

# A Digital Electricity Billing Is Erroneous To Power Supplier As Well As Consumer Via SMS

V. Manasa<sup>1</sup>, K.Suresh<sup>2</sup>

<sup>1</sup> Dept of EEE

<sup>2</sup>Assistant Professor, Dept of EEE

<sup>1,2</sup> SITS, JNT University Aanthapur, Tirupati, AP, INDIA

**Abstract-** *The proposed system focuses on development of low power and low cost electric energy meter reader. The system consists of two modules, measurement and communication module. The measurement module measures the line current and voltage in order to measure wattage and finally energy. Current transformer (CT) senses the line current while the potential transformer (PT) measures the line voltage. The outputs, obtained from CT and PT, are current to voltage converted, rectified, filtered, attenuated and analog to digital converted. The energy is summation of the power used over a known period of time. The amount of energy is transmitted to Power supplier as well as consumer via SMS (Short Messaging Service) at predefined intervals. The system also notifies Power Company in event of meter tampering. The current system of Electricity billing is erroneous and also time consuming. Errors introduced at every stage are result of errors with electro-mechanical meters, human errors while noting down the meter reading, and errors while processing the paid bills and the due bills. The major disadvantage of a post paid system is that there is no control of usage from the consumer's side. There is a lot of wastage of power due to the consumers be short of training of electrical consumption in a well-organized way. Since the supply of power is limited, as a responsible citizen, there is a need to use electricity in an improved and efficient way.*

*There are clear domino effect from many countries that a prepaid system has reduced the usage of electricity to a great extent . Additional advantage of the prepaid system is that the human errors made reading meters and processing bills can be reduced to a great amount. Wireless meter can be used in residential apartments and especially in industrial environments where bulk energy is consumed. Advances in technology have made exchange of information very high-speed, protected and truthful. Advances in wireless technology caused rapid change in the field of telecommunication system. Communication systems like internet and GSM are available in India. In this paper presented here the technique has been developed by a prepaid scratch card billing system for electricity.*

## I. INTRODUCTION

The next generation Automatic Meter Reading whose goal is to help collect the meter measurement automatically and possibly send commands to the meters was using new possibility explore and wireless communication propose a wide proliferation.. Automation ranges from Connecting to a meter through an RS-232 interface for transmitting the meter measurements all the way from the meter to the utility company via GSM network.

### 1.1 History of Meters

Meters previously, and today in a couple of nations, were electromechanical gadgets with poor exactness and absence of configurability. Burglary discovery was additionally a test. Such meters are constrained to giving the measure of vitality utilization on location. With the advancement of nation's economy and the change of national power, the force necessity is still continually expanding because of utilization of ill-advised force administration frameworks and the routine vitality metering framework. Over the previous years, metering gadgets have experienced much change, and are relied upon to end up considerably more refined, offering more administrations.

Present improvements in this heading appear to give opportunities in actualizing vitality proficient metering. Advances that are more exact and precise, mistake free, and so forth. The execution of WAMRS gives numerous key components as contrasted and the simple utility meter perusing with labor. Some of these elements are recorded beneath, Higher speed.

- Improved load profile.
- Automatic billing invoice.
- Real time energy cost.
- Load management.
- Alarm warning.
- Remote power switches on/off.
- Tamper detection.

- Bundling with water and gas.

This presents a two path correspondence between the power organization and the heap by sending in a great deal of force parameters and control sign to achieve the objective of burden administration and force interest control. Utilizing WAMRS on conveyance computerization can supply numerous capacities, for example, productive meter-perusing, appropriation, force checking and control, load administration and time-of-utilization rate. With fast development of versatile correspondence system, future application administration will steadily focus on information transmission administration. GSM has been created maturely and has numerous pragmatic applications at present. It has numerous points of interest, for example, more steady system with powerful components, covers for all intents and purposes all parts of the world, support and security of information transmission. It fulfills the need of rate for information transmission required for programmed meter perusing framework.

