A NOVEL APPROACH FOR INTELLIGENT ELECTRIC POWERTHEFT AND ENERGY METER READING BY USING IOT

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ABSTRACT:

The main objective of the project is to develop an IOT based electricity meter reading displayed for units consumed and cost there upon over the internet.The reading of the energy meter is also sent to Web Server. These days with emerging developments in all sectors and growing demands, electricity has become priority for every individual and every organization. Naturally owing to few technical faults, losses may occur due to power dissipation by some devices. These losses can be minimized using the fast developing technology.We are using manpower to monitor but we could not able to identify the theft occurs. To overcome this problem we implement new proposed system to find where the theft occurs by implementing the sensor system. When our system identify the theft occurs in the transmission line immediately to find it and send the information to concern person to alert the theft occurs.

I. INTRODUCTION

The new proposed system to find where the theft occurs by using the sensor system.When the system identify the theft occurs in the transmission line immediately it sends the information to concern person to alert the theft occurs. The main objective of the project is to develop an IOT based electricity meter reading displayed for units consumed and cost there upon over the internet.

II. METHODOLOGY

A.Smart Homes:

Smart Homes are created through implementation of Internet of Things (IOT) and smart meters.

In order to monitor and control the Advanced Metering Infrastructure(AMI), Energy Management System (EMS) was an essential integration of the system infrastructure.

Demand Side Management System (DSMS) is included as a function of EMS .

Its functionality focuses mainly on managing the demand response and loads.

It collects the demand information to dictate the optimal power usage such as implementing load-shifting to enable the use of electricity markets during peak and off-peak hours.

It allows users to conveniently dictate their smart appliances within the home area by using mobile devices.

More advanced and developed systems could further analyse the data collected and make its own decision for the smart homes to operate in a cost-effective and energy-efficient method based on users' consumption patterns.

B. Energy

Theft Energy theft has become a serious issue in the smart grid community.

It has caused massive losses for many countries that exceed billions of dollar. Nowadays, a smart meter will be placed at the end of every distribution network to record power consumption and generates the energy reports remotely.

An example of the home distribution network is shown in Fig.1.

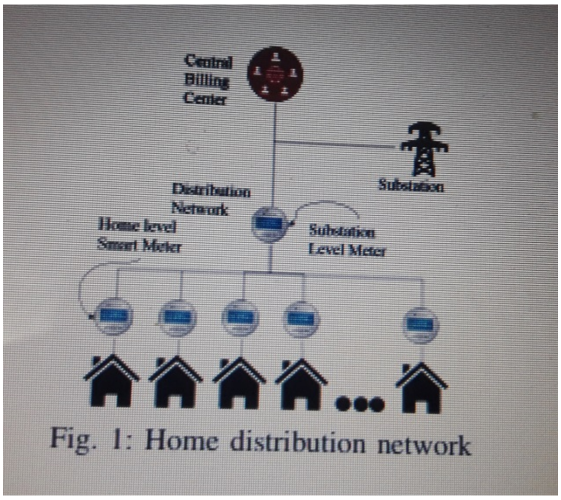


Fig. 1: Home distribution network

Energy theft methods involve hacking smart home appliance and most commonly direct hooking on other household electricity supplies. Other methods involved are tampering with the smart meter's software, mechanism, and manipulating data through cloud storage.

Thus, attackers can reduce their own electricity usage by manipulating other households through tampering and hacking to increase their electricity usage as the aggregate bill for all customers in the community remains the same

Fig.2 shows an example of energy theft situation.

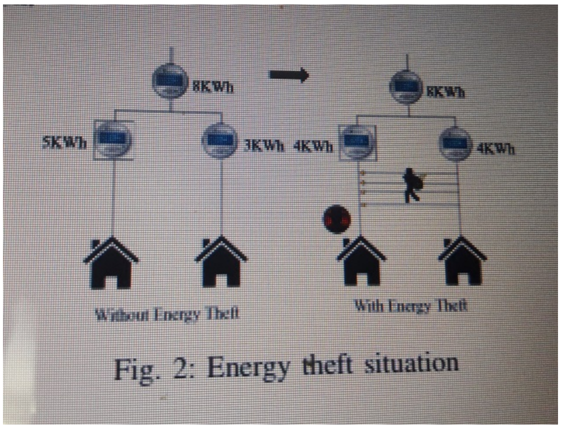


Fig. 2: Energy theft situation

The example shows that through energy theft, the higher consumption household can reduce their own power consumption through tapping on another household. It increases the electricity bills for the other household victim while reducing the energy theft culprit bills.

III.EXISTED WORK

Existing system has two subsystem implemented one system will detect and measure distributed voltage, current and transformer winding temperature.

In this section the all consumer consumed units is matched total unit if any consumer bypasses its energy meter then our system will detects i.e. theft occur in that particular thing.

