

Detection of Power Theft Using ZigBee Technology

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ABSTRACT

Science and technology with all its miraculous advancements has fascinated human life to a great extent that imagining a world without these innovations is hardly possible. While technology is on the raising slope, we should also note the increasing immoral activities. With a technical view, "Power Theft" is a non-ignorable crime that is highly prevalent, and at the same time it directly affects the economy of a nation. Detecting and eradicating such crimes with the assistance of the developing scientific field is the "Need of the Hour". With these views was this paper conceived and designed. Our paper provides a complete and comprehensive tool to prevent power theft which is very simple to understand and easy to implement. It includes three sections - transmitting, receiving, and processing sections. The main objective of this project is to indicate electric power theft to electricity board. It is carried over through embedded technology. Here wireless method is used to find out the electric theft.

Keywords : CT Coil, RS232, SPI, GSM, ZigBee.

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I. INTRODUCTION

Electricity Theft is a very common problem in countries like India, where population is very high and the users of electricity are ultimately tremendous. In India, every year there is a very increasing no of electricity thefts across domestic electricity connections as well as industrial electricity supply, which results in loss of electricity companies energy and because of which we are facing the frequent problems of load shading in urban as well as rural area so as to overcome the need of electricity for whole state. Also the ways using which theft can be done are also innumerable so we can never keep track of how a theft has occurred, and this issue is needed to be solved as early as possible.

In this abstract, we propose an electricity theft detection system to detect the theft which is made by the most common way of doing the theft and that is bypassing the meter using a piece of wire, people simply bypasses the electricity meter which is counting the current units by placing a wire before and after the meter reading unit. The

proposed system will be hidden in such meters and as soon as an attempt is made for the theft, it will send an SMS to control unit of electricity board.

With existing theft detection system it is not possible to identify the exact location of bypassed point. So with the help of our proposed system it is possible to find exact location of bypassed point. This can be one of the advantages for easy detection on theft of electricity with its proper location

II. LITERATURE SURVEY

In the paper [1], Virendra pandey et. Al. said that wireless electricity theft detection system using Zigbee technology present an efficient and less costly way to adulterate the wireless technique used in this research paper. This wireless system is used to overcome the theft of electricity via bypassing the energy meter and hence it also controls the revenue losses and utility of the electricity authorized agency.

In the paper [2], P.Kadurek et. Al. provide insight into the illegal use or abstraction of electricity in the Netherlands. The importance and the economic aspects of theft detection are presented and the current practices and experiences are discussed. The paper also proposes a novel methodology for automated detection of illegal utilization of electricity in the future distribution networks equipped with smart metering infrastructure. The necessary data requirements for smart meters and distribution substations are defined, in order to unlock this feature in distribution network.

In the paper[3], Sagar patil et. Al. described that tapping. In the recent past, several techniques were proposed for detecting the location of direct tapping on a feeder and identifying illegal consumers. On a parallel track, some non-technical measures, such as inspection of customers with suspicious load profiles and campaigning against illegal consumption, were also implemented to control electricity theft. Some of the techniques (proposed worldwide) are described in this section. Electrical power theft detection system is used to detect an unauthorized tapping on distribution lines. Implementation area of this system is a distribution network of electrical power supply system. Existing system is notable to identify the exact location of tapping. This system actually finds out on which electrical line there is a tapping. This is a real time system. Wireless data transmission and receiving technique is used. This will protect distribution network from power theft done by tapping.

In this paper [4] S. S. R Depuru et. Al. 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 this paper [5] M.V.Ramesh et. Al. This design incorporates effective solutions for problems faced by India's electricity distribution system such as power theft and transmission line fault.

In this paper [6] ZHOU Wei et. Al. 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 behavior of electricity-stealing with remote monitoring.

In this paper [7] H.G.Rodney et. Al. 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 this paper [8] Amin S. Mahmoud et. Al. This paper deals with automatic meter reading and theft control system in energy meter. This model reduces the manual manipulation work and theft control.

III.SYSTEM ARCHITECTURE

Transformer Section

CT coil:

A current transformer is defined as “as an instrument transformer in which the secondary current is substantially proportional to the primary current (under normal conditions

of operation) and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections.”Current transformers are usually either “measuring” or “protective” types We have used two CT coil units.

Here energy is provided by transformer and its current is measured at CT coil unit 1.

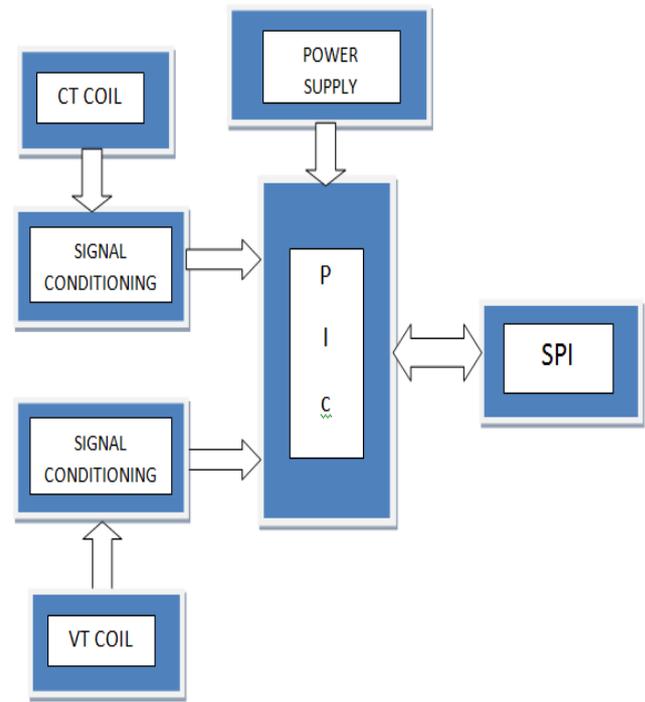


Fig 1. Block Diagram of Transformer Section

Unit 2 is used to measure current at receiving end that measurements are communicated through controller to home station by SPI protocol. This unit measure current, voltage and calculate power and transmit by SPI protocol.