### 1.2 Messaging over GSM Network

Worldwide System for Mobile Communications (GSM) is the world's most mainstream standard for versatile telephony frameworks. GSM is utilized by more than 1.5 billion individuals crosswise over more than 212 nations and domains. GSM additionally spearheaded minimal effort usage of the short message administration (SMS) which permits gatherings to trade delay-tolerant short instant messages. The fame and wide scope of cell systems have pulled in specialists to consider the utilization of SMS administration. However there are sure flawed issues seeing GSM system, for example, its versatility, dependability and security, particularly under high load. Zerfos et al. [7] have investigated genuine information taken from a genuine GSM system in India. SMS conveyance achievement rate was observed to be 94.9%; 73.2% of the effectively conveyed messages range to the destination inside of 10 seconds; around 5% of them require over 90 minutes. Utilizing SMS for Automatic Electricity Meter perusing administration will doubtlessly build the stream of messages colossally. GSM utilizes a few cryptographic calculations for security. The advancement of UMTS presents a discretionary Universal Subscriber Identity Module (USIM), which utilizes a more drawn out verification key to give more noteworthy security, and commonly validating the system and the client. The paper comprises of taking after areas: Section II portrays the proposed framework structural engineering. The framework incorporates a 32-bit ARM microchip to manage power information handling and hand-off control, which transmits the force utilization values intermittently, by means of a current GSM system to an expert station. Area III and IV depicts the equipment structural

planning and programming independently of WAMRS. Area V finishes up the paper.

## II. SCOPE OF THE PRESENT INVESTIGATION

The proposed system focuses on development of low power and low cost electric energy meter reader. The system consists of two modules, measurement and communication module. The measurement module measures the line current and voltage in order to measure wattage and finally energy. Current transformer (CT) senses the line current while the potential transformer (PT) measures the line voltage. The outputs, obtained from CT and PT, are current to voltage converted, rectified, filtered, attenuated and analog to digital converted. The energy is summation of the power used over a known period of time. The amount of energy is transmitted to Power supplier as well as consumer via SMS (Short Messaging Service) at predefined intervals. The system also notifies Power Company in event of meter tampering.

### 2.1 Existing System

Electricity is one of the basic necessities in today's world. It is the most convenient and valuable form of energy. It is extremely important to efficiently provide electricity to a large populace. One of important steps in proper transmission and usage of electricity is its metering. Lately, most of the countries, whether developed or developing, have turned to digital meters for energy data logging.

From the early days till today meter reading for electricity consumption and billing is done by human operators from houses to houses. This therefore requires a very large number of human operators and long working hours to acquire complete data reading and billing in a particular area. However, there may be cases where human operators miss to bill few houses in an area or restricted and slowed down by bad weather condition, transportation problems, etc. Moreover human operators are very much likely to make mistake while billing or reading a meter and sometimes the house's electric power meter may be placed in a location where it is not easily accessible. Again printed billing has the tendency of being lost in the mail box or being never delivered. Day by day due to the increasing number of residential housings and commercial buildings, more human operators and longer working hours is needed to complete the meter reading task which eventually increases the energy provider operation costs for meter reading. To achieve efficient meter reading, reduce billing error and operation costs, an Automatic Electric Meter reading system can be introduced with every energy meter in an area. It is an effective means of data collection that allow substantial saving

through the reduction of meter re-read, greater data accuracy, frequent reading, improved billing and customer service, more energy profiles and consumption trends updates and better deployment of human resource. This process in very time consuming and since manual intervention is required it also increases the error in billing procedure. So, there is obvious need for automation in this area which will reduce the time delay and cost incurred in the current procedure.

