

AN EFFICIENT APPROACH TO ELECTRICITY THEFT USING DETECTING AND REPORTING

Jayaprakash.S¹, Abinaya.M², Rathina priya.R³, Vanaja.A⁴, Karkuzhali.S⁵.

Department of Computer Science and Engineering,

Idhaya Engineering College for Women, Chinnasalem, Villupuram (Dt).

Anna University, Chennai.

ABSTRACT

Theft of electricity is the criminal practice of stealing electrical power. It is a crime and is punishable by fines and/or incarceration. It is the loss for government and indirectly to the people also. In terms of low voltage, increasing current price, transformer damage etc. Our intention is to deploy a real-time project to detect and report electricity theft in real-time. We will test the project in practical working environment for feasibility detection. The system is made over Arduino Nano programmer and Atmega 328 P microcontroller. The system works with the concept of vibration. If someone tries to do any type of tampering to the electricity meter then automatically it is sending the information to electricity board and junior engineer. The system is highly implementable and can be used for real-time applications.

INTRODUCTION

Generation, transmission and distribution of electrical energy involve many operational losses. Whereas, losses implicated in generation can be technically defined, but T&D losses cannot be precisely quantified with the sending end information. This illustrates the involvement of nontechnical parameters in T&D of electricity. Overall technical losses occur naturally and are caused because of power dissipation in transmission lines, transformers, and other power system components. Technical losses in T&D are computed with the information about total load and the total energy billed .

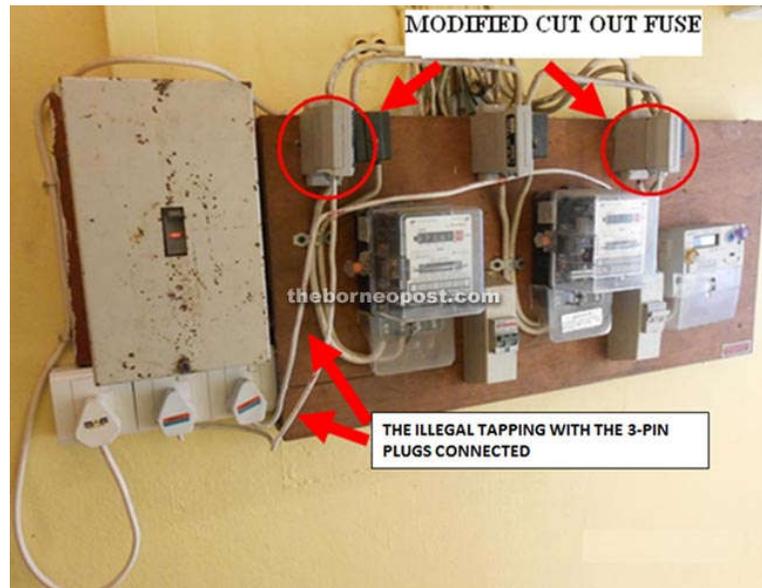


Fig.1.1: Illegal Tapping

NTL cannot be precisely computed, but can be estimated from the difference between the total energy supplied to the customers and the total energy billed. NTL are caused by the factors external to the power system. In many developing countries, NTL are a serious concern for utility companies as they account to about 10 to 40% of their total generation capacity. Data regarding NTL is uncertain and it is very difficult to analyze theft in terms of actions that cause these losses. Electricity theft forms a major chunk of the NTL. Electricity theft includes bypassing, tampering with the energy meter and other physical methods to evade payment. Illegal tapping of electricity from the feeder and tampering with the meter are the most identified and accounted ways of theft. Electricity theft can also be defined as, using electricity from the utility company without a contract or valid obligation to alter its measurement is called electricity theft .



