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Prepaid Energy Meter Using GSM

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ABSTRACT: The aim of the project is to minimize the queue at the electricity billing counters and to restrict the usage of electricity automatically, if the bill is not paid. The project also aims at proposing a system that will reduce the loss of power and revenue due to power thefts and other illegal activities. The work system adopts a totally new concept of "Prepaid Electricity". The GSM technology is used so that the consumer would receive messages about the consumption of power (in watts) and if it reaches the minimum amount, it would automatically alert the consumer to recharge. This technology holds good for all electricity distribution companies, private communities, IT parks and self-containing housing projects. The implementation of this project will help in better energy management, conservation of energy and also in doing away with the unnecessary hassles over incorrect billing. The automated billing system will keep track of the real time consumption and will leave little scope for disagreement on consumption and billing.

KEYWORDS: Energy meter, GSM, Arduino, LCD, Relay, IC voltage regulator

I.INTRODUCTION

The design of a prepaid power meter which will be able to communicate based on Global System for Mobile Communication (GSM) network; for the transparency between the user and the Power Development Department (PDD). The GSM Automatic Power Meter Reading System (GAPMR) consists of an energy meter connected with the compatible microcontroller, a display device and compatible software to capture, transmit and maintain the record of the electricity consumption data of a particular user.

II.PROPOSED SYSTEM

In the proposed system the power utility maintains a server and each consumer is provided an energy meter. The server and prepaid meters use GSM modem and GSM module respectively to communicate with each other using the GSM network. The energy metering chip produces pulses proportional to the energy consumed using the outputs of current and potential transformers. The microcontroller calculates the energy consumption by counting the output pulses of the energy metering chip on an interrupt basis. The microcontroller uses AT command set to communicate with the GSM module (mobile phone). A battery backup is also available in the energy meter. The backup is required to detect electricity theft. The recharging process in the proposed metering system is similar to that of recharging balance in a mobile phone. The user has to buy a scratch card and scratch it to uncover the secret pin number of the corresponding energy unit he has bought. For example, if a user wants to buy 100 units (KWh), he has to pay for the 100 units and obtain a scratch card which holds the secret pin number of the corresponding 100 units. The user has to send the pin number to the server through SMS.

The server then checks whether the pin number is valid or not. If the pin number is valid, the server then extracts the information of energy-unit from the pin number and sends it to the meter of the user through the GSM network. The household meter then receives the corresponding unit and is activated. As the user consumes energy, the corresponding units are deducted from the total balance and the remaining units are displayed using LCD. After the consumption of the allocated energy, the meter automatically disconnects the load from the main power line using the relay until the user recharges again. Thus the system avoids the irregularities associated with traditional billing system and ensures revenue collection.

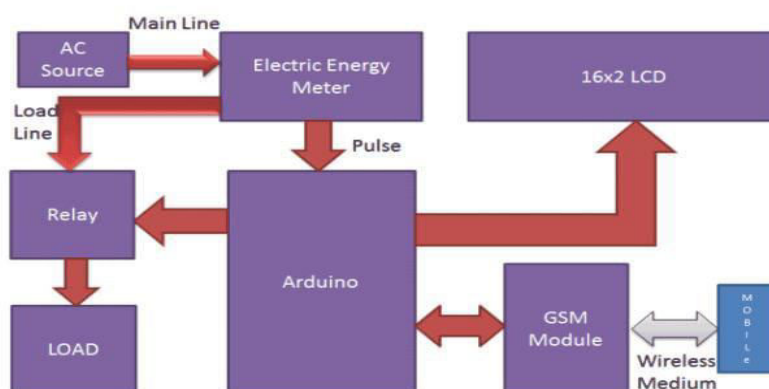


Figure 1: Block Diagram of Proposed Method

III.RESULT & DISCUSSION

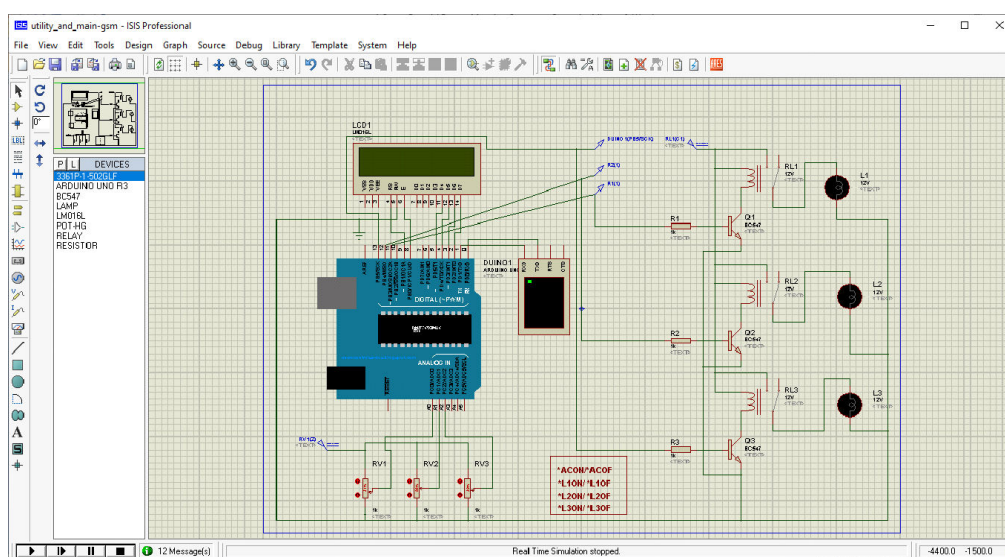


Figure 2: Simulation Diagram

IV.HARDWARE IMPLEMENTATION

An energy meter is used to measure electricity consumed by the user in domestic, industrial agriculture and many other applications. The energy is none other thing but the complete power consumed or utilized in the load center. Unit consumed or utilized by an energy meter provided in kilowatt hour. It is used in residential, commercial, and industrial purposes for measuring AC power consumed by the user. The energy meter is minimum expensive and crystal clear accurate. Microcontroller AT mega 328 is a general-purpose high-performance device with almost 32 no. of 8 bits General purpose high registers. It has on chip RAM which is briefly abbreviated as Random Access Memory and ROM which is briefly abbreviated as Read Only Memory.



Figure 3: Hardware implementation of prepaid energy meter using GSM

It has Harvard architecture of 8 bit using RISC processor. The GSM which is none other than Global System of Mobile Communications. It is a module introduced and developed by the European Telecommunication Standard institute to communicate by using mobile phones. In the GSM module Sim card holder is always available which allows the user to use a sim card for a maximum period of time. It is just like one kind of mobile phone. The modem RS232(max 232) is used to interface the microcontroller with the GSM module. A Relay is an Electromechanically operating and working switch which can be used to connect or disconnect the circuit.

V.CONCLUSION

In proposed work, a prepaid energy meter which takes advantage of the GSM network that has virtually access to every household and area across different 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 reported to the central authority. Therefore, utilities can take immediate legal action against the accused consumer and hence control electricity theft to a great extent. The proposed meter is thus highly useful for power utilities for reducing electricity pilfering and ensuring revenue collection

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