RESEARCH ARTICLE

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Minimizing Electricity Theft Using IOT

B. Lakshmi Sirisha*[1]

[1]. Associate Professor, ECE Department, V R Siddhartha Engineering College, Vijayawada, India; e-mail: suravarapuls@yahoo.co.in

ABSTRACT

Electricity is one of the non-renewable resources present in our daily life which is utilized in every country that results in abundant losses due to electricity larceny. An officer can find the dishonest user based on energy meter at the backend of electricity office with this proposed work. Firstly, creating a webpage in which the users are given with an unique identification number and this webpage will be maintained by the co-ordinators. A mobile app is provided to the users, so that they can login into their account by unique username and password to know the power used by them. Communication between the nodes is done using Zigbee protocol.

Keywords: Electricity larceny, Node MCU, Current sensor, Zigbee.

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INTRODUCTION

The term Internet of Things was popular now days, most of the industries work on IOT based research. The main principle of IOT is to sence and collects the data using network devices around the world. The collected data is shared across the internet for processing.

IOT technology is not limited to industry application, it is also used for home automation applications. In this paper proposing one of the use full applications called minimizing the electricity theft [1].

Electrical power is one of the basic needs for living. Present the world run towards digitization so without electric power any one cannot reach the digital technology. Utilizing power in a proper way is one of the challenging task now a days. Most of the people stealing the electrical power for their requirements, however this is a criminal practice. Every year, the government losses billions of revenue due to this thefting of power. As per the survey, India losses more money compared with other countries [2-4].

Corresponding Author : B. Lakshmi Sirisha, Associate Professor, ECE Department, V.R. Siddhartha Engineering College, Vijayawada, India; e-mail : suravarapuls@yahoo.co.in

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The losses are due to either commercial or technical losses. Technical losses occur due to energy dissipated by the internal equipment used for transmission and distribution [5-6]. Commercial losses are due to defective meters. Actually the existing meters cannot register the theft power so error will occur between the utilized power and registered power in the meter. This leads to loss of revenue to the government. In this paper we propose a method to avoid the electricity theft using IOT technology. Figure 1 represents the block diagram of proposed work.

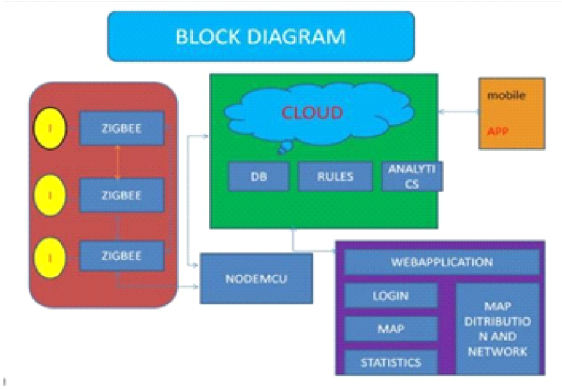

Figure 1: Block Diagram of Proposed Work

Description of Hardware

- Zigbee
- Current sensor
- Arduino Nano
- NodeMCU
- GSM module

Zigbee

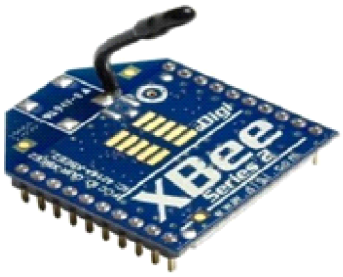

Figure 2: Zigbee module

Figure 2 is a microcontroller made by Digi and uses Zigbee protocol. It works with a power supply of 3.3V.Indoor range of zigbee is 40m and its line of sight is 120m.

Current Sensor

In the proposed method sensing of current and controlling is important task, for that purpose current sensors are used. ACS712, is a current sensor which sensing both AC and DC based on hall effect concept. This sensor is interfaced with PIC microcontroller for measuring DC.

Arduino Nano

Arduino is an open-source electronics prototyping platform. In this work , Microcontroller ATMEL ATmega328 is used with an operating voltage of 5v, input voltage 7- 12 v. Is shown in Figure 3.

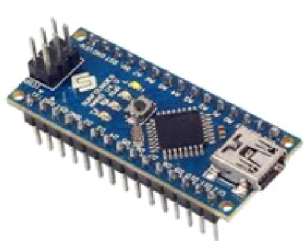

Figure 3: Arduino nano

Node MCU

It consists of WIFI, Analog pin – A0 , Digital pins – D0 to D8, 3 grounds, 3 Vcc, Vin(3.3V) , Receiver and Transmitter , Reserved pins – S2,S3 , Enable – Always high, 4 MB Flash , 80 MHZ speed , 160 MHZ over clock. Node MCU is an open source IOT platform.

