

GSM Based Power Theft Detecting and Monitoring

Prakash Udgire

IETE and ISTE Member, Associate Professor Guru Nanak Dev. Engineering College, Bidar

Abstract- Electrical energy is very imperative for ever day life and a spine for the industry. Electricity is indiscipline to our daily life with increasing need of electricity the power theft is also increasing, the power theft is a problem that continue to pledge power sector across the whole country. The objective of this paper is to design a system in order to avoid the displeasures for the users from theft bills irrespective of the use of the electricity due to theft using a GSM model. In order to integrate the various parts together we must first properly understand the working of the different parts to be integrated together. A brief study is alone on the component and the technology which we are going to use in our paper.

Index Terms- Global system for mobile (GSM), Digital Energy meter (DEM), Automatic meter reading (AMR), Tactile sensor (TS), Water and power development authority (WAPDA).

I. INTRODUCTION

The electricity is needed to be protected for efficient power delivery to the consumer because electricity is indispensable to domestic and industrial development activity. There are two types of losses technical and non-technical losses. Every year the electricity companies fare the line losses at an average 20-30% according to power ministry. WAPDA Company's loss more than Rs. 125 billion. The T&D losses have been a concerns for the Indian electricity sector. Since these have been very high when compared with the other developed countries, the present T&D losses including unaccounted energy are about 30% and there is a need to reduce these losses through efficient management the best operation and maintenance practice of the transmission and distribution. When we talk about T&D losses it also include the theft of the electricity, although it is a part of the commercial loss but there is no way to segregate theft from the T&D losses.

In practice we know the energy built and the input energy the difference between these two is T&D

losses. Obviously the theft is included in this loss. SERC, MOP also ask to segregate T&D loss and commercial loss but nobody is able to tell how these losses can be segregated as a theft (the part of the commercial loss) is embedded with T&D. electricity theft is at the center of focus all over the world but electricity theft in India has a significant effect on the Indian economy. The loss on amount of theft is reflected in ARR of the electricity economy. Thus these costs are routinely passed on to the customers on the form of the higher energy charges. Electricity power theft takes place in the variety of the forms and thrives with the support of the people from the different walks of life, utility staff, consumers, labor union leader, political leader, bureaucrats and high level utility officials. The problem challenging the power utilities worldwide is the electricity, in other words using electricity from utility company without the companies consent, significantly, it is enough to destroy the entire power sector of the country. According to sources 20% losses means the masses would have to pay extra 20% in terms of electricity tariffs. This paper discuss the problem of electricity theft as well as proposed new method of calculate and judge the seal breaking and also weather the electricity stealing is happened or not.

FACTORS THAT INFLUENCE ILLEGAL CUSTOMERS

There are many factors that encourage people to steal electricity of which socio-economy factors influences people to a great extent in stealing electricity. A common notation in many peoples is that it is dishonest to steal something from their neighbored but not from the state or public owned utility company. In addition other factors that influence illegal consumers are

1. Higher energy prices deject consumers from buying electricity. That able to illustrate the energy prices in different countries. In light of this, rich and highly educated communities also

steal electricity to escape from the huge utility bills.

2. Growing unemployment rate shows your effect on the customer's economy situation.
3. Lower illiteracy rate in under developed communities has a greater impact on illegal consumers, as they might not be aware of the issues, loss and offenses related to the theft.
4. Weak economic situation in many countries has implied its effect directly on common man.
5. In view of socio economic conditions of the customers, electricity theft is proportional to the tariff of the electricity utilization.
6. Countries with weak enforcement of law against electricity theft have recorded high proportions of theft.
7. Corrupt political leaders and employees of the utility company are responsible for billing irregularities.

Country	Tariffs In US \$ per 1Kwh	Information of Year
Australia	7.11	2006-07
Canada	6.18	2006-07
Denmark	42.89	2006-07
Finland	6.95	2006-07
Germany	30.66	2009
Italy	37.23	2009
Malaysia	7.42	2007
South Africa	10.15	2008-09
Sweden	27.34	2009
UK	18.59	2009
USA	9.28	2007

