

# REVIEW PAPER ON:POWER THEFT DETECTION AND PREVENTION

Prof. Rupali Shinde<sup>1</sup>, Prof. Soniya Joshi<sup>2</sup>, Vaibhav Rampure<sup>3</sup>, Rajendra Wagh<sup>4</sup>, Dinesh Potdar<sup>5</sup>,  
Mohsin Jamadar<sup>6</sup>

<sup>12</sup>Assistant Professors, Department of Electrical Engineering, Trinity College of Engineering and  
Research, Pune, India.

<sup>3456</sup>Students, Department of Electrical Engineering, Trinity College of Engineering and Research, Pune,  
India.

## ABSTRACT

*Electrical energy plays an important role in our day to day life and backbone for the industries. Today we can't imagine life without electricity. Because of the unnecessary actions taken by human beings, wastage, and theft of power increasing day by day. If proper actions are not taken to save electricity, future generations have no scope of living their life in light, peace, and harmony. Electricity theft is a great concern for the utilities. Many times power theft has been a major impact on the economy as well as the development of the country. The objective of this project is to design a system that will try to minimize the illegal use of electricity and also reduce the chances of theft, and if theft happens appropriate actions will be taken.*

**Keywords:** Power Theft, IoT, Arduino, GSM, PIC Microcontroller

## 1. INTRODUCTION

Electricity theft is a very common problem, especially in our country. As our population is high so the use of electricity is tremendously high. There are many operational losses involve in the generation, transmission, and distribution of electrical energy. Whereas the losses implicated in generation can be technically defined, but transmission and distribution losses cannot be precisely quantified with the sending end information. In T&D the Technical losses are computed with the information about total load and the total energy bill. Electricity theft is a social evil, so it has to be eliminated completely. Power consumption and losses have to be closely monitored so that the generated power is utilized in a most efficient manner. The system prevents the illegal usage of electricity. A large amount of electricity will save by implementation of this system will, and thereby electricity will be available for more consumers than earlier, in a highly populated country as INDIA.

Of all the inventions made by mankind electricity is the most important one. Today's life is impossible to imagine without electricity. In India, every year there is very increasing number of electricity thefts across domestic electricity connection as well as industrial electricity supply, which results in loss of electrical energy and because of which we are facing the frequent problems of load shedding in urban as well as rural areas so as to overcome the need of electricity for whole state. Also the ways using which theft can be done are innumerable so we can never keep track of how a theft has occurred, and this issue is needed to be solved as early as possible. In this, we propose an electricity theft detection system to detect the theft which is a made by the most common way of doing the theft and that is bypassing the meter using the a piece of wire, people simply bypasses electricity meter which is counting the current unit by placing a wire before and after the meter reading unit.

## 2. OBJECTIVE AND MOTIVATION

- This system would provide a simple way to detect an electrical power theft without any human interface.

- It would indicate exact zone and distribution line on which unauthorized tapping is done in real time.
- It would be time saving if distribution company personnel take reading by the wireless technique.
- To detect the theft and protect the power system from theft of power.

### 3. LITERATURE SURVEY

#### 3.1 IoT based Power Theft Detection (IJIET 2017)

In the system proposed by R Giridhar Balakrishna, P Yogananda Reddy, M L N Vital In order to prevent from power theft they used IoT system to detect the power theft and it is done by using Arduino, GSM, LCD, ESP module and current transformer. Among the two CTs one is connected to the source side and another is connected to load side and signals of both the CTs are given to Arduino. Basically Arduino compares both the data received from the CTs from source and load side. If any difference beyond the tolerance is detected then it simply means that there is a theft load is connected, then by using IoT and ESP module which works on internet this data is sent to the substation , If incase the internet failed to operate GSM module is used to send the message to the substation to which that line is connected where the theft load is detected. In this system the detection of the power theft is done by using IoT and GSM. In case of failure of IoT system GSM will work properly to neglect this huge global threat of power theft from the electrical network. [6]