GSM Module

In this work Global System for Mobile communication (GSM) is used as a communication link between the user and electrical office. The GSM modem contains the data base of the customer. Monthly bills and due bills are messaged to the customer using this unit or Bluetooth connection.

PROPOSED WORK

This project consists of the following components:

1. Curent sensor_ACS712
2. Zigbee_coordiator Zigbee_router
3. Arduino nano
4. NodeMCU

This prototype is implemented on system containg one current pole and two houses. Current pole is the source of electric power and houses act as loads. The power that is send to the houses is recorded dynamically using current sensor. The power consumed by the houses is computed individually by current sensors placed at each. The power that is sent from the pole has to be equal to the sum of power consumed by the two houses. When this condition is not satisfied, it implies that power theft has been done is the area of that corresponding pole.

Mechanism

Current sensor is used to record the current that is consumed and it is gives an analog value ranging from 0 to 1024 and corresponding current values are computed Zigbee that is present at the pole is configured as coordinator and the zigbees o consumers are configured as routers. Coordinator

regulates the routers. A system can have only single router and multiple routers. Two routers are choosen here for convenience. Zigbee modules are used to transfer data. Data is sent in the form of packets to coordinator and the range is 80 to 120m. This recorded data is maintained on a web page.

Mobile App

Mobile Application for the project Minimising Electricity Theft using IoT is developed using MIT AI2 app inventor. The main feature of this app is that it indicates the current consumed by each user at any point of time. When the user opens this application, the user can be aware of the power being consumed at any point of time. Hence when the user is aware of power being consumed, user can manage his consumption to minimise his electricity bill when consumption becomes beyond his expected level Figure 4 & 5 show the screenshot of the mobile app.

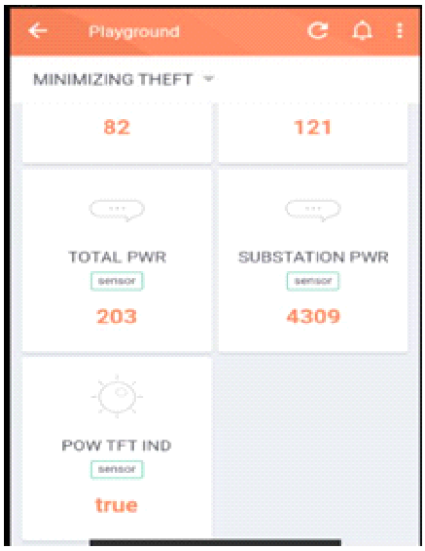

Figure 4: Screenshot of mobile app

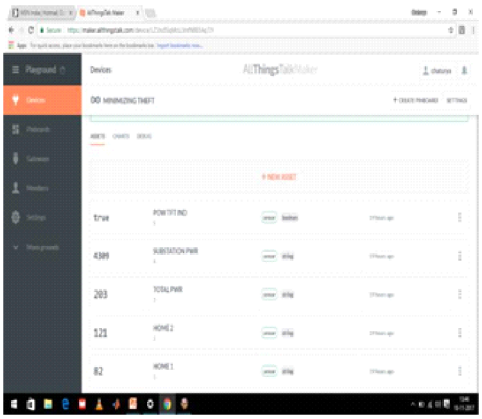

Figure 5: Screenshot of web page

Web Page

Webpage is created to monitor the values of power consumption of each user individually. Each user is given a unique identification number. Users can enrol in the website using their unique id. Details of group of users present in a location are monitored by coordinators. Whenever there is power theft, the power theft is indicated in the webpage. The coordinator gets an alert immediately. The coordinator can immediately go to the location of power theft as indicated in the webpage. Thus power consumption can be monitored continuously.

The Figure 6 represent prototype of the entire setup which performs all the functionalities.

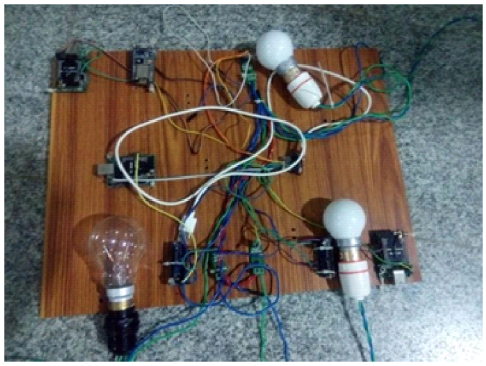

Figure 6: Top view of proposed model

Conclusion

Power theft is an one of the main problem in any country which leads to loss of revenue. This causes corruption and wastage of power. Proposed method identifies the unauthorised usage of power and controlling the power thefts.

Future Scope

In further implementation smart meter automatically cut electricity when any one tried to theft and it also monitor the electricity consumption through smart phone and smart meter that sends status if any fault occurred in transmission line. Furthermore it create bill by our self and also pay it and anyone can check the online status of energy meter as well as the consumption of energy.

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