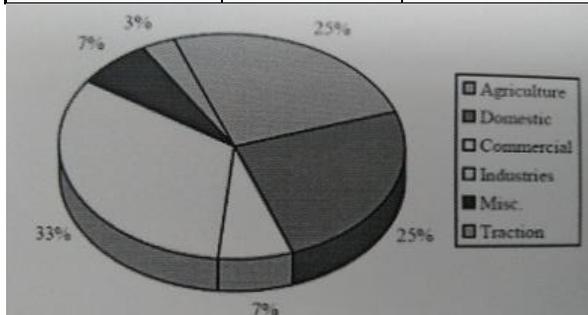


Figure 1: Electricity consumption in different sectors in India

EFFECTS OF ELECTRICITY THEFT

Negative effects of electricity thefts are severe and dangerous. Primarily electricity theft effects the utility company then its customers. In addition

electricity theft over loads the generation unit. In energy market utility companies expects their money back from the customers for the electricity supplied. Most of which is lost by them due to the Non-technical losses (NTL). Electricity theft is a serious concern for utility companies as they are under threat of survival. Because of these incurring economic losses, it is evident that some utility companies in developing countries are losing about 10-30% of their total revenue. Which shows that they could not invest on measure to reduce the electricity theft. These economic losses effects the utility company's interest in development of the devices in view of improving the quality of supply or for electrification process.

II. BLOCK DIAGRAM

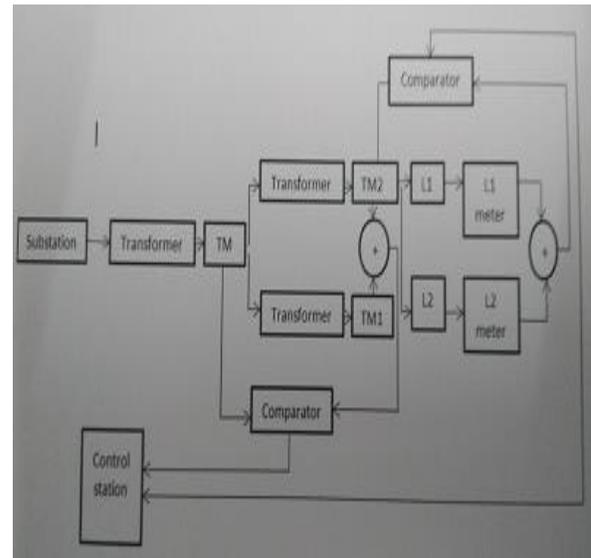


Figure 2: Block diagram of the proposed stealing method

The power theft monitoring is an important research in electric power system and electricity stealing prevention become a big problem to the electricity. Electricity stealing is a long term problem, however each power supply department has huge investment of man power and material, the phenomenon of defending stealing electricity has increased and not abated and the method of electricity stealing is continuously improved.

The behavior of electricity stealing not only makes the power industry suffering huge financial losses but also threatens the main power supply security and reliability. As in figure 2 the system has two parts they are the link method facility and remote terminal

facility in control room. The link method is used in between the main energy meter and the substation transformer and the user energy meter. The output of the user single phase electric energy meter also has a proportional relationship with power. If electricity stealing is took place the user single phase energy meter cannot measure accurately, then discrepancies will come up between the number of output impulse in standard electricity measure module and user single phase electric energy meter in unit time, it is considered electricity stealing happens or user electric energy abnormal when the discrepancies accumulate total arrives certain level. When the abnormality of the electricity measure impulse into two paths is monitored by system software in control room, current time is recorded, the beginning time of electricity stealing and alarm information are transmitted to the field man through the GSM network.

AUTOMATIC METER READING

Automatic meter reading is to increase the accuracy reading and the theft control system for the customers and government. In the proposed method GSM technology used to transmit the meter readings to the customers and the government with the required cost. As in the figure 3 shows the energy theft control by tactile sensor and ARM 7 processor. To control the theft we used two types of theft controlling process namely

