

Smart Switching Board

Prof.Ajit M.Bansode
dr.ajitbansode@gmail.com
Department of Electrical
NESGOI, Naigaon
SPPU, Pune

Somnath.A.Sangle
somnathsangle7777@gmail.com
Department of Electrical
NESGOI, Naigaon SPPU,
Pune

Suraj H.Mali
malisuraj030@gmail.com
Department of Electrical
NESGOI, Naigaon
SPPU, Pune

Jinesh K.Khandelwal
jineshkhandelwal11@gmail.com
Department of Electrical
NESGOI, Naigaon
SPPU, Pune

Akash G. Kadvade
akashkwadhe1995@gmail.com
Department of Electrical
NESGOI, Naigaon
SPPU, Pune

Abstract— In the Energy Management system, the main constraints are accurate metering, energy theft and implementation of proper tariff as well as billing system. This can be achieved by using Smart Meters. An energy calculation through smart meter is proposed for automatic meter data collection, give intimation through messages displayed on LED and energy auditing. This paper makes the consumer an active part of Energy Management duly monitoring the various parameters like voltage, current, power factor etc.

The present system only provides feedback to the customer at the end of the month. Also the meter readings are taken manually. Consumer can know the units consumed by seeing their electricity bill only. Also huge manpower is required to take the readings. There is no protection for energy meter tampering. The consumers cannot monitor the everyday energy consumption or usage. The major drawback of this system is the management of power consumption is difficult.

Keywords - Current Sensor, Buzzer, Arduino, LCD, Energy Meter.

I. INTRODUCTION

It has become a trend to integrate automatic systems via wireless applications over network. Along with the advancement of technology development, research on wireless applications and remote control has become significant and popular today. An electricity meter, electric meter, or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. A smart energy meter (SEM) is electric device having energy meter chip for electric energy consumed measurement, wireless protocol for data communication (such as GSM Modem) and peripheral devices for security purpose, data showing, meter controlling etc. Energy meter systems can be incorporated with embedded controllers such as GSM modem to transmit the data over the mobile network. Such data can be then fed and integrated into existing Energy Management Systems located at power companies and organizations. The problem of efficiently collecting data from a large number of distributed GSM Modems in the energy meters is still a challenging problem. GSM modem should needs the terminal to control that part. Our Embedded controller interfaced with energy meter reading systems and GSM modem to control both.

II. LITERATURE SURVEY

A. DESIGN OF SMART REFRIGERATOR USING RASPBERRY PI

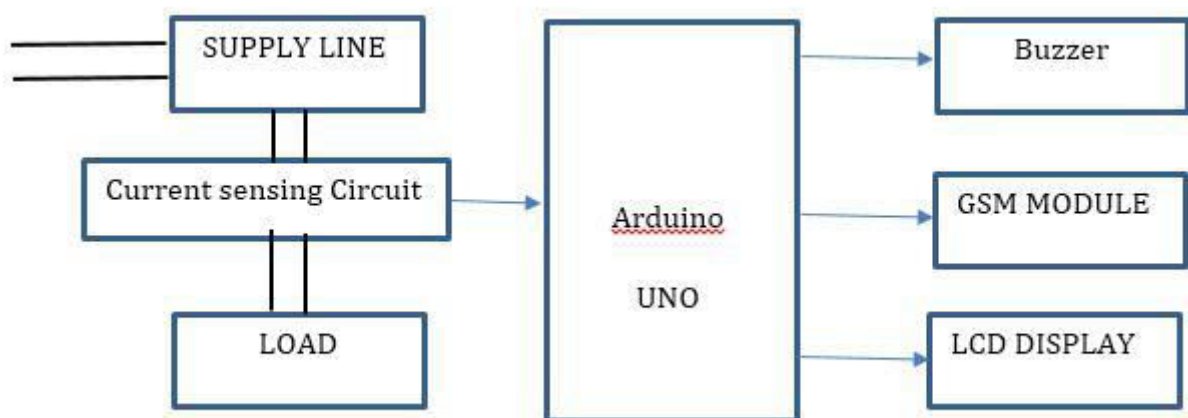
AUTHOR: NAEEM JAVED, NARULLAH, MOHSILKHAN

YEAR: IJEAT 2017

In any conventional or standard refrigerator there is no system of automatically monitoring the food items. A smart refrigerator is one which possesses self-monitoring capability of food items and automatically detecting and alerting the consumer of the need to restock the food items with minimal human intervention. Thus the devices ought to be smart enough to recognize our needs. Hence smart refrigerator is designed to convert any existing refrigerator into intelligent cost effective appliances using sensors. In our system the smart refrigerator automatically detect the weight of the products, any gas leakage and any changes in the level of the liquid in a container using load cell sensor, gas sensor and ultrasonic sensor then the system will automatically inform the owner about the status of the smart refrigerator through short message service (SMS) using Wi-Fi mobile network.

