

GSM Based Electricity Theft Identification in Distribution Systems

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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 power theft is a problem that continues to plague power sector across the whole country the objective of this project is to design a system in order to avoid the displeasure for the users from theft bill irrespective of the use of the electricity due to theft using GSM module. 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 components and the technology which we are going to use in our project.

KEYWORDS

GSM modem, Digital energy meter, tactile sensor, PC interface, Microcontroller.

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 Nontechnical 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.

T&D losses have been a concern for the Indian electricity sector. Since these have been very high when compared with other developed countries. The present T&D losses including unaccounted energy are about 30% and there is 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 includes the theft of electricity, although it is the part of commercial loss but there is no way to segregate theft from the T&D losses.

In practice, we know the energy billed 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 theft (the part of commercial loss) is embedded with T&D.

Electricity theft is at the centre 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 company. Thus these costs are routinely passed on to the customers in the form of the higher energy charges.

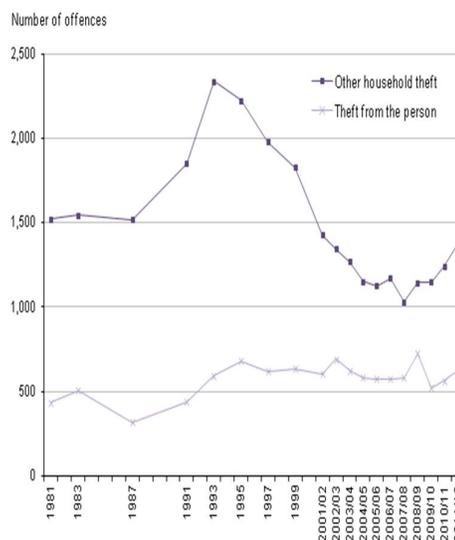


Figure 1: statistics of electricity theft in India

Electricity power theft takes place in a variety of forms and thrives with the support of people from different walks of life: utility staff, consumers, labour union leader, political leaders, bureaucrats and high level utility officials. The problem challenging power utilities worldwide is the electricity, in other words using electricity from utility company without the company's consent. Significantly, it

is enough to destroy the entire power sector of country. According to source 20% losses means the masses would have to pay extra 20% in terms of electricity tariffs. This paper discusses the problem of electricity theft as well as proposed new method for calculate and judge the seal braking and also whether electricity stealing is happened or not.

LITERATURE SURVEY

In et al [1] S. S. R Depuru, Electricity can be produced through many ways which is then synchronized on a main grid for usage. The main issue for which we have written this survey paper is losses in electrical system.

In et al [2] M.V.Ramesh This design incorporates effective solutions for problems faced by India's electricity distribution system such as power theft and transmission line fault,

In et al [3] ZHOU Wei, electricity-stealing prevention became a big problem to the electricity board. Based on the kind of electricity-stealing and actual demand of prevention of stealing electricity, realizes the behaviour of electricity-stealing with remote monitoring

In et al [4] H.G.Rodney, this paper presents of design and development of Automatic meter reading (AMR) system. AMR system is a boom for remote monitoring and control domestic energy meter.

In et al [5] Amin S. Mahmood, This paper deals with automatic meter reading and theft control system in energy meter. This model reduces the manual manipulation work and theft control.

PROPOSED SYSTEM

The power theft monitoring is an important research in electric power system and electricity stealing prevention became a big problem to the electricity.

Electricity stealing is a long term problem; however each power supply department has me huge investments of manpower and material, the phenomenon of defending stealing electricity has increased and not abated and the method of electricity stealing is continuously improved.

The behaviour of electricity stealing not only makes the power industry suffering huge financial losses but also threatens the main power supply security and reliability.

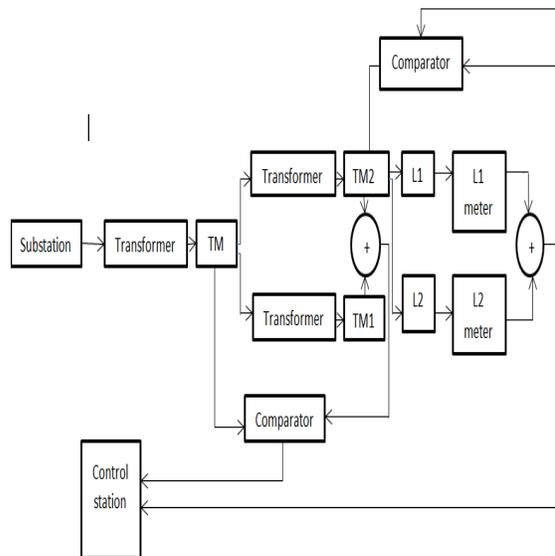


Figure 2: Block diagram of the proposed stealing method.

