

# IOT BASED SMART ELECTRIC METER READING, POWER THEFT AND LINE TAPPING DETECTION

Prabavathi S, Anupriyankha S, Gokulavani G, Tamilarasi K, Vishnupriya P  
*Department of CSE, M.Kumarasamy College of Engineering, Karur, India,*

## **Abstract**

*Starting from the primary invented electric bulb by means of Edison to the Tesla coil, the people have travelled an extended way. The importance and utilization of electricity has become an integral part of our life. In present day world, each little appliances proper from the electric teeth brush to huge automobiles works on energy. Life without energy is unattainable today. Because of advancement of technology, large quantity of electricity is generated today. The predominant goal of the project is to broaden an IOT primarily based clever electric meter, which indicates the power units fed on and its cost for the domestic usage. The analysing from the electric meter is transferred over the net and also despatched to the EB Web server. The home user can also view their particular electricity usage via authentication. Due to few technical faults like Line Tapping and Power Theft, the power losses might also occur. The manpower couldn't be aware of wherein the tapping occurs, by means of enforcing sensor machine the prevalence of tapping can be diagnosed and the sensor hit upon the tapping vicinity with the help of relay and ship the information to the concern individual to alert the tapping incidence. To overcome the trouble of energy theft, a metal sensor is positioned in the electric meter box. When an electricity meter is tampered with an exposing wire the sensor detects the occurrence of energy theft and sends the information to the authorized person in order to prevent from further energy theft.*

**Keywords:** *Electricity, Electric meter, IOT, Sensors, Relay, Web Server*

## **1. Introduction**

A proposed system claims to detect energy theft, by way of placing a metal sensor system in the electric meter box positioned in a home. An electric meter with the controller sensor system to measure power usage and is used to measure usage costs fed on and transfer the units and its cost is sent to the EB server via internet connection. This allows the home user to view the energy utilization at a side of the fee charged online the usage of a simple web application. The line tapping hassle can be overcome with the aid of finding the tapping vicinity using Sensors. Arduino controls the Relay board by running a code based on the input and sends an input to the webpage.

## **2. LITERATURE SURVEY**

A power grid communication with Intelligent Multi-Agent System is used to monitor the generated and distributed electricity from multiple places. The complete system is made using JAVA through the extension of JADE [1-4].

This paper is the close integration of pricing Cyber Attack and power theft. In Smart Home, energy theft is detected by using GSM Modem. It is designed like modem, which can access SIM card and works like mobile phone. When the GSM modem is attached to the computer it will communicate over the mobile network. It is a device with Bluetooth connectivity, USB and serial bus. It has 3G technology and 2G technology that includes GPRS and EDGE. Through this modem the information of energy theft is sent to the concern person. Ultimately, the circuit device is locked [5-8].

In present day world, traditional Analog electric meters is replaced by Smart Electric Meters. Whenever the energy theft is detected by means of certain programming

algorithms which compares the previous usage of electric power with the present usage, if the cost is low in the present the energy theft occurs [9-10].

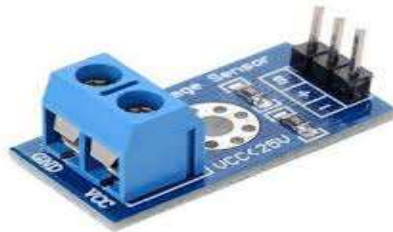
In Artificial Neural Networks, Automatic Decision is made for the detection of energy theft. Automatic Decision is done by comparing the previous electric usage costs form the present, the decision of whether the energy theft happened is made according to the comparison values [11-12].

In smart home, self-learning technique is used to monitor the power usage, how to save energy usage when high energy consumption is found and to detect the short circuit in large apartments [5].

### 3. COMPONENTS

#### 3.1 VOLTAGE SENSOR

Voltage sensor is used detect the electric fields, when the sensor is placed in the electric meter box it detects the electromagnetic waves that hits the sensor.



**Figure 1:** Voltage Sensor

#### 3.2 IR SENSOR

Infrared sensor is an electronic equipment that is used to measure a heat of an object and detects the motion. It compute infrared radiation in the field of view. The purpose of sensor is used for alarm and automatic lighting and Range of Sensor is (850nm...50um)



**Figure 2:** IR Sensor

#### 3.3 NODEMCU

NodeMCU is economical and it support IOT platform. It runs on ESP8266 Wi-Fi-SOC from Esprerref System, and based on ESP-12 module. Node MCU feature such as Wi-Fi devices.