#### 3.2 Power Theft Identification Using GSM Technology

In the system proposed by Rhea Prakash, E. Annie Elisabeth Jebaseeli, Y.S.U.Sindhu the theft detection is done by using PIC microcontroller, sensor, GSM module and LCD display. As we know electricity theft is most commonly done by meter bypassing. The heart of the system is Arduino controller as it consists of two microcontrollers. The project basically consist of two CTs one is fitted on one end of the pole and another is connected to another end of the pole and voltage pattern of the area is studied by given the output of the two CTs to the Arduino controller when the voltage drop limit exceed the permissible calculated value given by utilities so it means that theft load is connected to the system which is detected by Arduino controller then it gives message to the utility by using GSM module fitted with Arduino kit. The data given by the Arduino is collected and analyzed by using MATLAB and area of theft is detected and then action will be taken. In this project the theft is detected using real time data without any human interface. [7]

#### 3.3 IoT Based Power Theft Detection And Monitoring System (IJIREICE 2017)

In the system proposed by N Kunan<sup>1</sup>, Poornima BK<sup>2</sup> they used smart energy meter which is connected at the starting of transmission line and one at the load side, the signals from both given to the Arduino. Arduino collects the data from each consumer side's smart meter and compare that data with the source current given by the source side smart meter if the difference is within the tolerance then it means there is no theft load connected, if difference is beyond the tolerance then it means that theft load is connected to the system then the system will be isolated from the supply by using relay circuit and message will sent to the utility company by using GSM module. All this process is done by using Arduino and further by using Beagle bone black system. So, in this system power theft from the line is detected and required action is taken without any human interference. [3]

#### 3.4 GSM Based Electricity Theft Detection (ISSN 2016)

In the system proposed by Nilesh Mohite<sup>1</sup>, Rinkuraj Ranaware<sup>2</sup> , Prakash Kakade<sup>3</sup> They presents the solution for the detection of the different methods of power theft. To limit this global threat of power theft, this project provides good provision to reduce the illegal usage of electricity and also reduce the chances of theft. This project contains the automatic reading collection and detection of theft without any human interference. In this system the provision is mainly done by using GSM, current transformer, PIC 18F4520 and energy meter. As we know the common methods to do theft are by bypassing the meter using a piece of wire before or after connecting to the meter. In this system two CTs are used, one is connected to the input side and other is connected to distribution point of the house line, both signals from the two CTs are given to the PIC18F4520 in the case of bypassing the meter reading from input side will not match to the consumer or load side beyond the given tolerance for losses then it simply means that there is power theft takes place by meter bypassing and the message is given to the utility using

GSM module. In other case if there is meter tampering, an IR sensor is connected to the meter so that the indication is given to the utility by using GSM fitted on the PLC kit and theft is detected without any manual interface. So, in this project the power theft detection is done in simple way without any manual manipulation. [5]

### 3.5 Electric Power Theft Detection And Location Tracking Using IoT

In the system proposed by Ajay Mahato, Abhishek Nanda, Ajay Kumar Pal, Chandan Kumar To overcome this global threat they present electric power theft detection and location tracking using IoT. In this method there is current and voltage sensor connected before the wire connected to the meter and connection from energy meter also given to the PIC microcontroller which compares both the values of current and if difference is sensed by the PIC microcontroller then it indicate that there is theft occurred in the system, and that circuit will be isolated from the supply by using relay circuit and message will sent to the utility company by using GSM module. So, in this system power theft from the line is detected and required action is taken without any human interference. [1]

### 3.6 Distribution Line Monitoring System For The Detection Of Power Theft Using Power Line Communication

In this proposed system there is a provision for power theft using power line communication. Basically in this system a high frequency is added to the power frequency of magnitude in between 3 kHz to 500 kHz according Indian electrical standards. When tapping on the power line takes place then variation occurs in the system frequency that is analyzed in substation using Matlab System and area in which power theft occurred is detected and in due to the provision of high frequency the equipment connected to the Theft load fail to work. In this project power theft is detected and actions are taken without any Human interference. [2]