As in the Fig 2, the system has two parts; they are the link method facility and remote terminal facility in control room. The link method is used between the main energy meter in the substation transformer and the user energy meter, the output of user single phase electric energy meter also has an 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 happen or user electric energy abnormal when the discrepancies accumulative total arrives certain level.

When the abnormity of the electricity measure impulse in two paths is monitored by system software in control room, current time is record, the beginning time of electricity stealing and alarm information are transmitted to the field man through GSM network.

AUTOMATIC METER READING

Automatic meter reading is to increase the accuracy reading and theft control system for customer and government. In the proposed method GSM technology used to transmit the meter reading to the customer and government with the required cost.

As in Fig 3 shows the energy theft controlled by tactile sensor and ARM7 processor. To control the theft, we use two types of theft controlling process namely

- i) Tampering of seal in energy meter
- ii) Underground power theft control

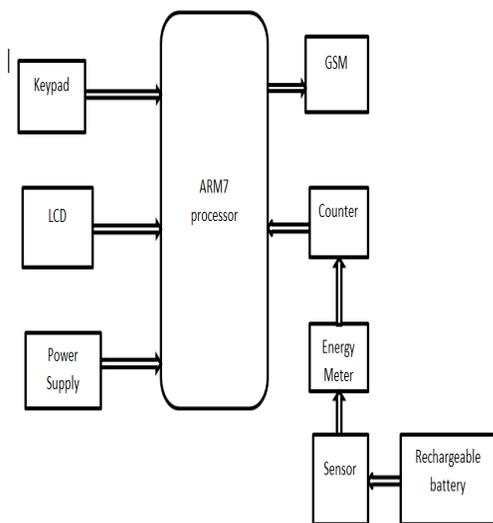


Figure 3: Block diagram of the AMR

The first process of theft control will be used by IR (Infrared) sensor. Tactile sensor is fixed in immediately inside of the energy meter.

After identifying theft, tactile sensor send the data to the ARM7 processor and then message send to the government office by using 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 Fig 4, this processor architecture is capable of up to 130 MIPS on a typical 0.13 μm process.

The ARM7TDMI processor core implements ARM architecture v4T. The processor supports both 32-bit and 16-bit instructions via the ARM and Thumb instruction sets.

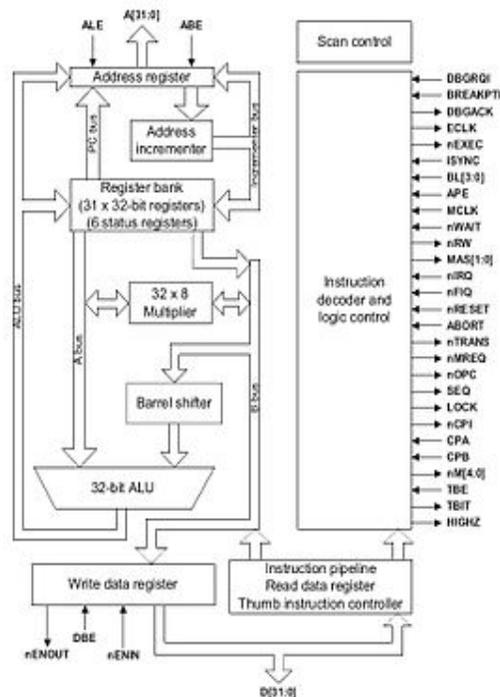


Figure 4: Architecture of ARM processor



Figure 5: Arm processor

TACTILE SENSOR:

Tactile sensor usually refers to a transducer 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. A tactile sensor is a device which receives and responds to a signal or stimulus having to do with force, sensor need to be designed to have a small effect on what is measured.

TOUCH SENSING

This is the detection and measurement of a contact force at a defined point. A touch sensor can also be restricted to binary information, namely touch and no touch.

