SMART ELECTRICITY METER FOR EFFICIENT CONTROL OVER UTILIZATION OF ELECTRICITY

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ABSTRACT—Smart electricity meter with the GPRS technology for communication is used in home automation and it generates the electricity bill to be paid (Autobilling). According to the present usage of power we can save the power and money for future by controlling the loads to the user requirement. There is no need of man power for billing.

With the help of Smart meter we can control the loads and monitor the loads status in IOT window. We can control the loads with a message And smart meter with help of real time clock it sets the montly electricity bill to be generated and sends a message to the user mobile and it reminds with a message if the bill is not paid . If the bill is still pending due to late payment then sends a message that the bill is not paid.

Keywords:optocoupler,enrgy meter

INTRODUCTION

Smart electricity meter has been an important conceptual paradigm for future energy use. Because of limited nonrenewable energy resources available on earth and also high costs of acquiring renewable energies, how to make energy use more efficient and effective is critical for future social and economic developments Home automation is a method of controlling.

This system principally monitors electrical parameters of household appliances such as voltage and current and subsequently calculates the power consumed. As WSN's are having many advantages, here we have designed smart meters predicting the usage of power consumption. However it is low-cost, flexible, and robust system to continuously monitor and control based on consumer requirements, GPRS technology for networking and communication, because it has low-power characteristics, which enable it to be widely used in home and building environments. The electricity utilization is a major issue being faced in our country. Problem associates with traditional meter reading have been increased day by day, due to various reasons such as rapid growth in population, tedious location, environmental conditions etc. Few of the reasons for the above issue are illegal connections by consumers which are difficult to find, utility usages written on paper and improper meter reading by utility workers leading to improper billing. These will cost more to the utility company. Other aspects which are to be included are man power utilization when utility workers went for meter reading, the consumers may not be present which in turn leads to pending billing activities and utility workers again require to visit to consumer. The purpose of the project is to provide a low power,

wireless, accurate meter reading and billing system for efficient control over utilization of electricity.

LITERATURE SURVEY

Energy saving solutions has been becoming increasingly essential in recent years because of environmental issues such as climate change and global warming. Environmental problems are very important issue and these problems are largely caused by the excessive use of energy. Since the existing systems are designed without considering the power usage ,it is not appropriate to the places such as house and office . All things considered, design goals of the Smart electricity meter with GPRS technology helps in home automation and autobilling so that we can save the money and power and there is no need of man power for billing purpose. The system should be energy efficiency and to save power for future.
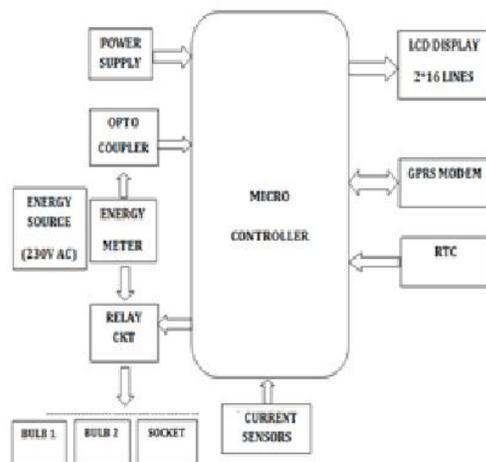
PROPOSED SCHEME

FIG: 1:Block diagram

METHODOLOGY

Micro controller: This section forms the control unit of the whole project. This section basically consists

of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

OPTO COUPLERS:

There are many situations where signals and data need to be transferred from one system to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microcontroller which is operating from 5V DC but being used to control a triac which is switching 230V AC. In such situations the link between the two must be an isolated one, to protect the microprocessor from over voltage damage. Relays can of course provide this kind of isolation, but even small relays tend to be fairly bulky compared with ICs and many of today's other miniature circuit components. Because they are electro-mechanical, relays are also not as reliable ó and only capable of relatively low speed operation.

Where small size, higher speed and greater reliability are important, a much better alternative is to use an Optocoupler. These use a beam of light to transmit the signals or data across an electrical barrier, and achieve excellent isolation.
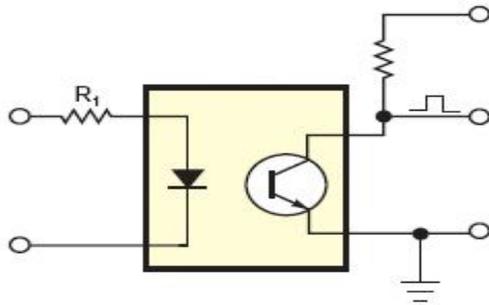

FIG: 2:Optocoupler structure

ENERGY METER

An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device.Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establishes billing cycles and energy used during a cycle.In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas the electric rates are higher during certain times of day, reflecting the higher cost of power resources during peak demand time periods. Also, in some areas meters have relays to turn off nonessential equipment.

