



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8

Issue: III

Month of publication: March 2020

DOI:

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Smart Billing

L. M. Varalakshmi, Jayanandhini. C², Elavarsi Dharshini. E³, Henitha Raichel. H⁴, Aswini. M⁵

¹Professor, ^{2,3,4,5}Department of Instrumentation and Control Engineering, Sri Manakula Vinayagar Engineering college, Puducherry

Abstract: *The objective of the project is to generate electricity bill automatically. The billing process of electricity consumption which is used in present days is a very long process and requires lot of man power. To overcome this issue we are introducing a fully automated billing process. To notify the user about their bill amount and caution them to pay their bills. If the consumers existing balance is not sufficient to pay the current bill the power supply will be automatically shut down once the payment of bill is done the power supply is given to the customer. Power management concept is also introduced in this system where we can reduce the amount of electricity consumed by the user.*

Keywords: *Analog energy meter, Global system for mobile(GSM),Electricity, Liquid crystal diode(LCD).*

I. INTRODUCTION

In today's world people live at a society where technology has become important at different stages of life, involving the everyday activity of man. of these activities constitute and deliver economic and social benefits and potential risks to the improvement of every and each nation and particularly the developing nations like ours.

Electricity has become one among the essential requirements of every and each person which is widely deployed for various purposes like domestic, industrial, agricultural etc. In spite of the well developed sources of electricity, there are a particular number of problems with reading and calculation of bills and control of consumption. Electricity is one of the important requirements for a comfortable life and so it should be used very necessary for its proper utilization without wasting it. But in our country we have lot of cities where we need a lot of supply for electricity but at the same time there are also places which does not have access to it. Our government policies for electricity distribution are also partially responsible for this because we are still not able to correctly estimate our exact requirements and usage of power .On the other side users are also not happy with the services of power companies, most of the time they have complaints regarding statistical errors in their monthly bills. Thus this project presents an innovation in the reduction of technical errors and in human dependency at the same time. With the help of this project the monthly energy consumption of a consumer can be obtained even from a remote location directly without any human effort. In this way human effort needed to record the meter readings which are till now recorded by visiting every home individually is reduced. The methods followed in current days will provide a considerable loss of human time and also loss in data regarding the consumption of electricity each and every day. This would help the electricity department officials to design transformers with the specification required for a particular locality.

This idea is economically efficient because the meter reading are often gotten at a really low cost. The implementation is completed in such the way that a SMS is delivered to the GSM MODEM whose reading is to be noted then that meter replies to the server within the SMS format and it's known that SMS costs are very low. The Global System for Mobile communication takes the advantage of providing accessible GSM infrastructure nationwide coverage and thus the Short Messaging System cell broadcasting feature to request and retrieve individual houses and building power consumption reading back to the energy provider quickly and correctly without any man power.

II. LITERATURE STUDY

This system involves Global System for Mobile communication (GSM) for automation in energy meter reading and billing .This system can be used as both prepaid and post-paid. In prepaid case, the recharge amount and the energy consumed by the user in the energy meter itself. The System is an IOT system where the energy consumed is measured in watts and displayed using the LCD (Liquid Crystal Display).The amount to be paid is displayed in the system and the recharge is done by sending message to the electricity department. If the prepaid account balance is low,the user is alerted using and sms to recharge the account.[1]BabakAghaei(2011) presented a paper on Electricity and Gas industry using wireless sensor network. In his paper, he presented a model for processes which related to user of water, electricity and gas(meter reading, distribution of bills, sending notice, cutting and reconnection of flow)by using wireless sensor network in Iran.Wireless Sensor Networks are wireless connective networks which sensors compose their main components. Sensors are deploying and are connecting with each other in environment

dynamically.[2]Professor P.Loganthurai(2017)presented a paper on Smart Energy Meter Billing using GSM with Warning System and the main idea of the project is to modernize our billing system using GSM. The main idea of the project is to modernize our billing system using GSM. The GSM is a technique works on the principle of TDMA - time division multiple access and operates at the frequency of 900MHZ. The details of power displaced in the energy meter is transferred to the mobile using GSM and it also shows the units consumed by the load. If the number of units consumed by the total load exceeds certain limit means it will give a warning based on tariff and also turn ON/OFF the load by setting password to each load using GSM technique.[3] Ahmed Saleem Abbas(2018) presented a paper featuring a project model to enhance electricity billing.The system employs web page application using C# and ASP.Net.The system consists of an interactive interface that allows the easy treat by the user. So that the user can know the monthly consumption and what remains in the account. The system is controlled by an administrator in the server of electricity distribution company. In this way, there will be a kind of clearness between the electricity distribution department and the consumer and guarantee the rights of both parties through an integrated software system. Also, the system divide the users to several classes depending on their consuming and adapted a penalty strategy to the company that provide electricity, these penalty in an appropriate manner applied in case of power shutdown.[4]Nidhi Gaur(2014) presented a paper on a novel implementation of a prepaid electricity billing machine(PEBM) on Xilinx Spartan6 FPGA device XC6LX16 package 3csg324.An interactive interface was designed to make user interaction with the system at runtime.

