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Power Theft Detection and Information Passing System

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ABSTRACT: In Power System, The power theft monitoring is an important research in electric power system and electricity stealing prevention became a big problem to the electricity. In the existing scheme, detection of power theft based on monitoring of the total power consumption, receiving the delivered power data that includes data delivered to a number of users. If there is a difference between them then the occurrence of power theft is determined. But there lies no specific way to find out where the power theft has occurred. The check metering system also be used to monitor the energy used on the secondary of a distribution transformer serving several consumers and compared to the sum of all the meter usage. This Paper proposes the idea of detection of power theft by using two current sensing parts one is Hall sensor and another one energy meter current measure current transducer. The hall sensor located at service receiving point. By comparing the two inputs as per the programming the controller, if there is any difference present between the two values then send a message to concerned authority with the help of GSM system. The proposed system will deliver continuous real-time monitoring of energy utilization, minimum energy loss and power theft detection.

KEYWORDS: Hall Effect Sensor, PIC, GSM Technology, SMS, LCD.

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 viz Technical and Nontechnical losses. Every year the electricity companies fare the line losses at an average 20- 30% according to power ministry. 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.

Existing cases of power theft by the customers are

- Tunneling out to roadside mains cables and splicing into the supply.
- A garage taking its night time power supply from the nearest lamp post.
- Domestic customers drilling holes into meter boxes and attempting to stop the counter wheels from turning.
- By keeping a strong magnet in front of the disc in the energy meter and thus arresting the rotation of the disc.
- Connecting the load directly to the power line bypassing the energy meter.

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In the advanced smart energy meters

- Interrupt measurement: This attack takes place before the smart meter makes a demand measurement and aims to prevent the smart meter from recording the consumed electricity.
- Tamper stored demand**:** The attacker can also tamper the data stored in the smart meter to achieve energy theft, since the smart meter's behavior are controlled by these data. The other way to tamper stored demand is erasing relevant records which are audit logs and the recorded total demand. These records can be accessed by administrative interfaces that need passwords.
- Modify in network**:** This attack directly injects the false data into communication between smart meters and utility company.

Now a days theft of energy has been detected by periodical checking of the service connections, information received from informers / meter readers. But in this system of detection, Most of the energy thefts cannot be noticed and leads to huge continued revenue loss to the Utility companies

More number of service connections available for inspection in a particular region. Every service connection has to be inspected periodically by the concerned Energy Theft Detecting squad to arrest the revenue leakage through theft of energy. Most of the service connections are available in the remote areas and left without any inspection for long time.

This paper aims to give solutions to the above problems faced in the detection of the Theft of Energy with the help of GSM Technology and some of the hardware components with microcontroller. Power consumed by the every people will give revenue to the utility company which in turn leads to maintaining the un-interrupted, quality power to the consumers.

The proposed system will deliver continuous real-time monitoring of energy utilization, minimum energy loss, power theft detection and isolation from the network hence eventually protecting the whole distribution network.

In the existing system the following problems are identified

1. One major disadvantage of this project is that it is not capable of detecting the exact location from where the power is being stolen and giving only an approximation to that place.
2. Cannot determine who is stealing, but even no other existing system is capable of doing this.
3. If implemented on a large scale it may take a lot of time and manual input.
4. Most of the energy theft cannot be identified and leads to huge continued revenue loss to the utility companies.
5. Most of the service connections are available in the remote areas and left without any inspection for long time.

Those problems are prevented in my proposed method.

II. OPERATING PRINCIPLE OF THE PROPOSED POWER THEFT DETECTION

This proposed system has two current sensing parts one is Hall sensor and another one energy meter current measure current transducer. The hall sensor located at service receiving point and it's connected with A/D converter. The A/D converter converts the analog signal into 8 bit digital signal apt to microcontroller. To set a pre-determined value or any other type of input the switch is interfaced with controller. From the two inputs as per the programming the controller performed a theft possibilities and it will show the value of difference power in display and if it is difference present between actual and pre-defined value then send a message to concerned authority with the help of GSM system.

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III. BLOCK DIAGRAM

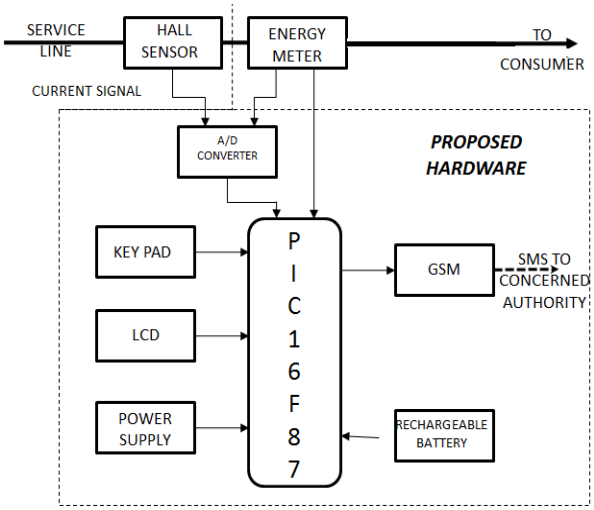

Fig.1.ProposedSystem

Our proposed system has two current sensing parts one is Hall sensor and another one energy meter current measure current transducer. The hall sensor located at service receiving point and it's connected with A/D converter. The A/D to converter the analog signal in to 8 bit digital signal apt to microcontroller. To set a pre-determined value or any other type of input the switch is interfaced with controller. From the two input as per the programming the controller performed a power theft possibilities and it will show the value of line current and meter current in display and if the line current is more than the meter current then the display **"Energy stolen in service connection No. xxxx"** and send a message to concerned authority with the help of GSM system.

III. RESULT AND DISCUSSIONS

Suppose there is any tapping done by the consumer on the line to connect his appliance, there will be a difference between meter reading and hall sensor reading. Microcontroller will compare these two values and if the measured value on secondary sensor is more than value send by meter then the power theft is happening. This theft signal or SMS generated by the system can be transmitted to substation by GSM, when the abnormality of the electricity measure impulse in two paths is monitored by system software, the beginning time of electricity stealing and alarm information are transmitted to the field man through GSM network.

The following table shows the result of the system with the lamp loads for the Normal and Power Theft conditions.

S.No	Condition	Load	Energy Stolen in kwhr (Units) (8 hours/day for 1 year)	Theft Alert		Revence Leakage based on the present domestic tariff of Rs.6.60/unit
				Through LCD	BY SMS	
1	Normal	200W	0	No	Not Sent	Nil
2	Theft in Partial Load	100 W	292	Yes	Sent	Rs.1927.20
3	Theft in Full Load	200 W	584	Yes	Sent	Rs.3584.40

Table 1 Result for Theft Alert System

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The power theft detection at the time of occurrence itself say 5 KW in a domestic service connection will arrest the revenue leakage of Rs.96,360 per year. Similarly power theft detection in large load will arrest the huge revenue leakage.

ADVANTAGES

- Spotting out the location where the power theft is occurring.
- Compact size, lightweight for quick and high accuracy make the system more effective.
- Any modification can be made to the code in less time.
- Give the immediate knowledge about the energy theft to the concerned energy theft detecting squad.

APPLICATION

- High consumption domestic consumers such as consumers having air conditioners.
- Commercial establishments such as shopping malls, cake shops etc.
- Industrial consumers such as cold storage and ice factories, Plastic industries, steel industries etc.
- Industrial consumers available in remote areas.

VI.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 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 get the immediate knowledge about the energy theft and passing to the concerned energy theft detecting squad. 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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