1. Tampering of seal in energy meter.
2. Underground power theft control.

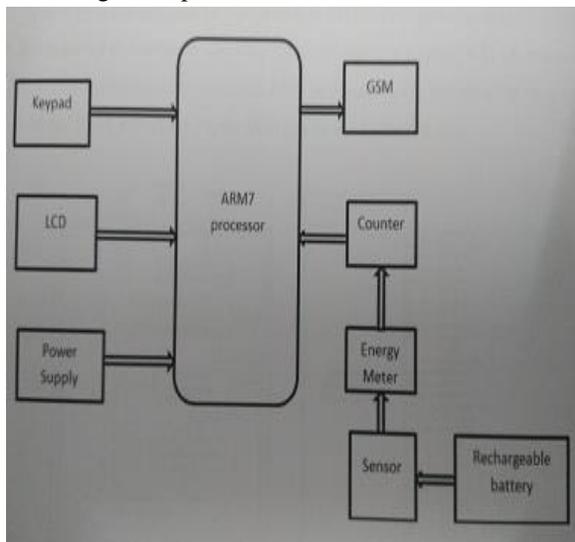


Figure 3: Block diagram of AMR

The process of theft control will be used by IR (Infrared) sensor. Tactile sensor is fixed in immediately inside the energy meter. After identifying the theft, the tactile sensor send the data to the ARM7 processor and then message send to the government office by using a GSM. Whenever there is a power cut 12V rechargeable battery give power to the tactile sensor automatically.

ARM7 FEATURES

1. Implementation size
2. Better performance.
3. Low power consumption.
4. Load/Store architecture.
5. An orthogonal instruction set.
6. Mostly single cycle execution.
7. 16x32 bit register.

It is a versatile processor designed for mobile devices and other low power electronics. As in figure 4 this processor architecture is capable up to 130 MIPS on a typical 0.13 μm process. The ARM7 TDMI processor core implements ARM architecture v4T. The processor supports both 32 bit and 16 bit instructions via the ARM and thumb instruction sets.

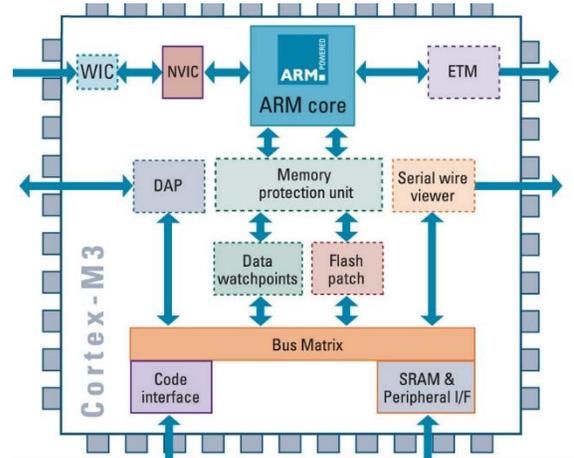


Figure 4: ARM processor Architecture



Figure 5: ARM Processor



Figure 6: Tactile Touch Sensor
TACTILE SENSOR

Tactile sensor usually refers to a transducers that is sensitive to touch, force, pressure. Tactile sensors are employed whenever between a contact surface and the environment are to be measured and registered. Tactile sensor is a device which receives and response to a signal or stimulus having to do with force. Sensors need to be designed to have an effect on what is measure.

III. ADVANTAGES AND DISADVANTAGES

3.1 ADVANTAGES

1. The proposed system provides solution for some of the main problems faced by the existing Indian grid system such as wastage of energy, power theft, manual billing systems and transmission line fault.
2. This method will reduce the energy wastage and save a lot of energy for future use.
3. We can detect the location from where the power is being stolen which was not possible before.
4. Optimized use of energy.

3.2 DISADVANTAGES

1. Not capable of detecting the exact location from where the power is being stolen giving only approximation to that place.
2. Cannot determine who is stealing but even no other existing system is capable of doing this.

IV. CONCLUSION

Developing countries electricity theft is a common practice especially in remote areas as they do not pay

utility bills to a government company in case of electricity and gas as well. To solve these problems government must think of an idea to provide help in terms of subsidy to manage this issue. With this system the service provider can collect the bill any time with a single message. The data collection and manipulation task becomes fast and easier. Any modifications can be made to the code in a less time changes in the rate or unit calculations can be done very effectively.

REFERENCES

- [1] Amin S Mehmood, T. Choudhary, M A Hanif "A reviewing the technical issues for the effective construction of automatic meter reading system" In international conference on microelectronic 2005 IEEE.
- [2] Abdollah, A. Dehghani, M. Zamanzadh "SMS based reconfigurable automatic meter reading system in control applications" 2007.
- [3] Bharat P, Ananth .N, Vijetha .S, Prakash A.V.J "Wireless automated digital energy meters" in sustainable energy technologies ICSET 2008.
- [4] S. N. Singh electric power generation, transmission and distribution 2nd edition Prentice Hall of India Pvt. Ltd.
- [5] ZHOU Wei, ZHU Rui-de, WANG Jin-quan "GSM based monitoring and control systems against electricity stealing electric power automation equipment" 2004 Vol 24, No 2, PP.64-66.