## 2.2 PROPOSED SYSTEM

The basic need is to reduce the energy consumption of the meter as well as that required for extracting data readings from the meter especially in developing countries where there is shortage of electricity supply. Most developing countries require human intervention for taking the electricity meter reading. This increases labour costs and energy (in form of fuel) is wasted by the personnel while travelling to the various consumer sites. Also improper and untimely billing results which leads to loss of unaccounted energy and paperwork. The proposed system integrates GSM (Global System for Mobile Communications) communication with a low power electric energy meter, using the LPC2148, to provide solution to these problems.

A microcontroller based solution for measurement of energy data from a meter is flexible and low cost in nature in contrast with FPGA based solution [1]. RFID reading system can be used for saving readings of electricity meter but active RFID tags are very costly and replacing current electricity reading system with RFID reading system is not feasible [5]. RFID systems require a manual reader to take the readings, so utility of this type of automation is limited in a country like India where population density is very high. GSM covers almost every region in India and also it is cost effective when comes to sending an SMS. Hence, the proposed system uses GSM technology to automate the process by sending the measurements through a module to a server, where the Billing is done automatically. This eliminates the need of a meter reader and records data without any human error.

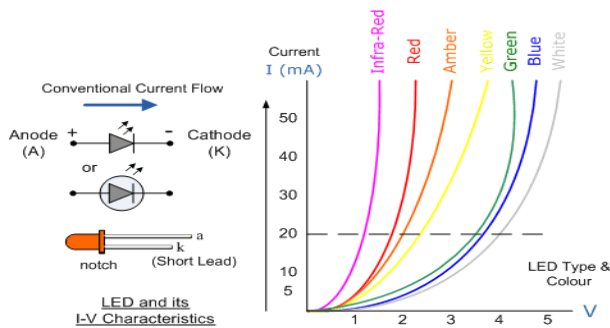
During the last few years, a few venture companies explored the potential of introducing AMR in the kingdom of Bahrain. Their effort was driven by the fact that number of households in Bahrain is manageable. However, the cost of replacing all electricity meters and the introduction of an overall management system was too high. To introduce the concept of AMR in the Kingdom of Bahrain, a model of low cost wireless AMR using GPRS Technology has been developed. GPRS is quite often used for meters that need to transmit a lot of data or for meters that needs to communicate as a point to point link. In cases where a roll out is scattered

over the region PLC cannot be used which results in a solution where the GPRS meter communicates directly with the central access server. Often this is called point to point so it is more secure than broadcast technique. It is also faster and is not sensitive for influences.

## III. EXPERIMENTAL METHOD

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set.

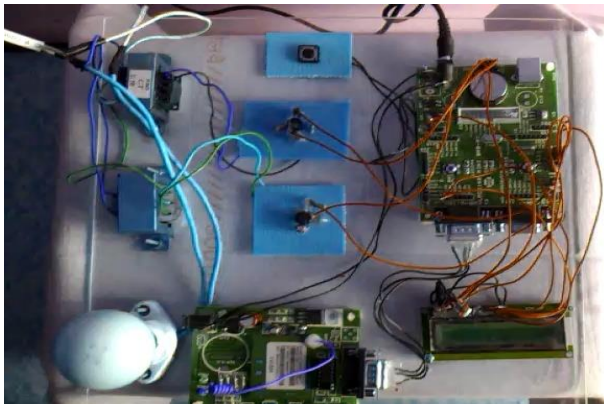
Before a light emitting diode can "emit" any form of light it needs a current to flow through it, as it is a present dependant gadget. As the LED is to be joined in a forward inclination condition over a force supply it ought to be Current Limited utilizing an arrangement resistor to shield it from unnecessary current stream. From the table above we can see that every LED has its own forward voltage drop over the PN-intersection and this parameter which is controlled by the semiconductor material utilized is the forward voltage drop for a given measure of forward conduction current, commonly for a forward current of 20mA. Much of the time LEDs are worked from a low voltage DC supply, with an arrangement resistor to restrain the forward current to a suitable worth from say 5mA for a straightforward LED pointer to 30mA or more where a high splendor light yield is required.



