

# Minimizing Electricity Theft by Internet of Things

Jatin Kaushik <sup>[1]</sup>, Avinash Jain <sup>[2]</sup>, Kartik Kasnia <sup>[3]</sup>, Ravi Sihag <sup>[4]</sup>, Kalyani Kumari <sup>[5]</sup>, Yashika Saini <sup>[6]</sup>

<sup>[1],[2],[3],[4],[5]</sup> Student, <sup>[6]</sup> Assistant Professor,

Department of Computer Science & Engineering, AIET, Jaipur - Rajasthan

## ABSTRACT

IOT use things to things associated with access the web of things, permit information to store, and access administrations. Administrations over the web of things improvement as indicated by the need of an individual to individual and thing to an individual, machine to machine cooperation without human association. As there are confidential non-sustainable chattels are available in our step by step life, Electricity is one of them used in each country that outcomes in plentiful misfortunes because of power robbery. Force mugging will be the key test. A brilliant energy meter is utilized to limit power theft. primarily, an energy meter is a gadget that computes the expense of power devoured by homes, organizations, or electrical gadgets. It diminishes the burglary of power. In this paper, an supervision character can track down the untrustworthy client by showing the situation with the energy meter at the back finish of the power office. To accomplish this, the energy meters speak with raspberry pi through GPIO pins. GPIO pins catch the successful information from the energy meter and it sends viable information to the raspberry pi and interfaces raspberry pi with the web. At the backend, an admin person can see the circumstances with the energy meter as charts.

**Keywords:** Electric Energy, Energy Meter, Raspberry pi.

## I. INTRODUCTION

With the increment of web availability in a home climate, electronic devices used to make home organization administrations. IOT use things to things associated with access to the web of things permit information to store and access administrations, like far off home sensors [1-2]. Administrations over the web of things improvement as per the need of an individual to individual and thing to an individual, machine to machine connection without human association [3-5]. The innovation utilized in this framework is radio recurrence recognizable proof.

Transmission and conveyance of power are keen from the use of sustainable power sources and progressed estimation and most recent correspondence advancements also utilities develop to be shrewd. So, with savvy utility most recent estimation and fuel sources and burden effectively oversee. The vital component of such an estimation and control organization could be a shrewd meter. A keen energy meter is utilized to limit power robbery. Fundamentally, an energy meter is a gadget that figures the expense of power devoured by homes, organizations, or electrical gadgets. It lessens the robbery of power. Electronic energy meter estimates current in both segment and Neutral lines and ascertains influence exploitation [6].

## II. SOFTWARE AND HARDWAREUSED

### A. IOT

With the expansion of web availability in the home climate, electronic devices used to make medical equipment, home organization administrations [7-8]. IOT use things to things associated with access to the web of things permit information to store [9-11] and access administrations, like a far-off home sensor [12]. Also, lights will naturally close off when leaving a room or condo while leaving for work. Moreover, the room temperature can be decreased when leaving for work and expanded ahead of returning home. Different capacities that can be controlled [13] away from home incorporate deciding if the condo windows are shut or the espresso producer is closed off. An energy supplier can peruse the energy utilization for a day, week, or month. Administrations over the web of things improvement as indicated by requirements of an individual to individual and thing to an individual, machine to machine cooperation without human association [14]. The innovation utilized in this framework is radio recurrence recognizable proof. The activity of structures or potentially homes will be more basic, protected, dependable, harmless to the ecosystem and practical by utilizing shrewd gadgets.

### IOT ELECTRIC ENERGY

Electric Energy is an essential asset in regular day-

to-day existence and a spine of the business. It is restricted, so legitimate use and estimation is vital. Prior to the usage of power, it passes a few stages [15]. It is first Generated (G) then, at that point Transmitted (T) over significant distances lastly Distributed (D) to shoppers. In this cycle of GTD energy misfortunes occur. Energy misfortune is characterized as the contrast between energy created and utilization.

There are mainly two types of losses

**i) Technical losses.**

**ii) Non-Technical losses**

**iii) Technical losses**

Specialized misfortunes are those misfortunes which happen because of properties of materials utilized in transmission and conveyance framework.

For instance, energy scattered because of obstruction of conductor utilized in transmission lines technical misfortunes are not difficult to reenact and figure; calculation devices for computing influence stream, misfortunes, and gear status in Force frameworks have been created for quite a while. Upgrades in data innovation and information securing have additionally made the computations and confirmations simpler [16].