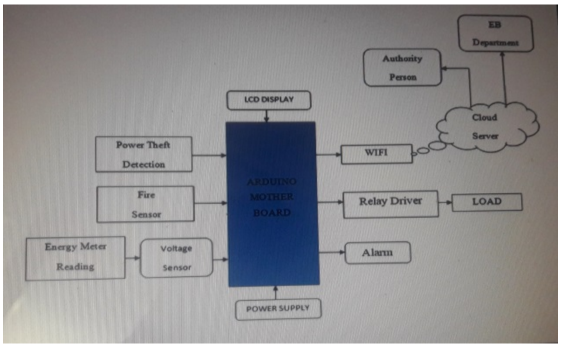
IV.PROPOSED WORK

Our proposed system claims to detect power theft in real time by using sensor system.

The system uses energy meter with controller system to monitor energy usage using a meter The meter is used to monitor units consumed and transmit the units as well as cost charged over the internet using Net connection.

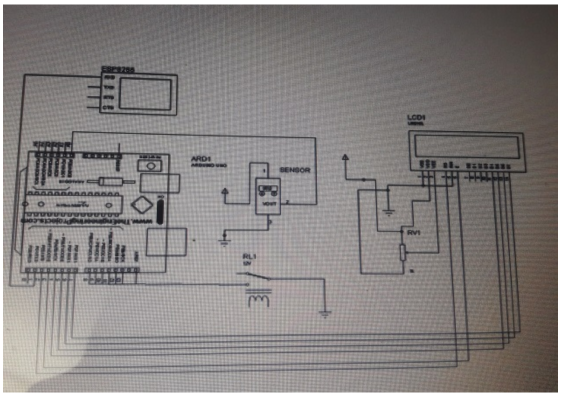
The power theft problem to be overcome and to identify the location using Sensors Arduino runs a code to control a Relay board according to the input and also serves a web page through which respective output to the relay board can be controlled

BLOCK DIAGRAM



The block diagram is given in the above figure for proposed system.

ARCHITECTURAL DIAGRAM



The overall architecture comprises the following modules:
• Data Collection Module
• Prediction Model
• Primary Decision Making Model – Continuous Hour Model – Same Day and Hour Model
• Secondary Decision Making Model – Power Consumption Model

The data collection module collects the data for SETS. The first stage of SETS is the prediction model. The prediction model uses Multi-Model Forecasting System that comprises different machine learning methods:

- Multi-Layer Perceptron (MLP),
- Recurrent Neural Network (RNN),
- Long Short Term Memory (LSTM),
- Gated Recurrent Unit (GRU).

It predicts and compares the actual data to detect abnormally. Second stage of SETS is the primary decision making model. This stage uses a statistical model called Simple Moving Average (SMA) to filter the abnormally from the first stage. Third stage of SETS is the secondary decision making model. This stage further filter from the second stage and decides whether energy theft had occurred. After taking the final decision, the whole process will be repeated for the next incoming data. SETS is best implemented with an independent hardware system directly at the smart meters, this is because any interferences for energy theft regardless of tampering hardware or manipulation of data can be detected. It is more accurate compared to just monitoring the data from cloud or operator's database as many other factors may affect the analysis.

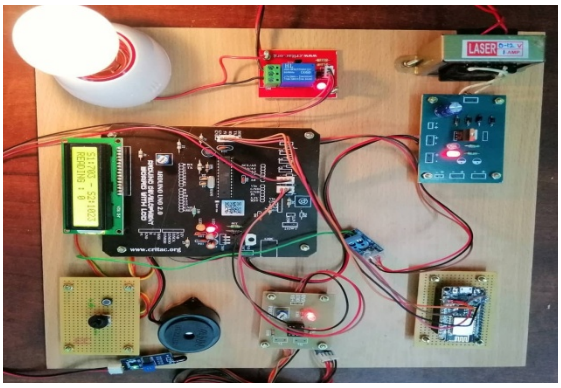
V.RESULT

The SETS was tested using simulated energy theft scenarios. The scenario was created by randomly stealing energy on 50 different periods. The best MAPE result was 0.18% which was considered most suitable method as compared to other methods tested.

VI. CONCLUSION

In this paper, an innovative Smart Energy Theft System (SETS) is proposed for energy theft detection.
A Multi-Model Forecasting System based on the integration of machine learning models such as Multi-Layer Perceptron (MLP), Recurrent Neural Network (RNN), Long Short Term Memory (LSTM), and Gated Recurrent Unit (GRU) was developed as part of SETS. Additionally, a statistical model called Simple Moving Average (SMA) was also further developed into SETS.
These algorithms enable SETS to efficiently detect energy theft activities.
The evaluation of its system carried out in a Singapore home environment.
Stage 1 has an energy theft accuracy result of 56.39%, by adding stage 2 has 99.89% and all 3 stages present the evidence of its energy detection algorithm accuracy of 99.96%.
In conclusion, SETS enhances the security of the Internet of Things (IOT) based smart home systems from energy theft and can be further implemented in commercial and industrial sectors.

VII.IMPLEMENTATION



The 100% of implementation is given in the above figure.

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