TACTILE SENSING

This is the detection and measurement of the spatial distribution of forces perpendicular to a predetermined sensory area and the subsequent interpretation of the spatial information. A tactile-sensing array can be considered to be a coordinated group of touch sensors.

- A touch sensor should ideally be a single-point contact; through the sensory area can be any size. In practice, an area of 1-2 mm² is considered a satisfactory compromise between the difficulty of fabricating a sub-miniature sensing element and the coarseness of a large sensing element.
- The sensitivity of the touch sensor is dependent on a number of variables determined by the basic physical characteristics of the sensors. In addition the sensitivity may also be the application, in particular any physical barrier between the sensor and the object. Sensitivity within the range 0.4 to 10N, together with an allowance for accidental mechanical overload is considered satisfactory for most industrial applications.
- A minimum sensor bandwidth of 100 Hz.
- The sensor's characteristics must be stable and repeatable with low hysteresis. A linear response is not absolutely necessary as the information processing techniques can be used to compensate for any moderate non-linearity.
- As the touch sensor will be used in an industrial application, it will need to be robust and protected from environmental damage.
- If a tactile array is being considered, the majority of application can be undertaken by array 10-20 sensors square, with a spatial resolution of 1-2 mm.



Figure 6: Tactile sensor

STEALING

The metering of electric energy meter is mainly according to the relationship with voltage, electric current and power factor angle. The behaviour of electricity stealing not only makes the power industry suffering huge financial losses but also threatens the main power supply security and reliability.

According to the analysis, there are many electricity stealing trick about electric energy meter, the methods could be approximately divided into under voltage, under current, phase shifted and difference expansion to their principle.

Some common tricks:

Un-hooking technology will electricity stealing. Secretly destroy the lead sealing of electric energy meter, open voltage hook of terminal in junction box and make no electric current through all using quantity of electricity steal.

One fire-one ground technology. Take the ground. Wire as naught line, generally take the water pipe or cal duct as ground wire, the risk is bigger (most dangerous).

Violated wire connection.

Loop of short electric current, which makes the electric energy meter shift slow.

Cross meter to connect wire, added bypass to reel across electric energy meter, which makes no or less electric current through, stall or rear measurement.

Exchange fire wire and zero wire.

Reverse the in and out of fire.

Make electric meter reverse by using external supply. Adopt hand generator with voltage and current output or inverter power supply to join into the electric meter, make the electric energy meter reverse rapidly (rarely used technique and dangerous)

As in fig 7, Due to the kind of electricity stealing and actual demand of preventing electricity stealing, based on that equipment of electricity stealing with remote monitoring is designed, which not only monitors the time electricity stealing occur but also offers the electricity stealing quantity and sends SMS to the local field man to catch the thief with positive proof to handle lawbreakers with the behaviour of electricity stealing.

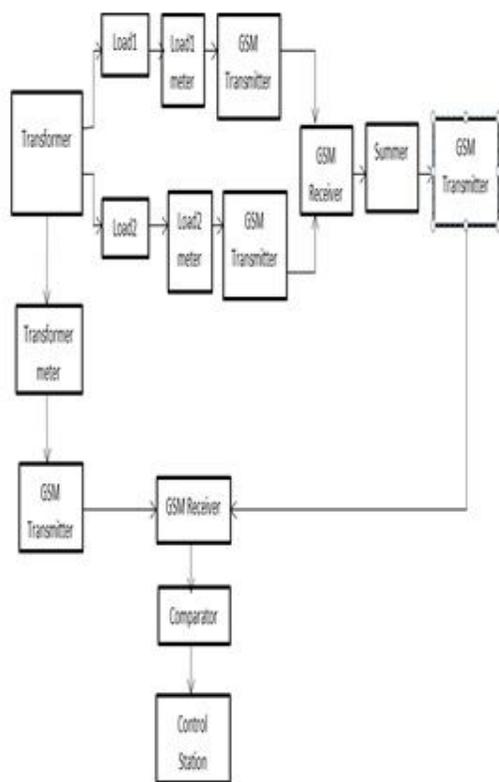


Figure 7: Block diagram of stealing

CONCLUSION:

In 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 problem governments 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 modification can be made to the code in less time. Changes in rate or unit calculation can be done very effectively.

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