**i) Non-technical losses**

Non-specialized misfortunes are power robbery and non-installment Electricity burglary is characterized as a cognizant endeavor by an individual to lessen or dispose of the measure of cash the person will owe the utility for electric energy. This could go from messing with the meter to make bogus utilization data utilized in billings to making unapproved associations with the force lattice. Non-specialized misfortunes are hard to evaluate. They allude to misfortunes that happen freely of specialized misfortunes in the influence framework. Two simple instances of wellsprings of such misfortunes are segment breakdowns that definitely increment misfortunes before they are supplanted on schedule and power robbery. The explanation that meter investigation is the principal technique for NTL identification is that the utilities believe power robbery to be the significant wellspring of NTL and most power burglary cases include meter altering or meter obliteration [17].

**Main reasons for non-technical losses.**

1. Electricity robbery: Electricity burglary implies that electric energy circulates to buyers that aren't determined by the energy meter of the purchaser. The shopper breaks the instrument, places a solid

magnet additionally by controller attempt to stop the meter.

2. Metering mistakes: Metering errors characterize as the distinction between genuine energy conveyed to the energy meter and energy estimated by the energy meter. A modest quantity of Error is available in all energy meters.

**C. Energy Meter:**

Energy meter and watt-hours meter is a gadget that figures the measure of electrical energy which is used by the customer. Energy meter is introducing at each spot like home, association, and enterprises to quantify the utilization of power by loads like fans, lights, and some more. Being a restricted vital asset, the metering of power utilization is fundamental. For the most part, individuals could do without the utilization of power in their everyday cycles and are worried about it when they get their power bills or if there should arise an occurrence of a force deficiency. Estimating power utilization was begun with an Electromechanical Induction meter which works by tallying the upheavals of a metal plate turning at a speed relative to the force. The quantity of insurgencies is corresponding to energy use. The electric meter had played a more significant job in the force framework. The force meter can be used to recognize or quantify the presence of voltage, current, power, and different boundaries. The electric energy meter is the most significant in exactness [18]

**i) Electronic Energy meters**

Electronics vigor gauge are exceedingly precise and unswerving energy dimension device as put side by side to another perfunctory meter. It utilizes very small amount of power and its start manipulative energy expenditure straight away while appending with the heap. Those meters are either simple or computerized. In the simple energy, meter power is changed to relative recurrence and it's anything but a counter situated inside it.

Be that as it may, computerized energy meter processors are utilized to quantify the power. Rationale circuits are utilized to coordinate the ability to get energy and furthermore help for testing. Then, at that point, it changes recurrence or heartbeat rate [19].

In a simple energy meter, a stage divider is utilized to get the worth of current and voltage and the current transformer straightforwardly joins to stack.



Fig.1. Types of Energy meters

### B. Raspberry pi

The raspberry pi is little in mass and it's anything but a modest PC which is dispatch by the raspberry pi establishment with the assistance of Broadcom and the University of Cambridge research facility for the proliferate of PC preparing in school. Raspberry pi doesn't just assistance us in the examination yet additionally helps in various undertakings [20-22]. The raspberry module likewise called a microcomputer and this microcomputer remains on the Broadcom BCM2835 SoC unit. SoC implies the framework on the chip where all design of the microchip is incorporated. So there is RAM (random access memory), ROM (read-just memory), CPU(central handling unit), and furthermore (analog to computerized) and (digital to simple) converter likewise sequential interfaces What is unmistakable from SoC from the microcontroller is that SoC gadgets are straightforwardly associated with the CPU so enormous computational capacity which assembles it practical to run in an operational way [23]. The Broadcom BCM2835 have an ARM1176JZFS processor, 512 MB RAM, and GPU (designs preparing unit). raspberry pi doesn't have any strong state drive just an SD card is utilized for introducing the working framework on it and this SD card additionally assists with putting away all information The raspberry pi working framework is open-source LINUX (Raspbian) LINUX working framework furnishes correspondence with outer gadget Microsoft window isn't introduced on it.

In any case, we can introduce numerous other Linux forms on it and it appears to be like a window [24]. Raspberry pi used to send electronic mail or surf the web. Raspberry pi just required a 5V 1A force supply to work and this force supply gives by a miniature USB port. The mystery of the less force is required is that ARM-base is utilized. We can't see the warmth sink on this gadget since it

creates exceptionally less warmth in any event, during complex activity is performed. On the PC and work area generally, two working frameworks are run, application Microsoft window working framework however both working frameworks are shut source. In the nearby source working framework, we can't change the source code as per our prerequisite however in the open-source Linux working structure work; we can make changes as indicated by our craving. Nothing is hiding in open source. There are a few adaptations of Linux including fedora remix, curve Linux and Debi an.



Fig.2. Raspberry Pi model

### III. ALGORITHM USED

Above figure shows the algorithm used. In this there are two sections software and hardware.

