India have the traditional mechanical watt hour meters and the billing system is not automated. At the end of each month a person from the electricity board goes to every house and takes the meter reading manually.These meter readings are used for electricity bill calculation and this bill sent to consumer house by post. Customer goes to electricity department for paying this bill amount. But in this technique we are required great number of persons for reading the meters. The procedures of sending the bills to customer are very laborious and cumbersome. But a new technology is named Automatic Meter Reading System. Remote meter reading (or AMR) refers to the system that uses a communication technique to automatically collect the meter readings and other relevant data from utilities' gas meters, without the need to physically visit the gas meters. The development of AMR technology has catapulted meter data to center stage

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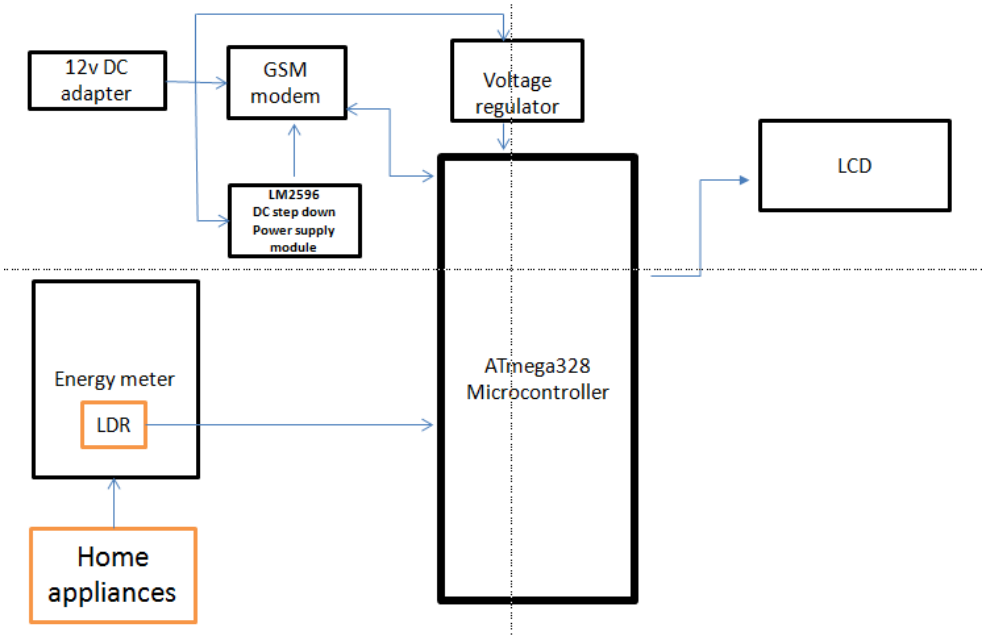
of the utility business plan. The Energy meter data acquisition system withwireless communication is presented in this paper. The proposed method is based on wireless communication with use of a RF Transceiver and GSM module. The power consumption is measured with digital energy meter in terms of units and then the power measurement readings are transmitted with use of RF transmitter from energy meter to the center node which contains a RF receiver and GSM module as Data Forwarder. The GSM module will forward the data to the end utility office. So the whole proposed method will work in two type of communications. First short distance wireless communication with use of RF Transceiver from energy meter to the center node. Second will be for long distance wireless communication from center node to the end utility office with use of GSM module. All the hardware and software based details are described in the paper. The system has many significant advantages such as, wireless communication, low power consumption devices, Accuracy, Large coverage area.The power consumption data are received at the end where they are stored and used for future references and customer billing system. The system has many significant advantages such as, wireless communication, low power consumption devices, Accuracy, Large coverage area.The power consumption data are received at the end where they are stored and used for future references and customer billing system. The front end web portal is User friendly and any employee with minimum knowledge of computers can work on this software.



(a).Block Diagram of Automatic Energy Meter Reading System

II. BRIEF HISTORY

Smart meter billing System is the modern Power measuring device. Which is being used in measuring electricity, gas, water consumption in many countries on the world since it has a lot of advantages that the old analog meters doesn't have. A low cost AMR system is designed using GPRS. But the installation charges are high and GPRS is not more reliable way. Also a huge amount of investment should be done. An easy Home Automation System based on very cheap distributed microcontroller architecture, rather than on devices interconnected by an expensive commercial bus. The means used for data communication is the home power

line, so that the system doesn't require placing other cables in addition to standard electrical facilities. Thus in proposed work a reliable power line will be used for communication The first AMR system was created on 1974 in USA by Mr. Paraskevakos who used a advance technology developed on 1972 by Theodore George. Automatic Meter Reading system created with the combination of PLC and GPRS, focusing on the working principle and hardware design of each component including collectors, concentrators and master station. The communication between concentrator and collectors is done using Power Line Carrier (PLC), while the concentrator is connected to master station via GPRS. accessing to internet. Some practical issues of Automatic Meter Reading (AMR) based on Power Line Communication systems. It highlights different factors affecting system performance and its time and location dependent behavior. A GSM automatic power meter reading was built to demonstrate an automatic power meter reading using GSM network. This system provides effective, reliable and efficient wireless automatic power meter reading, billing and notification through the use of GSM network

III. BENEFITS OF AUTOMATIC ENERGY METER READING SYSTEM

The automatic energy meter reading technology is very useful in many applications. By using AMR technology we can accommodate a lot of benefits. Some benefits of AMR are as follow-

A. Electrical Company Benefits

- Smart automated processes instead of manual work.
- Accurate information from the network load to optimize maintenance and investments.
- Customized rates and billing dates.
- Streamlined high bill investigations.
- Detection of tampering of Meters.
- Accurate measurement of transmission losses.
- Better network performance and cost efficiency.
- Demand and distribution management.