GPRS:

GPRS (general packet radio service) is a packet-based data bearer service for wireless communication services that is delivered as a network overlay for GSM, CDMA and TDMA (ANSI-I36) networks. GPRS applies a packet radio principle to transfer user data packets in an efficient way between GSM mobile stations and external packet data networks. Packet switching is where data is split into packets that are transmitted separately and then reassembled at the receiving end. GPRS supports the world's leading packet-based Internet communication protocols, Internet protocol (IP) and X.25, a protocol that is used mainly in Europe. GPRS enables any existing IP or X.25 application to operate over a GSM cellular connection. Cellular networks with GPRS capabilities are wireless extensions of the Internet and X.25 networks.

FIG:3: GPRS module

RESULT

The below figure shows that if the dead line of payment is reached and if the bill is not paid then the below window is opened to remind the bill payment. And if the bill is not paid then it sends a sms to the mobile that the electricity bill payment is due, kindly pay your bill. And it displays the bill to be paid (meter number, units, bill amount).
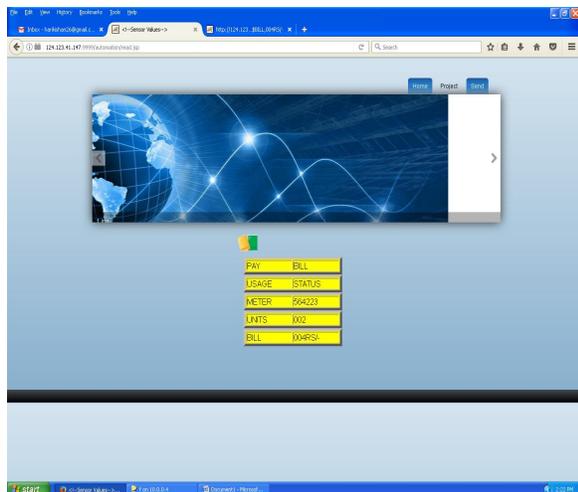
FIG:-4:Bill status

The below shows that the loads can be controlled with a message (ON- &BULB1 ON$, &BULB2 ON$) and (OFF- &BULB1 OFF$, &BULB2 OFF$) and it sends a message to the user that the electricity bill (units, amount to be paid) . And it sends a message if the dead line is reached and if the bill is not paid and the message sent is electricity bill payment is due, kindly pay ur bill.
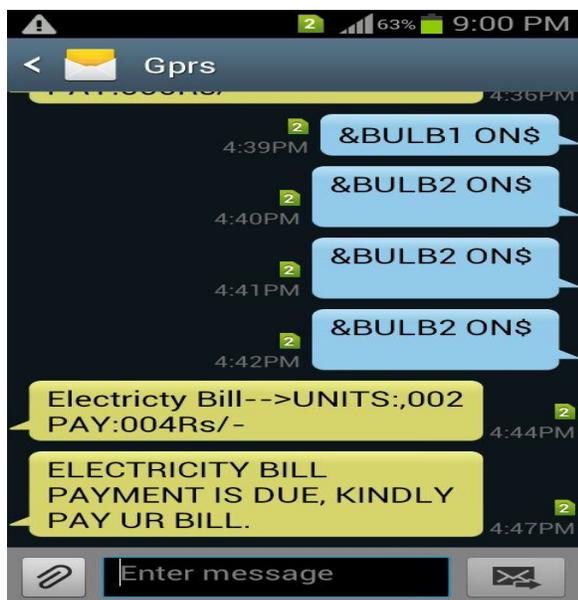

FIG:-5:Message sent to the user

CONCLUSION

. This project presents the GPRS Based Smart meters for autobilling and appliances control system using ARM 7 TDMI processor based LPC2148 controller Embedded Technology. It is designed and implemented with LPC2148 CONTROLLER in embedded system domain.

This describes the design and development of Smart electricity meter using GPRS technology for autobilling and controlling the appliances with a message.

Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

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