#### A. SOFTWARE

Software is kind of programs used to operate associated devices. Software consists of warily organized commands and code written by programmers in any of a range of special computer language.

##### i) Install OS in SD card

Initially, we need to download the working framework which is suggested, and afterward remove the downloaded record. After this download programming wins 32diskimager and embeds SD card into PC. Then, at that point open win 32diskimager programming and select the separated select infer where to remove record need to compose.

##### ii) Configure WIFI Module

Ensure our Wi-Fi connector is connected to the Raspberry Pi. Before the Wi-Fi connector can be arranged it needs to watch that the right drivers are introduced. With the assistance of the SSH association set up, wifi USB dongle gives raspberry pi distant work area application. This furnishes a

significant job on the grounds that with this distant work area application we ready to associate raspberry pi over wherever in the world.

iii) *Coding section*: it is divided into two sections.

- 1) Code: here in this we can write code in python language according to the request and save it with extension.py.
- 2) Run Code: here to run code first open LX terminal which is placed on raspberry pi desktop. now enter the command to run the program.

i) *Show result on website*: Now login your website page by user id and password. After login meter status.

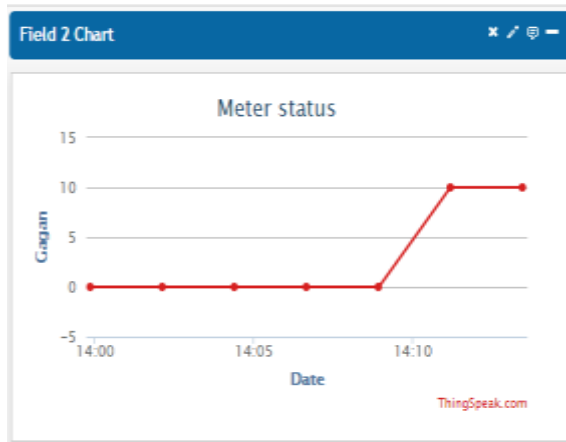


Fig 3: Status of energy meter

#### IV. CONCLUSION AND FUTURESCOPE

The arranged framework has referenced the execution of IoT. It is reasoned that by utilizing IoT innovation the public authority individual can track down the deceptive client, which can make the task of the specialists unfeasible to take the power. This examination work has been carried out to discover unscrupulous clients. To carry out our target, get equipment raspberry pi and introduce the working framework. The energy meters speak with raspberry pi through GPIO pins. GPIO pins bring the compelling in sequence from the energy meter and it sends powerful information to the raspberry pi, then, at that point associates the wifi module with raspberry pi. After this, associate raspberry pi with the web. At the backend, where government individuals see the situation with the energy meter after effective login with username and secret key, and the situation with the energy meter is displayed as diagrams. The whole execution is being occurred in PYTHON environmental factors. From the

outcomes, it has been reasoned that assuming there is any deceptive client, an administration individual can track down that unscrupulous client.

In additional execution, keen meter consequently slices power when anybody attempted to burglary and it likewise screens the power utilization through cell phone and shrewd meter that sends status if any deficiency happened in the transmission line. Besides, it makes bill by our self and furthermore pays it and anybody can check the online status of the energy meter just as the utilization of energy.

#### REFERENCES

- [1] Hari Om Choumal, Hitesh Bhagnani, Deepansu Soni, Dr. Manish Mukhija, "Smart Robotic Car With GPS & GSM", International Journal of Engineering Trends and Applications (IJETA) – Volume 8 Issue 4, pag-26-30, Jul-Aug 2021.
- [2] Ravi Khandelwal, Manish Kumar Mukhija, Satish Kumar Alaria, "Numerical Simulation and Performance Assessment of Improved Particle Swarm Optimization Based Request Scheduling in Edge Computing for IOT Applications", New Arch-International Journal Of Contemporary Architecture, vol-8, issue-2, pp. 155-169, 2021.
- [3] Dietmar P.F. Moller, Hamid Vakilzadian, "Ubiquitous Networks: Power Line Communication and Internet of Things in Smart Home Environments", IEEE, 2014.
- [4] Monika Mehra, Manish Kumar, Anjali Mourya, Charu Sharma, "MERN stack Web Development", Journal Annals of R.S.C.B., ISSN: 1583-6258, pp. 11756-11761, Vol. 25, Issue 6, 2021.
- [5] Shachi Sharma, Krishna Kumar Sharma, Himanshu Arora, "A Natural Human-Machine Interaction via an Efficient Speech Recognition System", International Journal of Applied Information System (IJ AIS), vol-4, issue-9, pp- 2249-0868, 2012.
- [6] Shutao Zhao, Baoshu Li, Jinsha Yuan, Guiyan Cui, "Research on Remote Meter Automatic Reading Based on Computer Vision", IEEE/PES Transmission and Distribution Conference, 2005.
- [7] Zaid Ahmed, Akash Rawat and Pankaj Kumari, "An Anaylsis of Iot Based Smart Cities", International Journal of Engineering Trends and Applications (IJETA) – Volume

