



# Electric Power theft detection and location Tracking using IOT

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## Abstract

Ever since the advent of electricity it has become an integral part of our life. From the first ever electric bulb by Edison to the Tesla coil we humans have come a long way. In today's present world every little appliance works on electricity from the electric toothbrush to huge motors. Life without electricity is unimaginable today. With the advancement of technology huge amount of electricity is generated today. This electricity can be transmitted to far away remote places to be used by the people. The high demand of electricity has made it a multi-billion dollar industry. It is the largest industry in the entire world with an interconnection of appliances like none other.

**Keywords :** Arduino, IOT, ESP8266, GSM, ThingsSpeak.

## I. INTRODUCTION

Of all the inventions made by mankind electricity is the most important one. Today's life is impossible to imagine without electricity. With the increase in use of electricity the immoral practices against it has increased. According to a survey conducted by **Outlook in 2015** the world loses about 81\$ Billion to theft of electricity. The highest electricity theft occurs in India of about 19\$ Billion followed by Brazil 15\$ Billion. This huge amount of electricity theft considerably affects the growth of a country specially a developing country. In India 30% of the total power transmitted is lost to AT&C (Aggregate technical and commercial) loss the highest in the world. Due to all this losses India is not able to meet the electricity demand and there are frequent power cuts.

## II. PRESENT SYSTEM

### A. Literature review

In the system proposed by R Giridhar Balakrishna, P Yogananda Reddy, M L N Vital [1] the IOT technology is used to detect the theft of electricity. The power transferred and the power consumed is measured and the difference is used to detect the theft of power.

In the system proposed by Anshu Singhal, Anupriya Tomar, Neha Kumari, S Hena Kauser, Mrs. Savitha. S.C. [2] the theft of power and location is also determined in this system. This system uses IR sensors and camera to detect the theft of power. The theft is detected when the IR sensor is tripped when a person approaches the electric pole. The camera can take pictures of the thief when the theft is detected

In the system proposed by N Kunan, Poornima BK [3] real time power transfer data is stored in an online database which can be viewed by logging in the website. The detection of power theft is by finding the difference of power transferred and power consumed.

### B. Problem in the present system

- [1] In this system power theft detection is not real time and also the location of theft is not determined.
- [2] In this system the use of IR sensor causes improper detection as any heat signal can trip the IR sensor causing the camera to take pictures. Also this system is not feasible as it is not possible to install a camera in every electric pole.
- [3] In this system the location of the theft is not determined.

## III. PROPOSED SYSTEM

### A. Description of System

Our proposed system claims to detect power theft in real time, along with location of theft. The system will have an online database which store all the data related to the distribution system along with the time and date. This data include power dispatched, voltage consumed at a pole and the serial no of the electric pole. The voltage value will be plotted against time. The pole number gives us with the location of the theft of power.