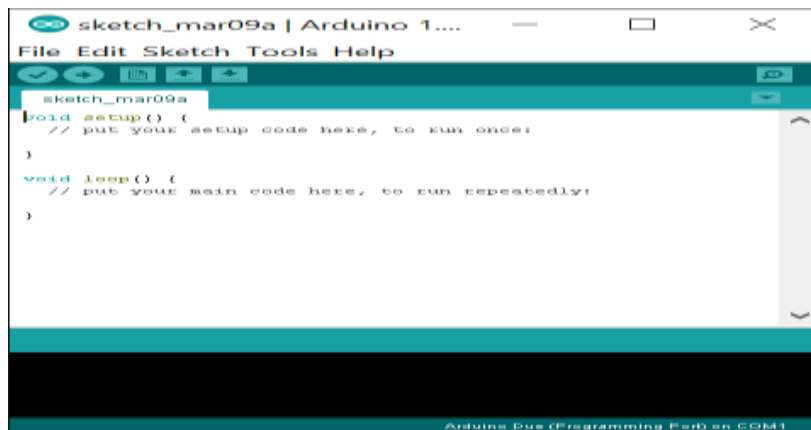
**Figure 3:** Node MCU

### 3.4 EMBEDDED C

Embedded C is lengthening of C, C++ computer program. These header files differs from controller to controller. It is used for the IOT project and helps in hardware devices.

### 3.5 ARDUINO IDE

Arduino IDE is a tool to code the Arduino embedded C, C++. It is used to turn the code into a text file and also storing into Arduino board. It is cross-platform application for Linux, windows etc.... Standard libraries are written in C and C++ and IDE uses gcc g++ compiler. The latest version is Arduino 1.5.x Beta. It can be used on Linux, Window (32 and 64 bits), and Mac OS X.



**Figure 4:** ArduinoIDE

### 3.6 ARDUINO UNO

Arduino UNO is a microcontroller board. It depends on microchip ATmega328p. It includes on 14 digital input and output pins out of this 14 pins 6 pins is used for PWM Outputs and it also contains tor, an ICSP header, a USB connection, a 16 MHz ceramic resonator, 6 analog inputs, a power jack and a reset button.



**Figure 5:** Arduino UNO

### 3.7 CLOUD SERVER

Cloud server is used to store the data for future reference. It accessed through internet connectivity. Cloud server is also called as virtual server. The cloud is used as metaphor for Internet. virtual server functions through an online interface.



**Figure 6:** Cloud server

### 3.8 WI-FI

Wi-Fi is a wireless technology that uses radio waves to access wireless network connection ultra-speed Internet-Wi-Fi-trademark *IEEE 802.11x*. Wi-Fi applications are used in, mobile phones, PDA, operating system, home network, game consoles, and consumer electronics. Wi-Fi range is 150 feet.



**Figure 7:** Wi-Fi

### 4. ENERGY METER READING

A controlled sensor system is fixed in the electric meter box to measure energy units and its respective cost for home usage which is transferred to the EB web server via internet connection. Eventually, the particular home user can view their electricity usage and costs by accessing the web server.

### 5. POWER THEFT DETECTION

An unauthorized usage of electricity without the knowledge of electricity board and particular home user can be detected by placing a sensor between the power line and electric meter box.

## 6. POWER LINE TAPPING DETECTION

Because of the bad weather conditions like rain, wind etc... the power lines might cut off which becomes a hassle to identify its location and it cause the loss of many lives, so a location sensor system is placed in suitable area for detecting the tapping location and sends the information to the concern.

## 7. RELAY CIRCUIT

Relays are the open and close switches. Here it is used for ON/OFF the power lines when the tapping occurs and when the energy theft is detected.



