ADVANCED ENERGY TAPPING IDENTIFIER THROUGH WIRELESS DATA ACQUISITION SYSTEM

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ABSTRACT

The project aims in designing an instrument for identifying the energy tapping directly from the grid system. Energy stealing directly from the main line is the major problem in our country, especially in rural areas lot of energy is tampered and our Electricity department doesn't have any appropriate instrument to detect exactly where the energy is looted. Therefore this project work is taken up for the benefit of state Electricity Department. The concept involved in the system is to measure the current flowing in the energy transmission line at sensitive areas, sensitive area is defined as where the transmission lines are passing very near to a village or passing over an agriculture field and people are tapping energy to run the pump sets. At these areas the current is measured with two CT's (Current transformers), these CT's are arranged at either side of the sensitive area, in series with phase. Now the current flowing through the CT primary is converted into digital and is fed to microcontroller. The controller displays the current in amps, since two CT's current is to be measured; two different systems are designed with two microcontroller units. One unit, which is supposed to be installed at starting point of particular zone, can be called as master unit. The other unit can be installed at other end of that particular zone, the current flowing through this unit Ct is transmitted in digital form. The master unit receives this data and displayed in LCD, the remote data acquired through Zigbee network is compared with master CT output and difference is displayed in separated row. The current flowing through both the CT's is almost equal, line loss is considered, whenever the energy is tapped between the two CT's, more current is passed through first CT, and the system is programmed such that when the difference is more than3-4% approximately, system energizes the alarm automatically.

DOI Number: 10.48047/nq.2018.16.8.1271 **NeuroQuantology 2018; 16(8):90-93**

INTRODUCTION

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LITERATURE SURVEY

Energy theft, particularly in rural and remote areas, poses a significant challenge to electricity distribution networks. This issue is not only a financial burden for utility companies but also hampers the reliability and efficiency of power delivery. Traditional methods for detecting energy theft, such as manual inspections and audits, are often time-consuming, labor-intensive, and prone to inaccuracies, making them ineffective in addressing the problem at scale.

The use of Current Transformers (CTs) for monitoring the flow of electricity in transmission lines has been explored as a means to detect anomalies indicative of energy theft. By measuring the current at different points along a transmission line, discrepancies can be identified, suggesting unauthorized tapping or leakage. This approach leverages the principle that any significant difference in current measurements between two points on the same line indicates possible energy diversion.

The integration of microcontrollers into monitoring systems has allowed for more sophisticated data processing and real-time analysis. Microcontrollers enable the conversion of analog signals from CTs into digital data, which can then be processed to detect discrepancies in current flow. This data can be displayed on local units or transmitted wirelessly for remote monitoring, providing a more efficient and accurate method for identifying energy theft.

Wireless data acquisition systems, such as those using Zigbee networks, have been developed to enhance the monitoring capabilities of energy theft detection systems. These systems allow for the transmission of current data from remote locations to a central monitoring unit, where the data is analyzed and compared. If significant differences are detected, the system can automatically trigger alarms, alerting authorities to potential energy theft.

Previous research has also explored the use of differential current measurement as a reliable method for detecting unauthorized energy tapping. By comparing the current flowing through two CTs placed on either side of a sensitive area (such as near a village or agricultural field), the system can detect any unusual increases in current that may indicate energy theft. This method is particularly useful in rural areas where physical inspections are difficult and where energy theft is more prevalent.

Advanced energy theft detection systems also incorporate algorithms that account for normal line losses, ensuring that only significant discrepancies trigger alarms. This reduces false positives and increases the accuracy of the detection system, making it a more reliable tool for utility companies.

In summary, the literature highlights the evolution of energy theft detection from manual methods to automated systems that use CTs, microcontrollers, and wireless data transmission. These advancements have significantly improved the accuracy and efficiency of detecting energy theft, particularly in challenging environments. The development of such systems is crucial for reducing energy losses and improving the financial stability of electricity distribution networks.

PROPOSED SYSTEM

schematic diagram and interfacing of PIC16F876 microcontroller with each module is considered.

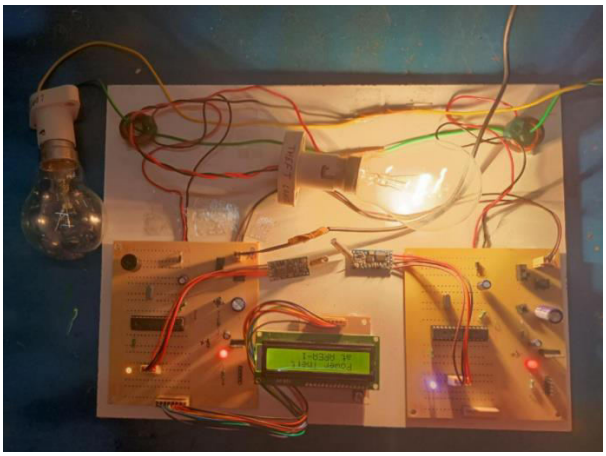

Fig 1: Schematic diagram of Energy Tapping Identifier Through Wireless Data Acquisition System

The above schematic diagram of **Energy Tapping Identifier Through Wireless Data Acquisition System** explains the interfacing section of each component with micro controller and energy meter. At the transmitting end transceiver is connected to pc through RS 232 cable and DB9 serial pin connector.

The crystal oscillator is connected to 9th and 10th pins of micro controller and regulated power supply is also connected to micro controller and LED's also connected to micro controller through resistors.An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers.

Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result.

The project "**Wireless energy meter reading and display on PC**" using PIC Microcontroller is an exclusive project that can be used

Advantages:

1. Automatic identification of power theft.
2. Very helpful for electrical department.
3. Alerts the electricity department if any tapping is done.
4. Continuous monitoring can be done on LCD Display.

Disadvantages:

1. Range of wireless communication is limited.
2. Alarm indication is for limited distance. (GSM technology can be used for longer range alerting)

Applications:

Can be implemented in real time to find the tapings.

Electricity department can use this for distribution lines.

The project "**Energy Tapping Identifier Through Wireless Data Acquisition System**" is designed such that it makes the electricity department to find out the tapings of high voltage bars easily without manually checking through the lines.

CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

FUTURE SCOPE

Our project "**Energy Tapping Identifier Through Wireless Data Acquisition System**" is mainly intended to design a system which helps in continuous monitoring of energy taping of high voltage bars without checking manually through the line. This system has two current transformers connected to high voltage bars at two points. Current transformers (CT) are used to measure the current. Basing on the fact that the current flowing through the line is constant, the system continuously checks the current at each point and transmits this information to other system which compares the current at that point and alerts if there is an error rate above threshold through LCD display available in the system. For having this operation the Microcontroller is programmed using embedded 'C' language. Here, in the system Zigbee modules are used for wireless transmission whose distance is limited to around 80m.This project can be extended by using GSM module which overcomes the distance limitation of the system..

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