Power analysis of the system is done with Xpower Analyzer tool which shows a total power consumption of 0.034W. Maximum frequency on which this system can work efficiently is estimated at 143.798 MHz This machine is developed keeping in view its use in residential areas, institution, corporate companies and big organizations, and the demand for fully automated systems. [5] S.A. Al-Qatari(1995) presented a paper on integrated single board automated measurement and billing system for public utilities. The system was equipped with credit card reading capability to read and charge automatically the customer's services consumption on site. Also, all service metering modules are facilitated with an automatic service connection and disconnection based on the available credit.The software structure commands the whole process via the microcontroller input/output ports. The integrated system was implemented and tested, and has proven to be stable, reliable and easy to maintain. [6] T.Narmada (2017) presented a paper on raspberry Pi 2 based prepaid electricity billing system for below poverty. In this paper, the Raspberry P 2 based prepaid electricity billing system for below poverty in developed. Nowadays the electricity board on behalf of Government, releases a benefits for the below Poverty peoples in India especially. The electricity board on behalf of Government has provided 100 units to poor people a month, but some of the people may consumes more than limited units (100 units) a month. The remaining units consumed by people are bourdons to the electricity board and loss of revenue. The loss is going to reduce by implementing Raspberry Pi 2 based prepaid electricity billing system. After consuming the units presented by board, the power is automatically cutoff by automated. [7] Nazri Bin Abdullah (2012) presented a paper on Automation of residential electricity cut off using network based embedded controller. This paper discusses the development of automation system for residential electricity cut off using network based embedded controller.

III.HARDWARE IMPLEMENTATION

A. Objective

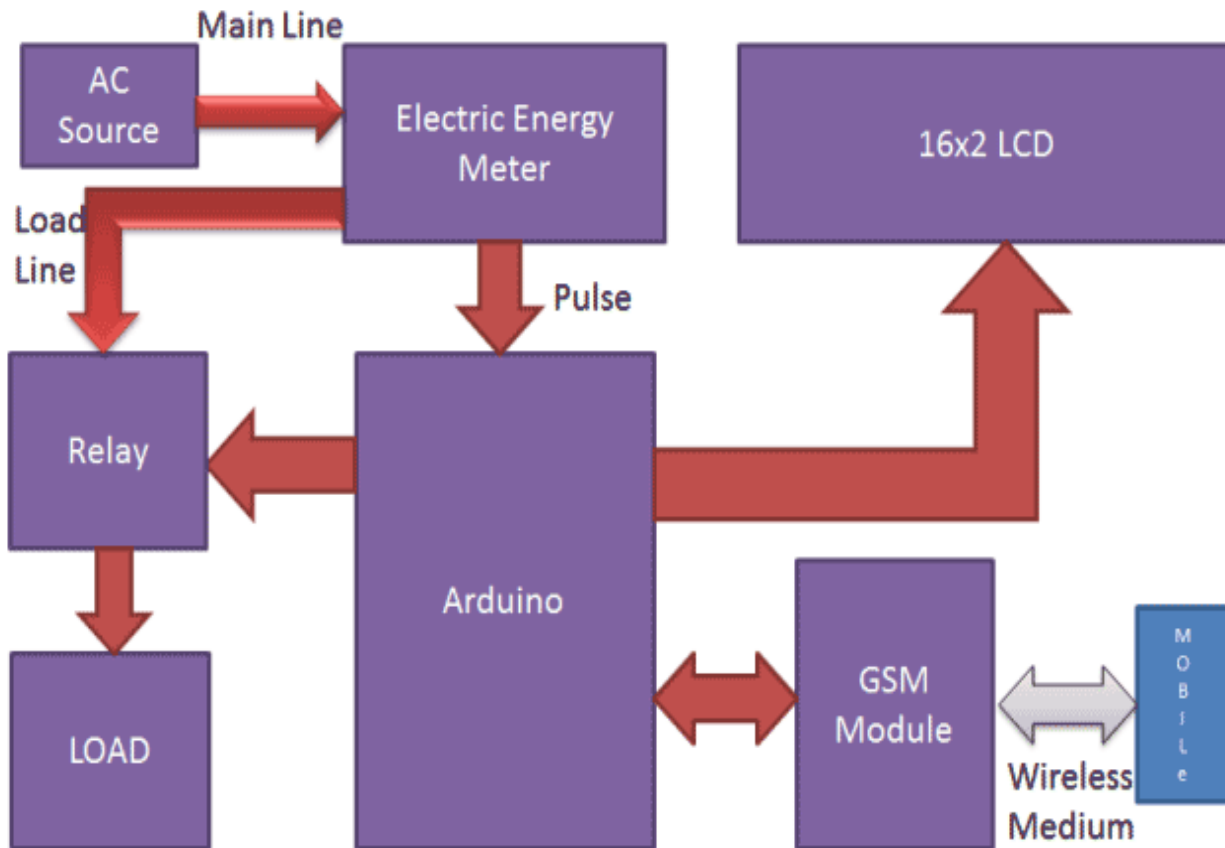
The project mainly aims at the following:

