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Microcontroller based System to Detect Power Theft by using CT and PT

Prof. Prakash.C. Patil[1], Gawandhe Chetan Ramdas[2], Bhabad Saurabh Mahadev[3], Gaikwad Siddhant Tulshiram[4], Tambe Yash Bhaupatil[5]

**1 Assistant Professor, Department of Electrical Engineering, Sir Visvesvaraya Institute of Technology, Nashik, Maharashtra, India*
**2,3,4,5 Students, Department of Electrical Engineering, Sir Visvesvaraya Institute of Technology, Nashik, Maharashtra, India*

ABSTRACT –
The energy cost has been constantly increasing to produce the quality power. The conservation and efficient management of energy has become very important to keep the industry productive, profitable and competitive. Paper deals with identification of online theft that prevails on distribution line. Here we check difference in total input power supplied and sum of individual power supplied to the customers to identify theft online. Here used microcontroller based system to detect power theft. Making the use of current transformer and a potential transformer we can measure power at both the points and taking the difference between the two we can say that theft has occurred or not. Also If any customer will use excess load than that of sanction load we can give warning message.
Utility companies in India estimate that electricity theft costs them over a billion US dollars in annual revenues. The purpose of this work is to provide an algorithm for the design of electricity theft monitoring system which allows violators to be detected at a remote location. It begins with the analysis of losses in electrical power systems. The bulk of these losses are caused by electricity theft, rather than other possibilities such as poor maintenance and calculation and accounting mistakes, though some power systems may suffer from both. Other aspects discussed include the various forms of theft practices, methodology for detection of theft, generating the theft case algorithm using the backtracking algorithm method and communicating these data from the consumer premises to the substation using the existing power lines. Appropriate conclusions and recommendations were given from the information gathered.

***Key Words*:** Power Theft, microcontrollers, Sensors, GSM module, Energy Meter, Power consumption, GSM modem

1.INTRODUCTION

The demand for electrical energy is ever increasing. Today over 20% power losses as transmission loss is 4-6% and distribution loss (overload or theft) is 15-18%. The electrical power deficit is 18%. Clearly reduction in distribution losses can reduce this deficit significantly. It is possible to bring down overload losses up-to 6-8%.With the help of newer technology option including Electrical Engineering in electrical power distribution sector which will enable better monitor and control. When power consumed becomes more than sanctioned limit, then use is increased. The distribution system cannot identify reason behind increase in consumption, that whether it is due to increase in consumption or power is being theft. If power theft is online on pole create problems to distribution line and at last distribution station.

Electric utilities lose large amounts of money each year due to power theft by electricity consumers. Electricity power theft can be defined as a dishonest or illegal use of electricity equipment or service with the intention to avoid billing charge. It is difficult to distinguish between honest and fraudulent customers. Realistically, electric utilities will never be able to eliminate fraud. It is possible, however, to take measures to detect, prevent and reduce fraud. This model reduces the manual manipulation work and theft control.

2. Review of Literature:

Electric powered electricity theft wastes approximately 30-35 percent of the earnings earned through the electric board. Previous attempts to monitor power theft have not resulted in a wellorganized manner due to the illegal practises of some employees and consumers. This research aims to alleviate all of these difficulties by developing a simple system that sends a message whenever there is power theft activity at a specific location.
In, a new method of detecting nontechnical losses (NTL) in electrical services employs an artificial intelligence-based strategy and pattern separation methods to detect and identify patterns of consumer customer fraudulent use patterns. FDM will not recognise a customer who commits fraudulent activities within two years of enrolling in this programme. It has been proposed to develop an internal and diverse crime detection method based on the ssnot consumer paying debt, crossing poles, receiving power abuse, and dialling the transmission line as defined. It determines which power lines are taped.

