

Wireless Technology for Power Theft Monitoring

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Abstract: *With the electric industry undergoing change, increased attention is being focused on power supply reliability and power quality. The main aim of power theft monitoring and indication system at local substation using wireless technology indicate the location where the power is being stolen. The power theft is main problem in INDIA so power theft detection is required. This will provide the owner, manager of the system to know about the working or any kind of default in the system. The goal is to find improvement over the previous surveillance systems 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.*

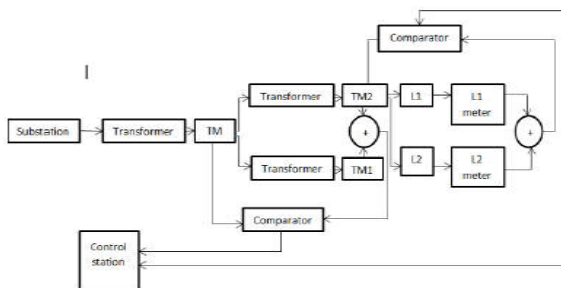
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1. Introduction

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. 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. 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. Line faults may be caused due to over current or earth fault. If there happens to be a connection between two phase lines then over current fault occurs. Earth fault occurs due to the earthing of phase line through cross arm or any other way.

2. Proposed System

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. In PC's or laptops any infiltration to the material , unauthorized person can be reported to the owner of the material , monitoring working of devices. This could be done by using proper settings and the use of this kind of system.



3. Components of modern system

The whole system architecture is based on integrating wireless network with existing electrical grid. The architecture consists

of four modules namely, Controlling Station (CS), Wireless Transformer Sensor Node (WTSN), Transmission Line Sensor Node (TLSN), Wireless Consumer Sensor Node (WCSN). WCSN is a consumer power metering device that measures the power consumed by the consumer and send the data periodically to the WTSN. Each feeder of the transformer has a WTSN which monitors power through each line and collects data from WCSN aggregate it and send to the CS. TLSN is another module associated with Distribution line, mounted in each distribution line posts. In Addition with following component:

1. Current transformer
2. Microcontroller
3. LCD (Liquid crystal display)

4. Methods of Theft

Methods used to commit theft fall into the Following broad categories:

- Connection of supply without a meter Connection of supply without a meter following disconnection for nonpayment or by "squatters" occupying empty properties.
- Bypassing the meter with a cable It covered into the supply side of the metering installation (i.e. the meter terminals, the metering cables, the cut-out or the service cable).
- Interfering with the meter to slow or stop The disc, including use of electrical devices which stop the meter or cause it to reverse (so-called 'black boxes).
- Interfering with the timing control Equipment used for two rate tariffs to obtain a cheaper rate.

5. 5. Mathematical Expressions

Losses incurred in electrical power systems have two components:

- Technical losses and
- Non-technical losses (Commercial losses)

Technical Losses-Technical losses will always arise as the physics of electricity transport means that, no power system can be perfect in its delivery of energy to the end customer. The Non-Technical Losses (Commercial Losses)-Losses

incurred by equipment breakdown are quite rare. These include losses from equipment struck by lightning, equipment damaged by time and neglect. Most power companies do not allow equipment to breakdown in such a way and virtually all companies maintain some form of maintenance policies. Other probable causes of commercial losses are:

- Non-payment of bills by customers.
- Errors in technical losses computation.
- Errors in accounting and record keeping that distort technical information.

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.

$$\Sigma P_{\text{sent}} = \Sigma P_{\text{consumed}} + \text{Loss} \dots\dots \text{No Theft}$$
$$\Sigma P_{\text{sent}} \neq \Sigma P_{\text{consumed}} + \text{Loss} \dots\dots \text{Theft Occur}$$

Here, P_{sent} = Power measured by pole side energy meter.
 P_{consumed} = Power measured by load side energy meter

6. Implementation of system

We can detect power theft wirelessly. Illegal usage of electricity can be solved electronically without any human control, using Radio frequency (RF) Technology. Electric Power is transforming from transmitter to the receiver at that time if load is apply in between transmission of power and if difference is find between the transforming and receiving.

7. Advantages

- The proposed system provides the solution for some of the main problems faced by the existing Indian grid system, such as wastage of energy, power theft, manual billing system, and transmission line fault.
- This method will reduce the energy wastage and save a lot of energy for future use.
- We can detect the location from where the power is being stolen which was not possible before.
- Optimized use of energy.
- Real time theft monitoring
- Currently used energy meters can be modified into this sensor, so no need to replace currently used energy meters.
- If the power is not stolen then the power is saving.

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