The objective of the project is to generate electricity bill automatically using GSM module.To reduce man power for noting and calculating the bill amount for each and every house.Notify the user about their bill amount and caution them to pay their bills.

B. Need for the Project

The project presents a new effective and low cost model of automatic meter reading system. In this model we need not replace the existing system I.E the system can be attached as an additional hardware to existing meter. During the power demand, the authority officer will select the restricted mode which limits the power supply to the each customer's house and sends the message to each customer's microcontroller via GSM. By receiving this message; the microcontroller also alerts the customer with a message and controls the usage of electricity. If the customer tends to consume more power, then the controller automatically disconnects the whole power supply to that particular customer's house. The reconnection is made only after paying the fine to the government. The payment of bill is done from the home itself using mobile phones.

C. Block Diagram

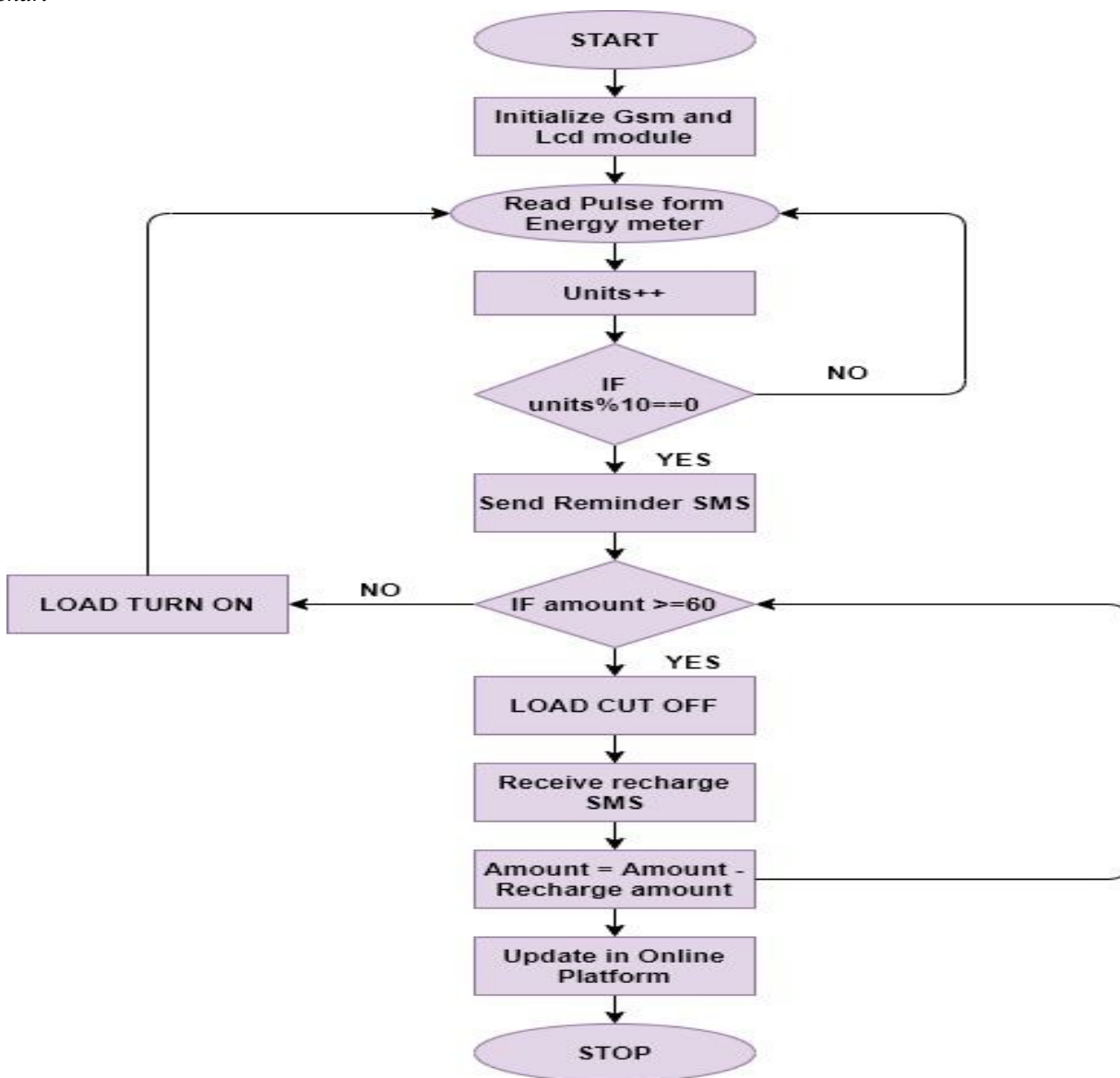


D. Components Used

- 1) *Electricity Meter:* Energy meters are the integrated instruments which measures the amount of electric energy supplied to the electric circuit in a specific time. It displays the quantity of electrical energy consumed by the user in Kilowatts/hour (KWH). It is used to read the amount of watts consumed. From this the units consumed is taken as output and will be automatically sent via SMS to the customer's mobile phone using GSM module.
- 2) *Arduino:* The Arduino Uno is a microcontroller board based on the ATmega328. The arduino is used to take the pulse from the energy meter and the units will be calculated according to the algorithm and displays the units in the LCD. The reading is stored and even if the power fails it continues to calculate the reading of the units consumed. The reading of the energy meter will be send as an SMS to the mobile phones of the user through GSM modem.
- 3) *ATMEGA328:* Atmega328 is one of the microcontrollers which is used with arduino boards. It is used to control and monitor the energy meter .GSM module is connected to this microcontroller and it is used to send the bill details to the customer mobile phone.
- 4) *GSM Module:* GSM stands for Global System for Mobile Communication. It is used to send messages to the costumers mobile phones. The Atmega238 is interfaced with the gsm module. If the costumer doesn't pays the bill on time, the power supply to the corresponding customers house power unit will be cut off by sending a message.
- 5) *Optocoupler:* Optocoupler are used to count the number of units consumed in the energy meter and there will a blink in the LCD display depends on the units consumed. The optocoupler mainly used to provide electrical isolations between the devices. It also prevents high voltages.
- 6) *LCD Display:* LCD display is an electronically modulated optical device. This display will be blinked according to the number of units consumed in the energy meter. It is used to display the energy meter readings on the LCD screen as well as can send SMS to the users account.