Figure 8: Relay Circuit

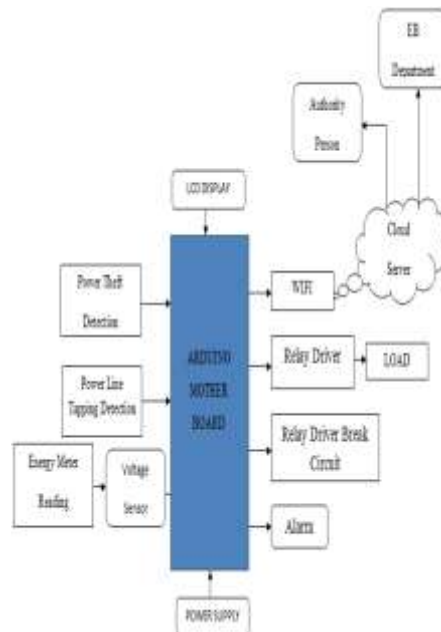


Figure 9: Smart Electric Meter Reading, Line Tapping Detection, Energy theft

## 8. CONCLUSION

In this paper, the IOT based Smart Energy Theft System (SETS) is detected. The energy that is implemented for commercial and industrial sector. The project IOT based electricity energy meter was designed for domestic usage. The device is switched ON/OFF using Ethernet in pc, android phone and to identify the circuit breaker in power line then the information gives to the server.

## REFERENCES

1. Weixian Li\*, Thillainathan Logenthiran†, Van-Tung Phan‡, and WaiLok Woo§, Intelligent Multi-Agent System for Power Grid Communication, IEEE Region 10 Conference (TENCON) — Proceedings of the International Conference, 2016, pp.ISSN 3386-3389
2. Yang Liu, Yuchen Zhou, and Shiyan Hu, Senior Member, IEEE, Combating Coordinated Pricing Cyber-attack and Energy Theft in Smart Home Cyber-Physical Systems, IEEE, 2016, pp.0279-0070
3. Yuchen Zhou, Xiaodao Chen, Albert Zomaya, Fellow, IEEE, Lizhe Wang, Senior Member, IEEE, and Shiyan Hu, Senior Member, IEEE, A Dynamic Programming Algorithm for Leveraging Probabilistic Detection of Energy Theft in Smart Home, IEEE, pp.ISSN 5991-5999
4. Hao Huang, Shan Liu, Katherine Davis, Energy Theft Detection via Artificial Neural Networks, Student Member, IEEE, Senior Member, IEEE, 2018, pp.978-1-5386-4505-5/18/\$31.00
5. Weixian Li, Thillainathan Logenthiran, Van-Tung Phan, and WaiLok Woo, Implemented IOT based Self-learning Home Management System (SHMS) for Singapore, Member, IEEE, Senior Member, IEEE, 2018, pp.2327-4662
6. P.Pandiaraja, P.Viajayakumar, V.Vijayakumar, R.Seshadhri, "Computation efficiency Attribute based broadcast group key management for secure document access in public cloud" ,Journal of information Science and Engineering, Vol.33, No3, PP 695-712.
7. P.Pandiaraj, P.Vijayakumar, "Efficient Multikeyword search over Encrypted data in untrusted cloud environment", Second International conference on Recent trends and challenges in Computational Model (ICRTCCM -17, PP 251-256).
8. N.Deepa, P.Pandiaraja, "Hybrid context aware recommendation system for e-health care by Merkle Hash tree from cloud using evolutionary algorithm", Journal of soft Computing springer, PP 1-13.
9. KSumathi, P Pandiaraja, "Dynamic alternate buffer switching and congestion control in wireless multimedia sensor networks", Journal of Peer-to-Peer Networking and Applications, Springer US, PP 1-10.
10. S. Saravanan, T. Abirami, P. Pandiaraja, "Improve Efficient Keywords Searching Data Retrieval Process in Cloud Server", 2018 International Conference on Intelligent Computing and Communication for Smart World (I2C2SW), IEEE Explorer ,PP 219-223.
11. P.Rajesh Kanna, and P.Pandiaraja "An Efficient Sentiment Analysis Approach for Product Review using Turney Algorithm", Journal of Procedia Computer Science Elsevier ,Volume 165 ,Issue 2019 ,PP 356-362
12. P. Santhi, S.Thilagamani, "A Survey on Audit Free Cloud Storage via Deniable Attribute Based Encryption", IRA-International Journal of Technology & Engineering, Vol.5, No.1, PP.1-5, 2016