SPI Protocol:

Serial Peripheral Interface (SPI) is an interface bus commonly used to send data between microcontrollers and small peripherals such as shift registers, sensors, and SD cards. It uses separate clock and data lines, along with a select line to choose the device you wish to talk to.

Home Meter Section

CT coil:

A current transformer is defined as “as an instrument transformer in which the secondary current is substantially proportional to the primary current (under normal conditions of operation) and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections.”

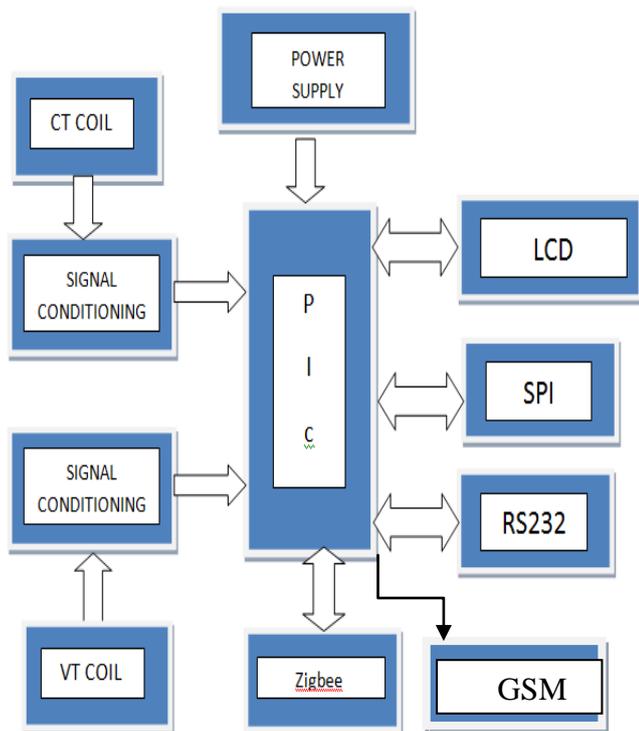


Fig 2. Block Diagram of Home meter

Current transformers are usually either “measuring” or “protective” types. Here in our home unit there are using two CT coil current measurements. We are going to check the difference between power delivered and power received. If it is significantly differing from the delivered power and distributed power then it means there is somewhere power theft loss is going on.

RS232:

Serial communication – RS232, a popular way to transfer commands and data between a personal computer and a microcontroller is the use of standard interface, like the one described by protocols RS232.

LCD:

The 16*2 alphanumeric display to display measured parameters. We are going to measure current, voltage, power. And also theft message would be shown. When this unit receives parameters, it compares with the parameters calculated at home station unit.

Theft Detection (mobile) Unit:

This is the portable unit which is used to locate theft point. We are going to measure parameters along service line and determine the points on the line between which there is large difference of power measurement is observed.

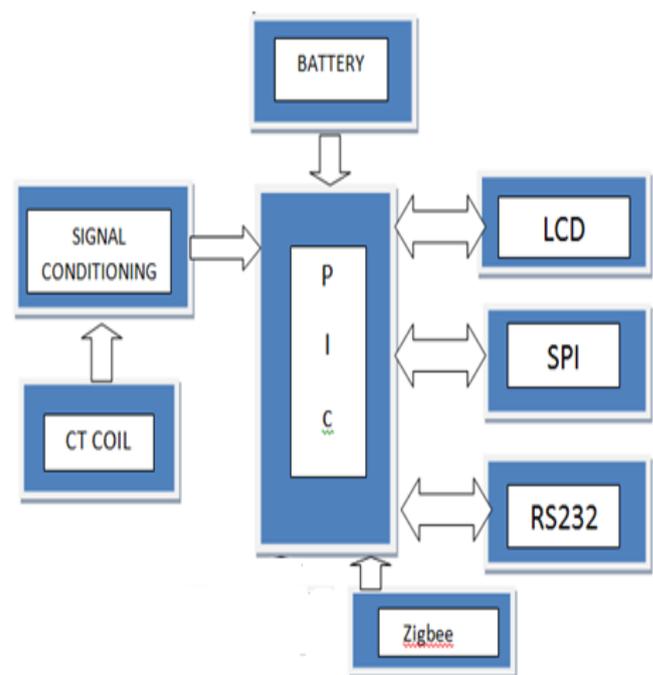


Fig 3. Block Diagram of Theft detection (mobile) unit

IV. ADVANTAGES AND APPLICATION

Advantages:

- The project model reduces the manual manipulation work and theft.
- Use of GSM in our system provides the numerous advantages of wireless network systems.
- The government saves money by the control of theft in energy meter and also more beneficial for customer side and the government side.
- Cost wise low when compared to other energy meter without automatic meter reading and theft control.
- The project better suits for displaying information in long distances, and the information can be send, alter any time according to user requirement.

Applications:

- To Detect The Illegal Use Of Electricity.
- Energy saving purpose to MSEB.

V. 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. This technique is more efficient than other technique for saving the electricity.

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