### 3.7 Electrical theft detection and Wireless meter reading (IJRASET)

In this proposed system given by Sagar Patil, Gopal Pawaskar, Kritikumar Patil, they are using digital meters, wireless data transmitter and power line communication to detect the theft in the power line. Basically in this system one digital meter is connected on the pole and other is connected in the consumer's premises or at load side. Digital meter on the load side collects the data and send it continuously to the pole side digital meter on which microcontroller is fitted with the help of wireless transmitter. The microcontroller receives both the data from source side and load side, with the help of wireless receiver and compares the data, if the difference is under tolerance band then there will be no theft occurring on the power line. In other condition if the difference is beyond tolerance then it means that theft is happening on the line that is detected by the microcontroller and the required information is sent to the substation by using power line communication, and further actions are taken, so the power line theft is detected and line is protected from the theft using this system. And by using same data given by load side meter consumer's meter reading is taken out. [8]

### 3.8 Smart Meter Data Analysis for Power Theft Detection

In this proposed system there is provision for power theft is done by using arduino uno controller, Smart energy meter and GSM technique. In this one CT is connected to the distribution box and data is given to substation periodically by using GSM module and the data from energy meter fitted on the consumer premises is programmed to measure the consumed current and send it periodically by using GSM module to the substation. At substation data from both the distribution end and from consumer premises is collected and compared if there is a difference in the reading is occurred above the permissible tolerance then it simply means that the theft load is connected to the system and from that there is an GPRS which fitted on the poles and energy meters fitted in consumer premises the area in which theft takes place is found out and further action takes place. In this project electric theft is detected without any manual interruption using real time data. [4]

## 4. APPLICATION

- Power Grid
- Factories

- Industrial Area
- Home Automation And many more

## 5. ADVANTAGES

- 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..
- Optimize use of energy.
- System can be monitored and controlled from anywhere.
- Save time.

## 6. COMPONENTS USED

### 6.1 GSM Module



Fig-1 GSM Module

### 6.2 PIC Microcontroller



Fig-2 PIC Microcontroller

**6.3 Arduino**



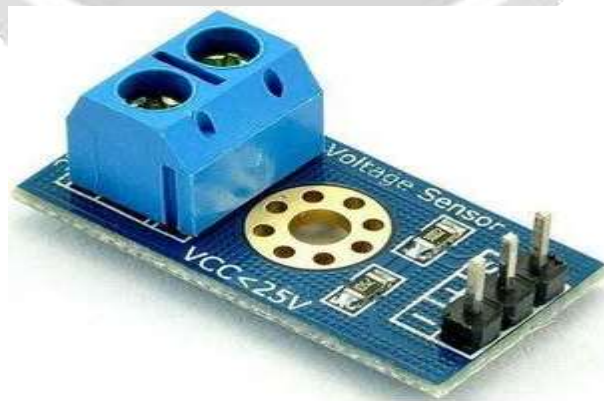
**Fig-3** Arduino

**6.4 Current Sensor**



**Fig-4** Current Sensor

**6.5 Voltage Sensor**



**Fig-5** Voltage Sensor

## 7. CONCLUSION

We have reviewed some papers on power theft detection which consist of different proposed system and techniques to detect and prevent the power theft. Basically all these systems uses Arduino, GSM, PIC Microcontroller and current transformers etc., By using these techniques we can easily detect and prevent our system from power theft and we can overcome this global threat of power theft and able to meet the increasing demand of electricity. It will be helpful for overall growth of our country.

## 8. FUTURE SCOPE

- ❖ As Mentioned above , we know that electricity demand is increasing day by day and at such time we can't afford the power theft . If mentioned provisions will be implemented then we can overcome this global threat of power theft and able to meet the increasing demand of electricity. It will reduce the economic losses in power sector and contribute to overall economic growth of country.
- ❖ As we know that due to the huge development in engineering field by using Internet based things we can connect all the system and control it as per requirements from remote locations and we can avoid unwanted things to be happen.
- ❖ So, in future following objectives can be achieved to save power and avoid thefts:-
  1. We can make a IOT based system where consumption pattern of consumer is open for users and for utility and user can pay bill accordingly.
  2. We can also message to the consumer in case of over loading of line and also for power theft detection.

## 9. REFERENCES

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