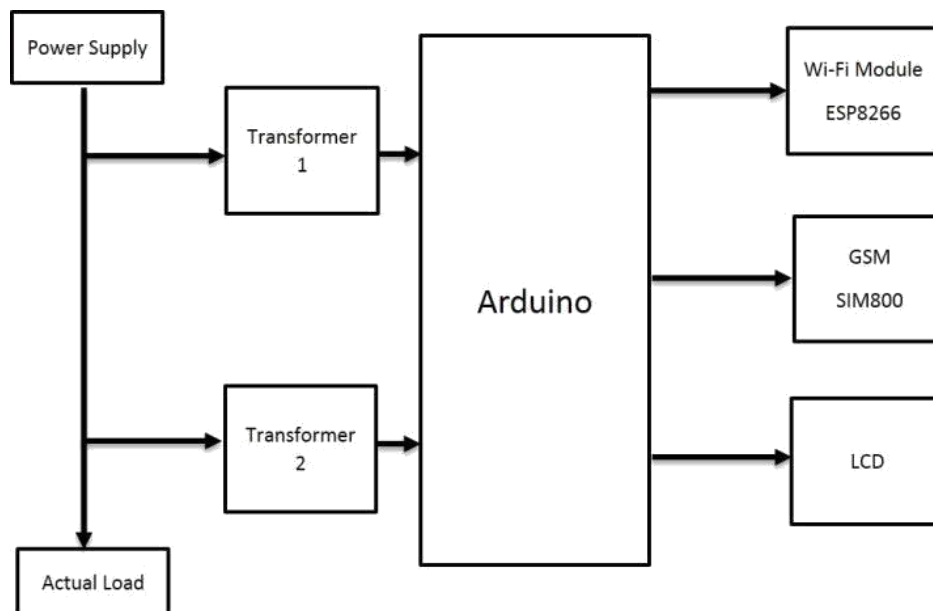


Fig. 1

The system will tabulate and form a statistical data for monitoring voltage levels in area where theft is taking place for a period of time, the authorities can closely monitor the area and conduct a survey to find out where power theft occurs. We will compare the sending end and receiving end voltage levels, see demand of load if the difference is more than permitted value then a close check must be scheduled to look into abrupt rise of power demand. The authorities can use this to find the regions where there is really rise in power consumption and where power theft is occurring.

## B. Working

The circuit consists of Arduino, LCD, GSM, ESP8266 module, Energy meter, 2 transformer and loads. Energy meter is used to measure the input power supplied by the source. Two transformer are used to measure the voltage consumed in two different areas.

The heart of this project is Arduino Uno controller.

It receive voltage signal from two transformer by means of bridge rectifier. Than it compares the voltage magnitude with the voltage drop anointed for that locality .If there is no theft, than the voltage drop will be very low so there is no theft in the system. If theft occurs then the voltage drop will be high. The bridge rectifier is used to convert the AC to pulsating DC then the capacitor based filter circuit smoothens the DC power. Potentiometer and resistors are provided to reduce the voltage level and set it to 5volt.

The voltage given by the transformer is multiplied by a value to represent the real voltage value being supplied. If the voltage shown by the transformers drops below a particular value mentioned, it means the load in the area has increased and so there is theft occurring. Than the control moves to the alert function such as SMS and email.

An online database is created by making use of THINGSPEAK server where the data of voltages of different areas are stored and updated automatically. In it the analysis of data can be done by MATLAB and the location of monitoring can also be done. It gives us a graphical view of the change in voltage in an area.

LCD is used to display the load voltages of different areas.

The ESP8266 module allows the Arduino Uno board to connect to the internet, so that monitoring authority can get the information through the internet. The exact location of the power theft is determined by placing multiple transformers in load line at a specified distance by which monitoring authorities will be in a state to take legal action against the culprit.



Fig. 2



### C. Components

- Arduino UNO
- ESP8266
- GSM SIM800
- LCD (16x2)
- Transformers
- Bridge Rectifier
- Energy Meter
- Load
- Resistor
- Capacitor

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In this project we are making use of very simple equation of power to find the theft of power. The equation are

Power theft= power supplied- power used

Power supplied - The power supplied from distribution station.

Power used - It is the actual load of the users.

#### E. Future Scope

This system can be further be improved in future because of its high usage factor. For instance a system can be designed in which instead of knowing the consumers load beforehand we can install smart energy meter in the consumer premises so that we can know the real time load of the consumer. With this

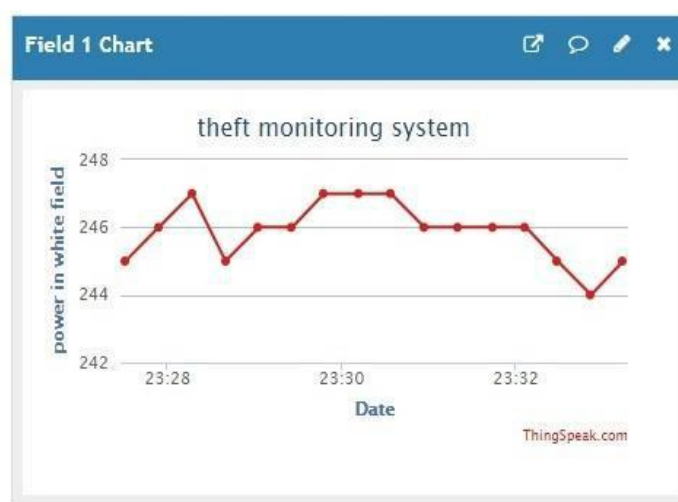


Fig. 3

We can detect the theft of power more precisely. GSM modules can also be interfaced with the circuit to determine the exact location of the theft instead of just the street name. The use of current sensors can give us the exact value of the power being theft at any moment.

#### IV. References

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