IV. SOFTWARE IMPLEMENTATION

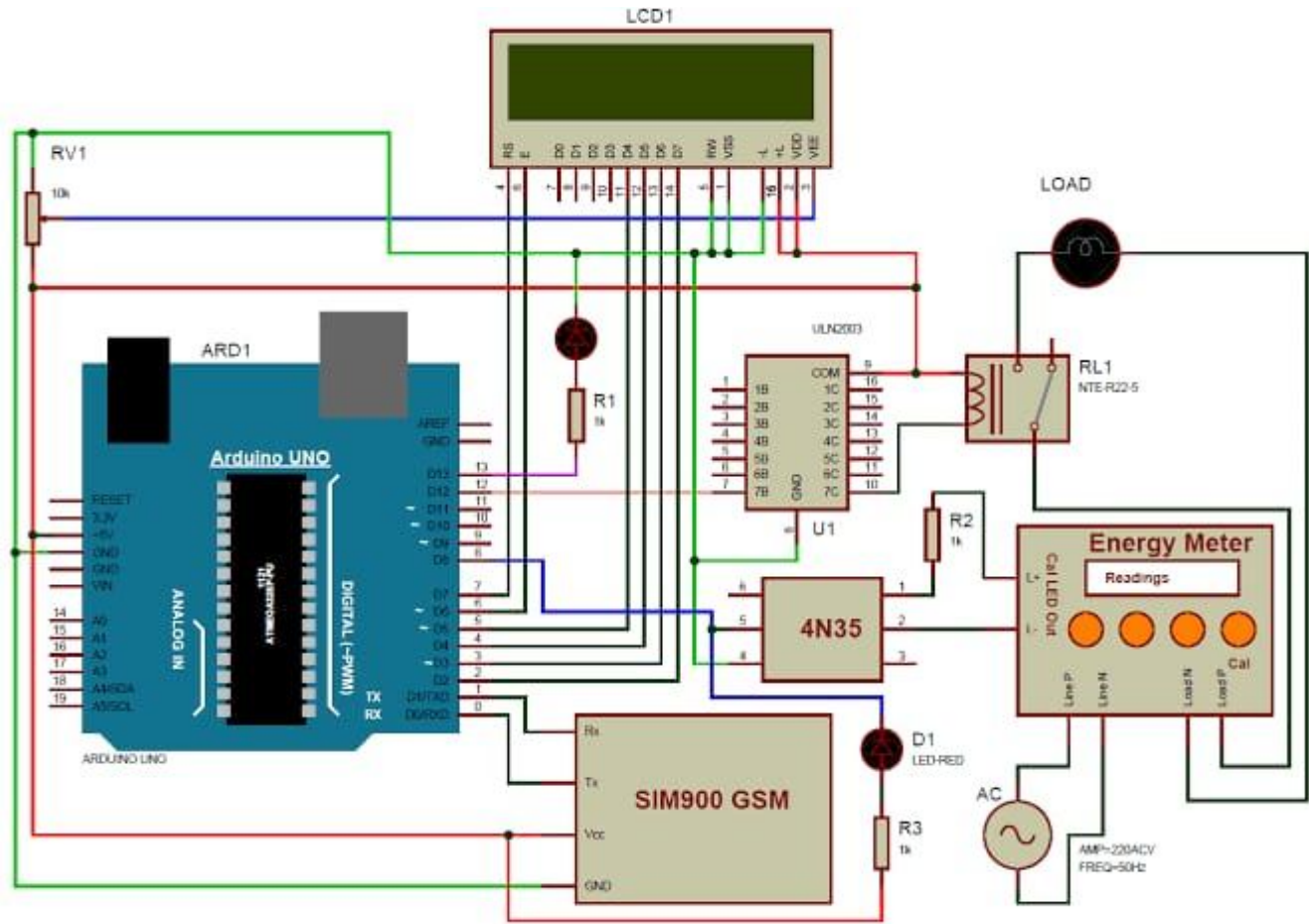
A. Flowchart



B. Algorithm

- 1) The energy meter pulses are given to the optocoupler circuit.
- 2) The optocoupler gives 5v output when there is no incoming pulse and gives 0v output when there is pulse input from the energy meter.
- 3) Every 0v output of the optocoupler is counted in the Arduino using the external interrupt.
- 4) The units is increased every time the interrupt is fired and the amount for the consumed units is calculated and the value of both units and amount is updated in the EEPROM memory.
- 5) The value of units is checked for every 10 units (for prototype purpose) and a reminder SMS is sent to the consumer.
- 6) The Limiting Value of 60 rupees is checked and the load is cut off if the amount reaches the limiting value.
- 7) The recharge SMS is received and the recharged amount is reduced from the original amount and saved in the EEPROM memory.
- 8) The amount is again checked and the Load is turned on if the amount is less than the limiting value.
- 9) The process returns to Step 4 and goes on.

C. Simulation Block



V. CONCLUSIONS

The proposed system eliminates the use of man power and the data obtained is more accurate than the existing system. It is more efficient for both the consumers and the energy providers. The project involves GSM module which is used to communicate the bill details to the consumer which eliminates the chances of losing the bill. The power consumption is also reduced by disconnecting the power supply to the user if a particular limit is exceeded and if the payment of bill amount is delayed.

VI. ACKNOWLEDGMENT

We would like to express our profound gratitude to Prof. L. M. Varalakshmi (Head of the Department) for her constant support and encouragement and all the other faculty members who guided us and supported us to complete this project.

REFERENCES

- [1] Loganthurai, P., Shalini, M., Vanmathi, A., Veeralakshmi, M., & Vivitha, V. (2017). Smart energy meter billing using GSM with warning system. 2017 IEEE International Conference on Intelligent Techniques in Control, Optimization and Signal Processing (INCOS).
- [2] Tariq Jamil, 2008 "Design and Implementation of a Wireless Automatic Meter Reading System" in Proceedings of the World Congress on Engineering.
- [3] Tarek Khalifa, Kshirasagar Naik and Amiya Nayak, "A Survey of Communication Protocols for Automatic Meter Reading Applications" in Communications Surveys & Tutorials, IEEE.
- [4] Vinu V Das, "Wireless Communication System for Energy Meter Reading" in 2009, International Conference on Advances in Recent Technologies in Communication and Computing.
- [5] Xiujie Dong, Yan Yang, You Zhou 2010 IEEE, "The Design of Wireless Automatic Meter Reading System Based on SOPC" in WASE International conference on Information Engineering.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)