Wireless Power Theft Monitoring System
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Abstract—The main objective of the project is to develop a wireless energy meter. Real-time Power monitoring at houses. Sensing the power theft. And transmitting the information over wireless to substation. By sensing current flow through the line & energy feedback we can prevent theft using a circuit breaker. In this system, a micro controller is interfaced with an energy metering circuit, current sensing circuit, RF communication link, & a contactor to make or break power line. At the sub-station end, a pc is connected with a RF link to communicate with all energy meters & a buzzer. In normal condition, micro controller reads energy pulses & current signals. If current is drawing & energy pulses are normal, then no power theft is being done & the output is connected. If current is drawing & energy pulses are not coming, then it indicates that power theft. So microcontroller trips the o/p using relay. The microcontroller takes the reading from the energy meter and displays the reading on the LCD. This project is powered by an on-board power supply takes the ac power and converts it into dc power that is fed to on-board devices and integrated circuits.

Key words: Microcontroller, Energy Meter, LCD Display, MAX232

I. INTRODUCTION

Power theft is the biggest problem nowadays, which causes huge loss to electricity boards. And to cover these losses ultimately, price are increased. So if we can prevent these thefts, we can save lot of power. By keeping track of electricity used, you determine where the greatest opportunity for energy savings lies. Becoming aware of overall energy use involves keeping track of the readings on the readings on the electric meter.

The normal practice for power theft is to short the input and output terminals or to place a magnet on the wheel in case of old meters. So by sensing current flow through the line & energy feedback we can prevent it using a circuit breaker.

In this system, a micro controller is interfaced with an energy metering circuit, current sensing circuit, RF communication link, & a contactor to make or break power line. At the sub-station end, a pc is connected with a RF link to communicate with all energy meters & a buzzer.

In normal condition, micro controller reads energy pulses & current signals. If current is drawing & energy pulses are normal, then no power theft is being done & the o/p is connected. If current is drawing & energy pulses are not coming, then it indicates that power theft. So microcontroller trips the o/p using relay. This information is sent to substation using wireless communication. In the substation, it receives the information in the form of digital codes & on decoding it, we can know at which house power theft occurred.

The objectives of the project include:
1) Real-time Power monitoring at houses.
2) Sensing the power theft.
3) Transmitting the information over wireless to substation.

II. BLOCK DIAGRAM

Block Diagram of wireless power theft monitoring system is given below. This block diagram is the overview of circuit of wireless power theft monitoring system.

A. Power Supply Block

Fig. 3: Power Supply Block

B. Microcontroller

An integrated circuit that contains many of the same items that a desktop computer has, such as CPU, memory, etc., but does not include any “human interface” devices like a monitor, keyboard, or mouse. Microcontrollers are designed for machine control applications, rather than human interaction.
We call these devices “microcontrollers”. Micro because they’re small, and controller because they “control” machine, gadgets etc. Microcontrollers are designed to connect to machines, rather than people. They’re useful because, you can build a machine or device, write programs to control it and then let it work for you automatically.

Any microcontroller (or computer) system consists of two primary components: hardware and software. The hardware is the actual physical components of the system. The software is a list of instructions which reside inside the hardware. We will now create the hardware, and then write a software program to “control it”.

It is a smaller computer. Has on-chip RAM, ROM, I/O ports.

D. ICs
The HT 12E Encoder ICs are series of CMOS LSIs for Remote Control system applications. They are capable of encoding 12 bit of information which consists of N address bits and 12-N data bits. Each address/data input is externally trinary programmable if bonded out.

The HT 12D Decoder ICs are series of CMOS LSIs. These are paired with each other. For proper operation a pair of encoder /decoder with the same number of address and data format should be selected. The Decoder receive the serial address and data from its corresponding Encoder, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data.

E. LCD Display
Most common LCDs connected to the microcontrollers are 16x2 and 20x2 displays.

This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (and communicates directly with the LCD.

If an 8-bit data bus is used the LCD will require 11 data lines (3 control lines plus the 8 lines for the data bus)

The three control lines are referred to as EN, RS, and RW EN=Enable (used to tell the LCD that you are sending it data)

| RS=Register Select (When RS is low (0), data is treated as a command) |
| (When RS is High(1), data being sent is text data ) |
| R/W=Read/Write (When RW is low (0), the data written to the LCD) |
| (When RW is low (0), the data reading to the LCD) |

F. Energy Meter
An energy or electric meter is a device that measures the amount of electrical energy consumed by a residence, business, or an electrically-powered device.

Electric meters are typically calibrated in billing units, the most common one being the kilowatt hour.

Periodic readings of electric meters establish billing cycles and energy used during a cycle.

An electricity meter, electric meter, or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device.
Electric utilities use electric meters installed at customers' premises to measure electric energy delivered to their customers for billing purposes. They are typically calibrated in billing units, the most common one being the kilowatt hour [kWh]. They are usually read once each billing period.

In settings where energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. "Time of day" metering allows electric rates to be changed during a day, to record usage during peak high-cost periods and off-peak, lower-cost, periods. Also, in some areas, meters have relays for demand response load shedding during peak load periods.

Edison at first worked on a DC electromechanical meter with a direct reading register, but instead developed an electrochemical metering system, with an electrolytic cell to totalize current consumption. The electrochemical meter was labour-intensive to read and not well received by consumers.

III. WORKING

This arrangement of photo diode & IR led removes the reflecting IR light falling on the photo diode if the cover of the energy meter is removed, resulting in an obstacle between IR transmitter and photo diode getting switch OFF.

Thereby placing logic HIGH at pin no12. This change in logic sends a pre-shorted message from the microcontroller.

Through the ICs and RF module to the destination number. Where tempering of the meter is received.

IV. CONCLUSION

This project is aimed at reducing the heavy power and revenue losses that occur due to power theft by the consumers.

The power theft can be effectively curbed by detecting where the power theft occurs. Also, an automatic circuit breaker may be integrated to the unit so as to remotely cut off the power supply to the house or consumer who tries to indulge in power theft.

The ability of the system to inform or send data digitally to a remote station using wireless RF communication link adds a large amount of possibilities to the way the power supply is controlled by the electricity board.

To control the revenue losses the authorized officials need to detect the theft of the electricity it means the theft of the bypassing is the most effective one over the whole world comparing to the other techniques used to steal the electricity i.e. the unauthorized consumption of the electricity.

V. FUTURE ASPECT

- 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 wastage and save a lot of energy for future use.
- We can detect from where the power is being stolen.
- Optimized use of energy.
- Per unit rates which is consumed by consumers will be lowered.

REFERENCES