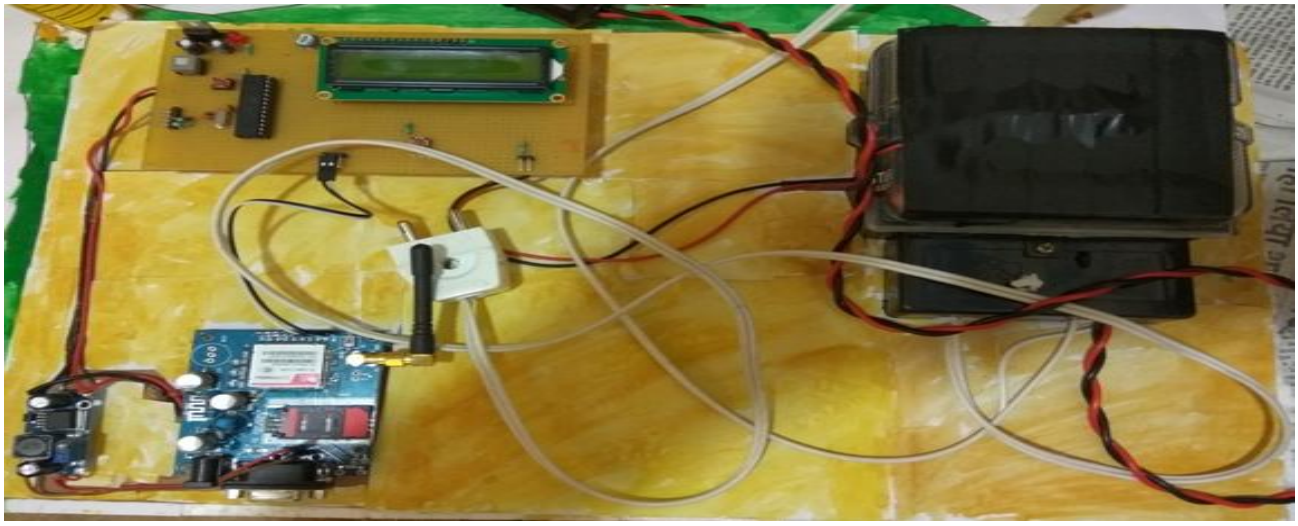
B. Customer Benefits

- Precise consumption information.
- Clear and accurate billing.
- Automatic outage information and faster recovery.
- Better and faster customer service.
- Flag potential high consumption before customer gets a high bill.

IV. WORKING

The energy meter records the amount of power consumption.It does so by an electromechanical system.The system is provided with such a mechanism that an increment in amount of current flow through circuit causes the disc to rotate faster,means that the rotational speed of disc is directly proportional to the amount of current flowing through circuit. This rotation effect of disc causes the gear mechanism to work accordingly and in

similar fashion rate of power consumption increases the blinking rate of LED integrated within the meter.The pulses from this LED are fed to microcontroller for count operation i.e. these pulses are counted by microcontroller and readings are stored into external memory. The memory is able to store previous database as well in case one needs to check past consumption status.LCD is connected with microcontroller so as to show the current status of GSM Modem. The LCD is connected to port 0 of microcontroller. GSM modem is the means to communicate over wireless systems.For transferring data, a GSM modem is used, which sends SMS to the particular mobile number defined.GSM modem is connected with microcontrollerATmega328.Whenever a command is sent to the GSM modem,it decodes the commands and works accordingly.The micro-controller is programmed to send the SMS every day to particular mobile user.



(b). System design of Automatic Energy Meter Reading System

V. CONCLUSION

Automatic meter reading is all about "Reading a utility meter without the requirement for visual inspection of the meter", it is indeed an easy and fail-safe method for monitoring consumption details of a customer. Automatic Meter Reading can detect meter tampering and illegal drawing of power (hooking/power pilfering). AMR as a way of improving customer service while reducing the cost of reading meters. The Automatic Meter Reading system enables us to save millions of dollars every year in meter reading costs and also provide our customers with better information about water use, more accurate billings, and keep rates as low as we can.

VI. FUTURE SCOPE

- Accurate meter reading, no additional estimates.
- Security will be improved and tamper detection for instrumentality.
- Management of energy through profile information graph
- Improved procurement power though more accurate data - "de-risking" price
- Transparency of "cost to read" metering.

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