Fig.1.2: Electricity Theft

2. Existing System

2.1 Electricity theft detection using SVM, RF, SMS, IOT

There are many methods which have been proposed for theft detection. Many of these methods include load profile analysis of customers to detect abnormal energy consumption patterns. But these methods cannot be used to detect energy thefts when there is a complete bypass of electricity meters. In such cases, electricity losses are calculated by using energy balance between the energy supplied from the distribution transformer and the energy consumed at the consumer's end. An effective way for estimating nontechnical losses in the electricity distribution network is correctly estimating the technical losses in the network and then subtracting it from the total loss in the network.

A. Theft Detection using SVM

This paper presents a novel approach for detecting non-technical loss in electricity transmission. An artificial intelligence based technique SVM (Support Vector Machine) is used. SVMs are one of the best-known techniques with computational advantages over their contenders. This method uses data mining techniques for feature extraction from old energy consumption data from consumers. The SVM method utilizes the load profile data of consumers and extra qualities to identify the irregular electricity usage. As the result of this method, some classes of consumers are produced who are shortlisted to be evaluated as suspects, for the purpose of inspection those consumers based on significant behavior that

arises due to deceptive activities. SVM does not need to be linear or even have the same function form of all data obtained. Its function is non-parametric and it operates locally. SVM provides a good result out of generalized samples, if the Gaussian and Kernel parameters chosen and provides a unique solution. But the SVM technique lacks the transparency of results.

B. Theft Detection using RF transmission

In this system, Radio Frequency (RF) transmission is used to establish the communication between the EB server side and the consumer end. RF signals are used to establish the wireless communication between EB server side and Consumer end so that server side can access the information about the measured units of consumed electricity at the consumer side. RF signals are used to make the system autonomous and reduce number of cables. When the current transits from the distributor side to the consumer end, if the consumer does not receive the total amount of power, then there is a possibility of electricity theft. Then this information about the system is displayed through the Wi-Fi space to the EB server side.

C. Theft Detection using GSM

A GSM based technique for Electricity Theft Detection is proposed in this paper. In electricity metering system, tampering is done basically for the purpose of electricity theft. To protect the electricity energy meter from this theft attempt a lever switch is used at the opening of the meter. The lever switch is connected to interrupt pin of the ARM processor which is configured as pull down. Hence closed switch applies 3.3V to the interrupt pin and opened switch drives the voltage to zero. The switch normally closed when the meter chassis is closed. If someone tries to open or tamper with electricity energy meter, that switch gets opened and the interrupt pin gets triggered as 0V is sensed by it. The ARM processor immediately sends AT comments to GSM for sending SMS. Upon receiving SMS the authority can take further legal action against it and penalize the guilty person.

D. Theft Detection using IoT

This paper presents an IoT based tamper or theft prevention system for electricity energy meter. This paper proposed an embedded system to prevent electricity theft with the use of Internet of Things, a recent technology. This embedded system consists of a Wi-Fi module attached to electricity meter for the purpose of connectivity, a microcontroller for controlling the major functions. The Passive Infrared (PIR) sensor is being used for the purpose of sensing the tampering attempt and Solid State Relay is used for the purpose of actuation on detecting the tampering attempt. In addition to this, there is an additional facility of sending the GPS location of the meter to the distribution company portal or Electricity Board server. Thus, the proposed system will reduce electricity theft and makes the electricity system smart.

Limitation

- ✓ Practical Implementation Issues
- ✓ Lower Detection Level
- ✓ Easily tamperable
- ✓ Complex Implementation

Proposed System

Our proposed approach deals with the tampering detection system for electric meters. Once the meter starts if any tampering is done the report will be immediately sent to the highest official and police station to take further access with consumer name, address, consumer id etc. We use SIM 800 GSM modem to send SMS and Atmega Microcontroller for logic analysis.

Vibration sensor is used to detect any changes in the position axis of the meter. The programming language used is Embedded C. If someone tries to damage the seal or bypass the meter then meter orientation changes and tampering is detected. This will be reported to officials in terms of SMS to any number of users. Overall Functionality will display in LCD display. This is 100% practically implementable in real-time.

