National Conference on
"Role of Engineers in Nation Building" organized by VIVA Institute of Technology, Mumbai
(6th and 7th March 2020)
International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-5, Issue-3, March- 2020]

A Review paper on Wireless Power Theft Monitoring in Energy System

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Abstract— *Electricity has been the need with increasing Urbanization; Engineers are a challenge to make cities more efficient. Electricity has been considered as the most important resource nowadays and there have been many types of research going to generate power economically. The various utility companies have now been facing problems due to large losses on the distribution side. One of the common problems for these losses is power theft. The companies have been facing many problems detecting this power theft. The man aim of this project is to detect the power theft and inform the utility substation where the power theft has occurred.*

Keywords— Wireless Technology, Buffer, Driver, Relay, GSM, Microcontroller, Theft detection.

I. INTRODUCTION

In India, power theft has become a major problem causing huge losses to the electricity generation sector. The power theft problem causes the electricity board to charge more and increase the prices of the utility system. Therefore, if power theft is detected we can save more energy and the charges will become affordable to all users.

The power theft is done in different ways such as shorting the input-output terminals or placing magnets on the wheels near the metering system. Many people in India risks their life by hooks-up-line. This may cause the consumer on the same line to pay more without using the energy and pay for the penalty for stealing the energy. The power theft is detected by various methods using buffers, GSM systems, relays, RF communication systems & IoT systems. In this paper, our main aim is to analyze different methods used for power detection & monitoring.

1.1 OBJECTIVES

1. To develop and implement smart metering which can deal with smart technology

2. To make a system free from power thieves by detecting them and monitoring further.

3. To overcome the architecture limitations faced while designing a metering system.

4. To eliminate the present complex system that enhances many limitations regarding power theft.

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II. METHODS USED FOR POWER THEFT DETECTION

2.1 BY USING RELAY & MICROCONTROLLER

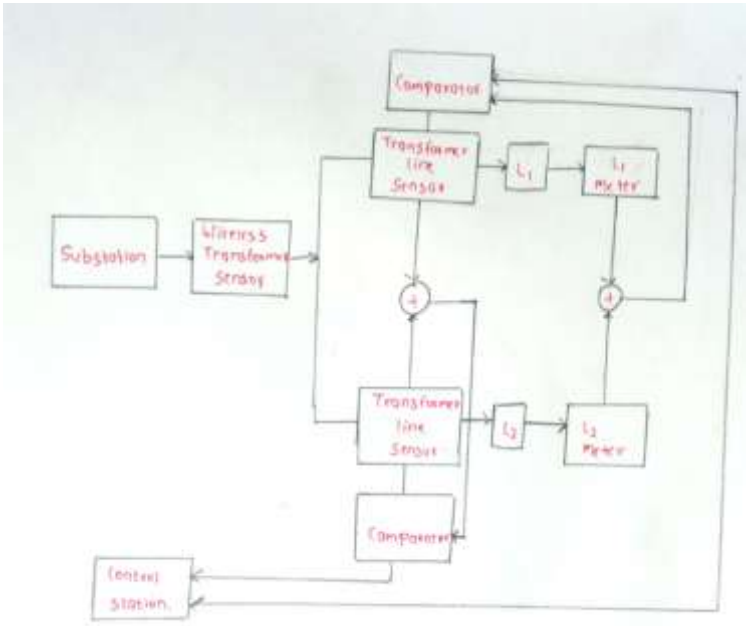

FIGURE 1: Block diagram of Power theft detection using relay & microcontroller.

Fig. 1 shows the relay circuit using a microcontroller on which trips when abnormal conditions are detected. This circuit is implemented at the output of the meter continuing the power supply. The system has four sections, namely controlling station, wireless transformer sensor, transformer line sensor & wireless consumer sensor node.

The wireless consumer sensor node senses the energy consumed by the consumer & sends the data to a wireless transformer sensor. Then the wireless transformer sensor sends the data to the controlling station. The wireless transformer sensor senses the data from each transformer line sensor and then the cumulative is done at the consumer station & compared with the total energy sent to the consumer.