**Fig: Light Emitting Diodes I-V Characteristics**

In this system, the aim is to obtain the electricity meter reading automatically to the consumer on request. For this purpose, we have selected GSM to communicate the customer of the amount being consumed. The series of steps to be followed to obtain the result are illustrated in this chapter using some screenshots. Note that each screenshot is indicatively taken to make the readers gain some knowledge on the working of this model. The actual system can change its form from the pictures shown in this chapter.

**Step 1:** Connect the 12V 1A adpoter to the microcontroller and connect the kit to the mains.



**Fig: connecting hardware to main supply.**

**Step 2:** After switching the mains on, the system looks as shown in the figure below. This means that the automatic energy meter reading system is successfully turned on. Connect the system to the load, to calculate the energy consumed. In this case, a bulb of 100 W is used as a load.

#### IV. CONCLUSION

The remote programmed meter perusing framework (WAMRS) displayed in this paper ingested numerous propelled study results in PC innovation and correspondence innovation. The meter-perusing errand can be done at the administration bureau of using so as to live arrangement zone this framework.

Interim, the vitality assets administration divisions can screen the utilization of force with a specific end goal to enhance the utility of force. It's the essential to acknowledge programmed convey of vitality assets. The framework has numerous noteworthy excellences, for example, remote, low-workload, extraordinary amount of information transmission high-veracity and low-costs. The utilizing of implanted framework enhances the soundness of remote information transmission. For a long separation transmission GSM telecom has indicated brilliant execution at any conditions.

This paper has shown for measuring the electrical vitality utilization of an electrical burden for two wire dispersion frameworks with the proposed vitality meter as a distinct option for the routine electromechanical meters. This microcontroller based vitality meter model has been executed to give estimation up to 40 A heap current from a 230 V line to nonpartisan voltage. The proposed vitality meter is equipped for measuring vitality utilization for all heaps conditions i.e. force element and non-sinusoidal voltage and current waveforms. It doesn't have any pivoting parts that help in the counteractive action of meter treating, which is an alluring element for the utilities. The proposed vitality meter incorporates a "no heap limit" highlight that will take out any inching impacts in the meter. What's more, the procedure of perusing the vitality utilization is encouraged by the LCD show that is less difficult than that for the simple meters which decreases human mistakes while taking note of down the meter perusing.

#### REFERENCES

- [1] "Handbook for Electricity Metering" by The Edison Electric Institute—The Bible of electricity meters, continuously updated since electricity was discovered.
- [2] Chunjuan WEI \_ ,Junjie YANG "Implementation of Automatic Meter Reading System Using PLC and GPRS" Journal of Information & Computational Science 8:16 (2011)
- [3] Ahmed Husein, and Mohamed El-Geziry "Practical Issues of Power Line Communication for Automatic Meter Reading Systems" Proceedings of the 14 th International Middle East Power Systems Conference (MEPCON'10), Cairo University, Egypt, December 19-21, 2010,
- [4] Tarek Khalifa, Kshirasagar Naik and Amiya Nayak "A Survey of Communication Protocols for Automatic Meter Reading Applications," IEEE communications sureveys & tutorial, 2011, 13 (2):168 –182.
- [5] Muhammad Saadi, Rabeel Manzoor, Lunchakorn Wutisittikulij, Proposal for Low Cost GSM based Electric Meter for Efficient and Automated Meter Reading for Developing Countries, Proceedings of the

World Congress on Engineering 2012, London, U.K., Vol II, pp. 1024–1027, July 4 - 6, 2012.

- [6] Peng Xuange Coll. of Inf. Sci. & Media, Jingtangshan Univ., Ji'an, China, Xiao Ying, "An Embedded Electric Meter Based on Bluetooth Data Acquisition System", 2nd International Workshop on Education Technology and Computer Science (ETCS 2010).