III. SYSTEM IMPLEMENTATION

In the proposed method, the consumer can manage their energy consumption by knowing their energy usage time to time. This method not only provides two way communications between utility and consumer but also provides other functions that are it reminds the consumer to pay the electricity bill with the help of buzzer once the bill is paid user can reset the system. Another huge advantage of this system is that it notifies the consumer & utility at the event of the meter tampering. By this information the consumer & utility can control the tampering are reduce energy crises.



1) *Arduino UNO*

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

2) *Current sensor*

We have to interface the C.T. by means of voltage only. We can convert current signal to voltage signal by using a rectifier. As the rectifier converts AC signal to DC signal, the output across the resistor connected in the rectifier circuit can be taken as the voltage signal. The secondary of the C.T is connected to the input of bridge rectifier. Capacitor is used to reduce the ripple content in the output. A resistor is connected at the output side to measure the voltage across it.

3) *Ac supply*

Input supply 230 volt and required kit circuit voltage 7-12 volt.

IV.WORKING

In the proposed method, the consumer can manage their energy consumption by knowing their energy usage time to time. This method not only provides two way communications between utility and consumer but also provides other functions that are it reminds the consumer to pay the electricity bill with the help of buzzer once the bill is paid user can reset the system. Another huge advantage of this system is that it notifies the consumer & utility at the event of the meter tampering. By this information the consumer & utility can control the tampering are reduce energy crises.

Arduino-UNO is a microcontroller board which has on-board microcontroller ATmega-328. It has total 14 pins including analog and digital pins. There are 6 PWM (Pulse Width Modulation) output pins on this board. Also, it has 6 analog inputs, a USB connection, a power jack, a 16 MHz ceramic capacitor, an ICSP header and a reset button.

DIGITAL METER

The digital energy meter design in such way the surrounding things do not affect its working. The construction is such that it the reading recorded through sensors is shared with the controller and displayed on LCD

PROGRAMMING LANGUAGE & SOFTWARES USED

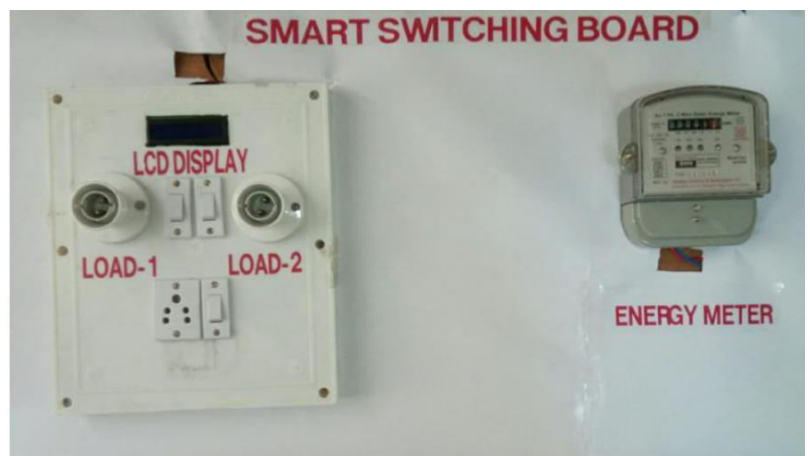
Programming Language	: Embedded C
Programming Software	: Arduino
Program Dump Software	: Arduino
Simulation Software	: Proteus
PCB Designing	: Dip Trace
Software Target Device	: Arduino

ADVANTAGES

- The system will reduces manpower, reduces accidents and have high accuracy.

V. HARDWARE OVERVIEW

Picture shows the hardware of the system.



VI. CONCLUSION

Control the usage of electricity on consumer side to avoid wastage of power. Helps to the country revenue by stopping current theft and punishing the dishonest customers. This pre-paid emote energy meter proves to be a boon in the power sector. By using this system we can manage time schedule for pay bill and monitor energy consumption. The digital energy meter design in such way the surrounding things do not affect its working. The construction is such that it the reading recorded through sensors is shared with the controller and displayed on LCD

VII. FUTURE SCOPE

A mini printer can be interfaced to get a printed bill or details of billing.

Remote recharging can be implemented through telephone line or wireless network.

Software can be modified to view the balance on request.

VIII. REFERENCES

1. G.vani ,V.ushareddy “Application of smart enery meter in indian energy context” IOSR journal of electrical and electronics engineering (IOSR – IEEE) vol.10 Issue. 3.ver(May-Jun 2015)
2. Naeemjave ,Narulla , Mohsin khan “Design of smartvenergy meter with overload trip facilities. International journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249-8958 , Vol -6, Issue-6 Aug.2017