Block Diagram

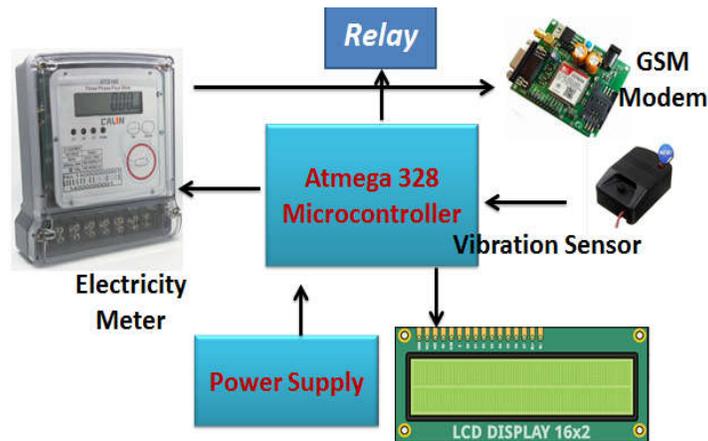


Fig.4.1: Block Diagram

Explanation

Electricity, the most commonly need of every one in daily life is electricity. It is so necessary element that without electricity people cannot live. Due to that this the electricity demand is increasing and also increasing electricity theft. As the electricity. Theft is increasing, it is necessary to the control it various technique are used to control electricity theft. Detected and monitored by comparing the power energy meters. In this project the meter at homes will be compared to vibration sensor so to detect and monitors electricity theft. 16x2 LCD is used to display whole process. Power supply to power up whole system. Vibration sensor is used to detect the tampering. We use SIM 800A GSM modem to send SMS to authorities.

1.3.5 Advantages of proposed system

- Real-time Implementation is Possible
- Lesser Complex Design
- High Accuracy
- Lower Cost

Vibration Sensor

Buzzer is this product USES and contact spring vibration sensing system, has the characteristics of high sensitivity, fast, and high performance. Internal spring heavy hammer structure with piezoelectric ceramic chip testing vibration signal, and through operational amplifier LM358 and output control signal, low cost, high sensitivity, stable and reliable work, the vibration test the advantages of jmwide adjustable range, is widely applied to steam, motorcycles, car anti-theft system, currently 80% of the vehicles used this kind of sensor, alarm sensor internal use SMT technology, imported components assembly, sensors can also be with single-chip computer, the wireless transmitting module, wired alarm, etc., are widely used in

car alarm and other security products, be the first choice of the modern security of low cost, practical products.



Fig.2.1.2: Vibration Sensor

CONCLUSION

Thus we created a system of electricity theft detection and alert to Electricity Board. This paper defines electricity theft in social, economic, regional, political, infrastructural, literacy, criminal and corruption points of view. This paper illustrates various cases, issues and setbacks in the design, development, deployment, operation, and maintenance of electricity theft controlling devices. In addition, various factors that influence people to steal electricity are discussed. It makes the electricity theft almost impossible if implemented in real time. With minor attachment in Present electricity meter it can produce the reliable output. Vibration sensor we used is of commercial standard

FUTURE WORK

As the future enhancement project can be further enhanced to send the GPS locations also to find the pin point location of the consumer. This reduces the time complexity to check address database.

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Mr. S. Jaya Prakash was born in Gingee, Villupuram District, Tamilnadu. He received his B.E in Computer Science and Engineering from University of Madras in 2003 and M.E in Computer Science and Engineering from Anna University in 2008.

He has 13 years of academic experience and currently working as Associate Professor/HoD of Computer Science and Engineering Department at Idhaya Engineering College For Women, Chinnasalem, Tamilnadu.



Mr. M. Abinaya was born in Mayavaram, Nagapatinam District, Tamilnadu. She received her B.E in Computer Science and engineering from Anna University in 2012 and M.E in Computer Science and Engineering from Anna University in 2015.

She is currently working as Assistant Professor in Computer Science and Engineering Department at Idhaya Engineering College for Women, Chinnasalem, Tamilnadu.