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Power Theft Indication using Smart Transformer Protection System

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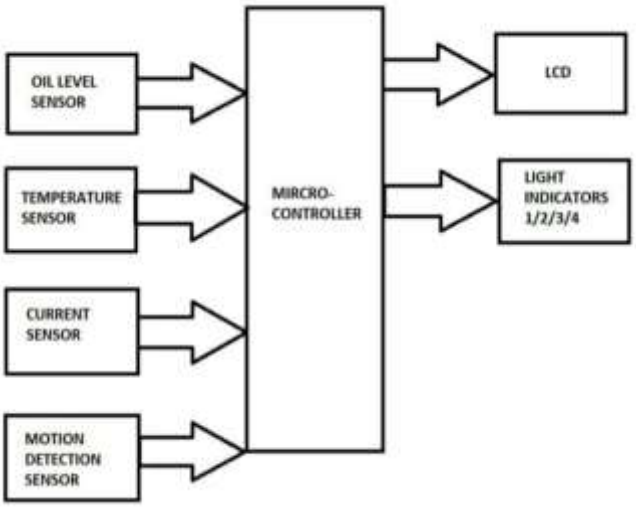
ABSTRACT

In the current scenario it is very difficult to imagine the human life without electricity. Almost all the daily appliances are powered by electricity and is the most important factor in everyone's life. In developing countries like India where there is huge population the demand for electricity is drastically increasing to satisfy the human needs. Power theft is one of the major concerns for Government, public and utility. The existing methods are not capable enough to detect the power theft and there is a huge demand for the smart system which can detect the power theft and enable to monitor and protect the health of the transformer.

