Wireless Power Theft Monitoring System In Energy Meter

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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. This paper deals with theft control system in energy meter. To avoid theft, radio frequency is used to send the signal to the electricity board. The measuring of energy meter and monitoring of IR sensor is done with a PIC microcontroller. The informative system will be helpful for the electricity board to monitor the entire supply and the correct billing accordingly without any mishap. This model reduces the manual manipulation work and theft control. 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: Power theft, Electricity bill, Overcoming losses

1. Introduction

Power theft is the biggest problem now days which causes huge loss to electricity boards. And to overcome these losses prices are increased. So if we can prevent this theft we can save lots of power. The normal practice for power theft is to short input output terminals or to place magnet on the wheel in case of old meters. So by sensing current flow through the line & energy feedback we can prevent it using circuit breaker. In this system a micro controller is interfaced with an energy metering circuit current sensing circuit, RF communication & a contactor to make or break power line. In normal condition micro controller reads energy pulses & current signals. If current is drawing & energy pulses are normal then no power is theft. If current is drawing & energy pulses are not coming then it indicates power theft. So microcontroller trip the o/p using relay. This information is sent to substation using wireless communication.

2. 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. Mahmoud, This paper deals with automatic meter reading and theft control system in energy meter. This model reduces the manual manipulation work and theft control.

2.1 Existing Methods

In the existing methods wireless communication system of energy meter used with Zigbee GPRS. The cryptographic method is used to secure the communication channel and Zigbee for the transmission of data in a serial process. GSM technology used to transmit the meter reading to the customer and government.

2.2 Proposed Methods

In the proposed method a relay circuit is used to trip the supply on sensing the abnormal condition. The relay is interfaced with the microcontroller and is connected after the meter continuing power supply.
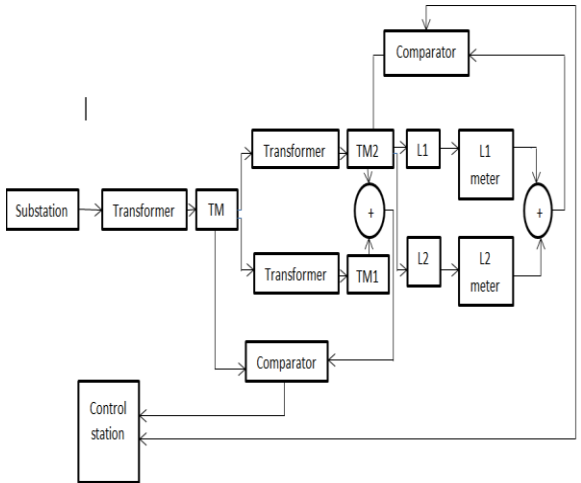
3. Working

Figure 1: Working of proposed method

As in the Fig 1, 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 trip signal is sent to the relay which discontinues the power supply. Moreover for the GSM based system, theft alarm is sent to the EB(electricity Board).
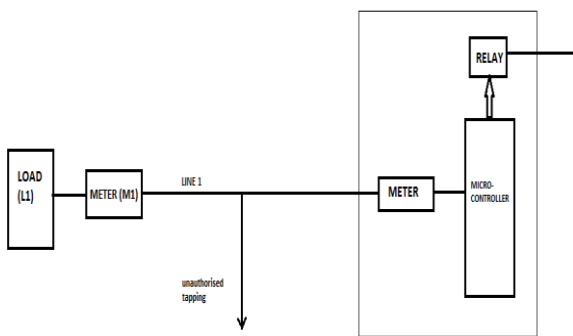
3.1 Power Theft Detection

Figure 2: Power theft detection

Digital energy meter (M1) will measure a consumed power by load (L1) over a period. It will send a data in proportion with consumed power to receiver with the help of wireless digital data transmitter. Receiver on the pole system will receive a data sent by transmitter in a load side meter. Receiver will send it to microcontroller. Also energy meter on pole will measure power sent over line1 and provide appropriate data to microcontroller. Now microcontroller has two readings one is power calculated on pole itself and

another is power consumed by load (L1). Suppose there is tapping done by any unauthorized person on the line to connect his appliance as shown in figure, over a certain period there will be difference between meter reading (M1) and pole based reading. Microcontroller will compare these two values and if the measured value on pole is more than value send by meter (M1) by some tolerance, then power theft is happening on line1. This theft signal generated on pole system can be transmitted to substation and rectified by power line communication technique or by wireless technique whichever is suitable an economical.

Tolerance should be provided for losses of line. Because over a long period there will be difference in reading of meter on load side and pole side due to loss of line between pole and load. Therefore tolerance should be provided through programming of micro-controller.

3.2 Modifications

One can decide the resolution of this system. Due to economic consideration, instead of installing this system for each consumer utility company can install one system for one colony. Then power theft on any line in that colony will be identified by this system.

4. Mathematical Expressions

Whenever input power is passing from supplier to the receiver, at that time if the total amount of power is not received by the receiver then there is possibility of theft of energy.

ΣPsent = ΣPconsumed + Loss ……..No Theft
ΣPsent $\neq$ ΣPconsumed + Loss ……..Theft Occur

Here, Psent = Power measured by pole side energy meter.
Pconsumed = Power measured by load side energy meter.

5. 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 proposed system found to be little bit complex as far as distribution network is concerned, but it's an automated system of theft detection. It saves time as well as help to maximize profit margin for utility company working in electrical distribution network. Utility company can keep a constant eye on its costumer.

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