8 Issue 4, page-30-35, Jul-Aug 2021.

- [8] G. K. Soni, A. Rawat, S. Jain and S. K. Sharma, "A Pixel-Based Digital Medical Images Protection Using Genetic Algorithm with LSB Watermark Technique", In Smart Systems and IoT: Innovations in Computing: Springer. pp. 483-492, 2020.
- [9] Manish Kumar, Dr. Sunil Kumar, Dr. Harish Nagar, "Enhanced Text and Image Security Using Combination of DCT Steganography, XOR Embedding and Arnold Transform", Design Engineering, issue-3, page no- 732 – 739, 2021.
- [10] Swati Bhargava, Manish Mukhija, "Hide Image And Text Using Lsb, Dwt And Rsa Based On Image Steganography", ICTACT Journal On Image And Video Processing, Volume: 09, Issue: 03, Pp-1940-1946, February 2019.
- [11] Soni G.K., Arora H., Jain B, "A Novel Image Encryption Technique Using Arnold Transform and Asymmetric RSA Algorithm", Springer International Conference on Artificial Intelligence: Advances and Applications 2019. Algorithms for Intelligent Systems, 2020.
- [12] Karan Gandhi and Hari Om Bansal, "Smart Metering in Electric Power Distribution System", IEEE International Conference on Control, Automation, Robotics and embedded system (ICARE), 2013.
- [13] Gaurav Kumar Soni, Vidhata Poddar, Yogita Sahu and Pratima Suryawanshi, "Hand Gesture Recognition Based Wheel Chair Direction Control Using AVR Microcontroller", International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, no. 3, pp. 344-348, 2016.
- [14] M. Anas, N. Javaid, A. Mahmood, S. M. Raza, U. Qasim, Z. A. Khan, "Minimizing Electricity Theft using Smart Meters in AMI", IEEE Seventh International Conference on P2P, Parallel, Grid, Cloud and Internet Computing, pp.176-182, 2012.
- [15] Bedi, Guneet, Ganesh Kumar Venayagamoorthy, Rajendra Singh, Richard R. Brooks, and Kuang-Ching Wang. "Review of Internet of Things (IoT) in electric power and energy systems." IEEE Internet of Things Journal 5, no. 2, pp. 847-870, 2018.
- [16] E. Upton, G. Halfacree, "Meet the Raspberry Pi," Wiley, 2012.
- [17] Sannidhan, M. S., Jason Elroy Martis, and Abhir Bhandary. "A cost-effective approach for detecting electricity theft using raspberry pi board." In 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC), pp. 132-138. IEEE, 2017.
- [18] Provincial Energy Authority of Thailand Department of Power Economics, Internal Annual Report, pp. 20 – 54, 2020.
- [19] Rahul Gupta, Manish Mukhija, "A heuristic approach for efficient detection of intrusion", International Journal for Research & development in technology, Vol.12, Issue 2, pp. 86-91, August 2019.
- [20] Gaurav Kumar Soni, Sonam Gour, Mr. Kshitiz Agarwal, Aakash Sharma, Chandraveer Singh Shekhawat, Braj kishore sharma, "IOT Based Smart Agriculture Monitoring System", Design Engineering, Issue-6, pp. 2243- 2253, 2021.
- [21] Sakhnini, Jacob, Hadis Karimipour, Ali Dehghantanha, Reza M. Parizi, and Gautam Srivastava. "Security aspects of Internet of Things aided smart grids: A bibliometric survey." Internet of things (2019): 100111.
- [22] Manish Mukhija, "A Resourceful Technique for virtual Machine Migration in Fog Computing", International Journal of Innovative Science and Research Technology, vol-6, issue-6, pp. 167-170, 2016.
- [23] Abhishek Singhal, Manish Mukhija, "An Advance Subspace Method for Implementing Palm Print Recognition", International Journal of Emerging Technology & Advanced Engineering (IJETA), Vol.6, Issue 6, pp.07-11, ISSN: 2250-2459 (Online), June, 2016.
- [24] Ibrahem, Mohamed I., Mahmoud Nabil, Mostafa M. Fouda, Mohamed MEA Mahmoud, Waleed Alasmay, and Fawaz Alsolami. "Efficient privacy-preserving electricity theft detection with dynamic billing and load monitoring for AMI networks." IEEE Internet of Things Journal 8, no. 2, pp. 1243-1258, 2020.