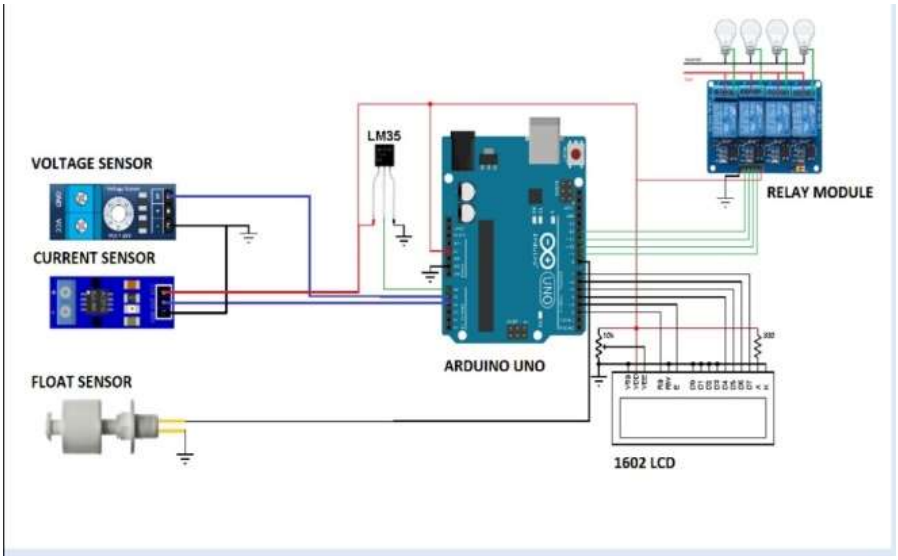
Introduction

India, the largest democracy with an estimated population of about 1.04 billion, is on a road to rapid growth in economy. Energy, particularly electricity, is a key input for accelerating economic growth. The theft of electricity is a criminal offence and power utilities are losing billions of rupees in this account. The following sections will describe the proposed detection and control system for illegal electricity usage using the power lines. With the constant growth in technology, the need of automated meter reading systems is also growing. The conventional meter is not suitable for accurate meter readings and involves large man power to take the meter readings, analyzing the data and generating the bill amount. This leads to misreading of the energy consumed and results in great economic loss to the consumers as well as to the utility providers. With the advent in technology and ever increasing human population has created a demand of generation of electricity at higher rates. This has created an imbalance between the generation, distribution and consumption of electricity. The conventional meter reading systems involves manpower to visit to the consumers place and generates bill amount according to energy consumed. The absence of the consumers creates a difficulty for the operator to revisit the consumer place again thereby wasting a lot of time, resources. Lack of payment of the bill generated creates situation where the operator has to manually disconnect the electrical supply.. The authorized electrical operators find it challenging to identify unsanctioned connections or power theft carried out by the end users in order to stop or reduce the meter reading creating a huge economic loss in the global economic scenario.

Block Diagram



Circuit Diagram:



Power Theft Methods Meters:

• Tampering with meters and seals

• By-passing the meters

• Damaging or removing meters Wires/ Cables:

• Illegal tapping to bare wires or underground cables

Transformers: Illegal terminal taps of overhead lines on the low side of the transformer

Billing irregularities made by meter readers. Unpaid bills by individuals, government institutions and “untouchable” VIPs.

Few Other Ways Of Power Theft

Use of single phase supply from three phase supply. ϖDisconnected neutral from both the ends. ϖUsed earth/separate neutral for return circuit. ϖConnecting phase voltage to neutral of used single phase supply. Potential difference w.r.t. neutral of used single phase supply is zero. Hence power product of voltage and current, will be zero. ϖIsolating neutral from both ends.

1 .Methods for Reduction of Theft of Power A. Technical/Engineering Methodology Electric power is not a new technology and innovations taking place enabled very efficient system to be installed and maintained. Many power systems devote inadequate resources and effort to Transmission and Distribution (T&D) Systems and do not use the latest technology. The investment necessary to reduce losses includes upgrading power lines, transformers, information technology monitoring systems and installing and maintenance of modern metering systems that are at the interface of the organization and the consumers of the electricity. Since much theft is from meter tampering it is important to replace old easy to tamper-with meters. New high-tech sealed meters that cannot be altered in any way and can be read automatically are expensive but can reduce theft when required of moderate to heavy power users and the investment in high technology metering requires a sound and complex infrastructure in place to make the System work effectively.

B. Manegerial Method Distribution Companies are very large entities that operate as bureaucracies even though many are private sector organizations. Combining strong technical improvements with intelligent and active anti-theft remedial measures may result into significant improvements .Corruption is one of the most difficult problem areas for Distribution Company because power theft occurs with the connivance of employees of the power organization. Increased investigation and surveillance may provide opportunity for more corruption. Employees may even extort money from electricity consumers not to disclose theft. Employees should be paid adequately so that they will. Not have to resort to bribes in order to support a family.[3]

Advantages

• By using this system most of the power theft can be detected easily.

• Regular maintenance of transformer is not required. This system can automatically detect oil level and temperature level and inform when is maintenance is needed.

This system can also provide protection from overload.

• This can reduce the heavy power and revenue loss that occur due to power theft by the consumers.

• It reduces the operations cost required for maintenance. 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.[6]

Application

• It can be used in domestic distribution system where most of the power theft is occur.

• It can be used in domestic households.

• It can be implemented in malls where huge amounts of power are wasted.

• It can also be implemented in schools and colleges.

• The concept is well suited especially for villages and interior areas.

• We can use this system as transformer maintenance monitoring system.

Future Scope

• Little modifications like IOT tech can improve this system.

• GSM technology can be used to improve communication technology.

• By installing GPS system tracking a transformer thief will become possible.

• This can be use in every power transmission industry.

Conclusion:

In the era of smart city advancement, this project is targeting the connectivity & networking factor of the IOT. during this project, we are detecting the facility theft, identifying the fault and also tracking the location of the fault area to require necessary measures. The proposed system provides the answer for a few of the most problems faced by the prevailing Indian grid system, like wastage of energy, power theft, and cable fault.

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