International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Energy Theft Detection on Grid System

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Abstract: ***In this project, we show that how it is possible to give automatic information to head office about electricity theft. For this magnetic sensor is used to sense magnet which is placed on the meter. With the electric industry undergoing change, increased attention is being focused on power supply reliability and power quality Power providers and users alike are concerned about reliable power, whether the focus is on interruptions and disturbances or extended outages Monitoring can provide information about power flow and demand and help to identify the cause of power system disturbances The work of this paper is to monitor the power consumed by a model organization such a household consumers from a centrally located point. Monitoring the power means calculating the power consumed exactly by the user at a given time. The power consumed by the user is measured and communicated to the controlling substation whenever needed by the person at the substation. The feedback from the user helps in identifying usages between authorized and unauthorized users which helps in controlling the power theft, one of the major challenges in current scenarios.***

Keywords: energy, grid system

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.

Power theft is the biggest and major problem in recent times which leads to huge loss to electricity boards. It is very important to take this issue in to consideration and hence to resolve and to overcome these losses prices are increased.

2. Literature Survey

2.1 Power Theft Detection and Prevention

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. [1]

2.2 Smart Meter Data Analysis for Power Theft Detection

In this proposed system there is provision for power theft is done by using ardunio 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. [2]

2.3 IoT based Power Theft Detection

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. [4]

2.4 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. [5]

3. Conclusion

There have been may electricity related theft and in this way we will bring it under control and also design the microcontroller based power theft identifier. The major motive of designing such system is that it will eventually and ultimately reduce the illegal used of electricity and will save lot of money because it directly affects the economy of nation as well as the consumer who suffers a lot of loss due to power theft. Thus this system will be beneficial to consumer as well as for government. The best thing about this project is that it will require only one time installation cost and can be used in future with ease without any future investments. Thus this project will be a great advantage and relief to all the consumers and the entire nation as a whole.