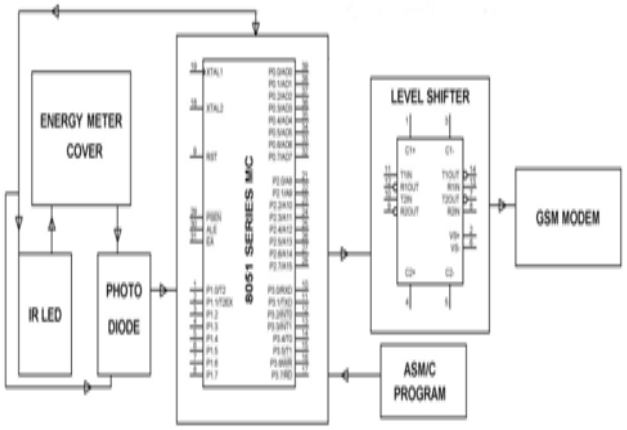
This is a live programme. Wireless data transmission and reception is employed. This will provide the same amount of wireless reading space at the same price. This will protect the distribution network from power theft, metre interference, and other threats. [3] To detect power line theft, Sagar Patil, Gopal Pawaskar, and Kritikumar Patil propose using digital metres, wireless data transmitters, and power line communication. In this system, one digital metre is
connected to the pole, while the other is connected to the consumer's premises or at the load side. The data is collected by a digital metre on the load side and continuously transmitted to a microcontroller equipped digital metre on the pole side via a wireless transmitter. The microcontroller receives data from both the source and load sides using a wireless receiver and compares the data; if the difference is within the tolerance band, there will be no power line theft. In other words, if the difference is greater than the tolerance, it means that theft is occurring on the line, which is detected by the microcontroller, and the necessary information is sent to the substation via power line communication, and further actions are taken, so that power line theft is detected and the line is protected using this system. The consumer's metre
reading is obtained using the same data provided by the load side metre. [4]
Power theft is allowed in this proposed system by utilising an arduino uno controller, a smart energy metre, and a GSM technique. This CT is connected to the distribution box, and data is sent to the substation on a regular basis using a GSM module, and data from an energy metre installed on the consumer premises is programmed to measure the consumed current and send it to the substation on a regular basis using a GSM module. At the substation, data from both the distribution end and the consumer premises is collected and compared; if there is a difference in the reading that exceeds the permissible tolerance, it simply means that the theft load is connected to the system, and because there is a GPRS installed on the poles and energy metres installed in the consumer premises, the area where the theft occurs is identified and further action is taken. Electric theft is detected in this project using real-time data without any manual intervention. [5]

3. 8051 controllers:

This microcontroller is frequently used in simulations. The circuit for detecting theft makes use of an 8051 microcontroller. Internal memory is less than that of a PIC microcontroller. Because the CPU can only work on 8 bits at a time, processing is slow. Different sensors can be used to detect theft, but a separate ADC must be included in the circuit. This is overcome by using a PIC microcontroller with an integrated ADC.

Zigbee- Communication:

In this existing system, an energy metre wireless communication system with Zigbee, relay control, and GPRS is used. The cryptographic method is used to secure the communication channel and zigbee for serial data transmission. The disadvantage of this process is that it requires collecting readings, travelling in a specific range of area, and manually cutting power supply if necessary. The cryptographic method is used to secure the communication channel and zigbee for serial data transmission. The main disadvantages are that readings must be collected while moving within a specific range of area and that power must be manually cut off if necessary. [6-7] The electric energy theft notification system is critical in today's modern world, where people are introducing new methods for stealing electric energy. The demand for energy is increasing with the passage of time, but unfortunately, the percentage of stolen electric energy is also increasing with the passage of time. This is an ambiguous problem all over the world, particularly in Pakistan, and we must devise a system to address it. We are working on a new electric energy theft detection system based on a GSM modem. The diagram below depicts the block diagram of an electric energy theft notification system based on a GSM modem. Utilizing a PIC Microcontroller



4. Research Methodology

Existing energy metre wireless communication systems use Zigbee, relay control, and GPRS. The cryptographic method is used to secure the communication channel and Zigbee for serial data transmission.

5.Result and Discussion

In society, there are various methods of stealing power. Hooking of the main overhead transmission line, metre tampering, and types such as metre bypassing by illegally connecting to switch before metre, mechanical impediment to rotating disc, placing magnets and metre tilting, and illegal wiring are some of them. Existing systems are classified into two types. EB employs techniques such as IRDR port metres, raiding specific areas where excessive electricity is used. There are also

systems that use an 8051 microcontroller for simulation and zigbee communication.

CONCLUSIONS

Electricity Theft Detection and Monitoring was designed and developed with proper hardware and software integration. An intelligent power theft detection system is presented in this system. It detects unmetered load (illegal load) instantly and alerts the utility company to take appropriate action. The designed system is highly reliable, sensitive, and efficient. The study of various techniques is done in order to propose a new technique that is expected to have higher accuracy in detecting electricity theft. This technique would assist power authorities in further reducing nontechnical losses in electricity distribution

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13. Ms. M.Madhavi received M.E degree in Industrial Engineering from Kumaraguru College of Technology in 2012. She is currently workingas an Assistant Professor in Sri Ramakrishna Engineering College, Coimbatore, India. Her interests are in Optimization, Embedded.