2.2 BY USING THE BLUETOOTH MODULE

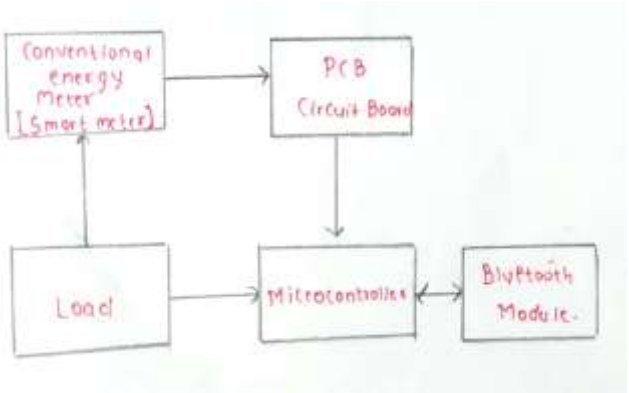

FIGURE 2: Block diagram of Power theft detection using Microcontroller & Bluetooth module

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Fig. 2 shows the power theft detection using the microcontroller & Bluetooth module. The system is designed by converting conventional energy meter, a smart energy meter by using PCB & wireless sensor networks. The system is designed if there is theft occurring between transmitting & receiving end then the person in charge at the substation will receive a message from Bluetooth module as "TEMPERED".
If there is no theft occurring between transmitting & receiving end then the person in charge at the substation will receive a message from a Bluetooth module connected to the meter as "OK".

2.3 BY USING IOT BASED SYSTEM

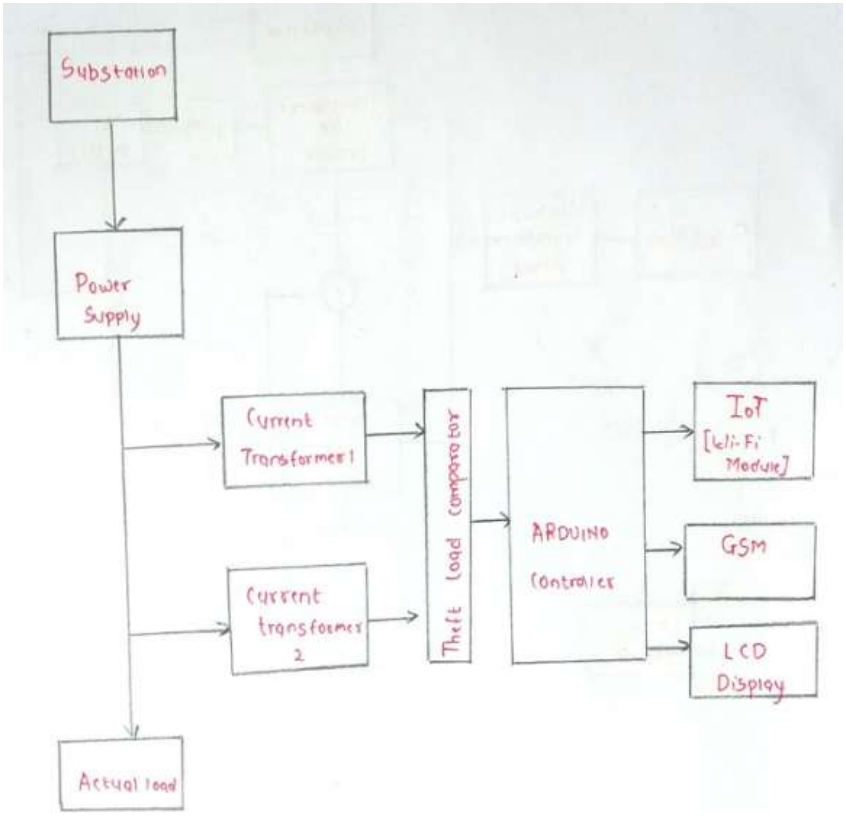

FIGURE 3: Block diagram of Power theft detection using IoT based system

Figure 3 shows the power theft detection using IoT based system. The system comprises of the substation, current transformer, theft load comparator, Arduino controller, Wi-Fi module, GSM & LCD. In this system, 2 CTs are used. One of the CT is connected at the supply side to measure the current supplied by the source & another CT is connected to the actual load side to measure the current at the load side. The current of these two CT's is compared and checked. If both the CTs shows the same value then there is no theft occur. If the values are not the same then they are compared in the theft load comparator and given to the Arduino controller in voltage signals. The Arduino then sends the signals to the Wi-Fi module and then the message is sent to the person-in-charge via GSM.

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TABLE 1
COMPARISON BETWEEN THREE METHOD

Sr. No.	Method	Advantages	Disadvantages
01.	By using relays & Microcontroller.	This system gives us the detection at each segment of transmission.	The maintenance costing is high due use of relays.
02.	By using the Bluetooth module.	The actual conversion of the conventional meter to a smart meter.	The maintenance costing is high due use of a circuit breaker.
03.	By using IoT based system.	This system gives us precise information by using advanced technology.	The theft detection cannot be located at the exact location.

III. CONCLUSION

The above system can be used for detections of power theft and reduce the power loss and revenue loss by the consumer. If the theft detection reduces then the revenue of power bills will be reduced and the power will easily available to the consumer for cheap. The above methods can be used according to the requirement of the user. For this project, the knowledge of electrical and electronics applications had been proven.

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