|| Volume 6 || Issue 6 || June 2021 || ISSN (Online) 2456-0774
INTERNATIONAL JOURNAL OF ADVANCE SCIENTIFIC RESEARCH
AND ENGINEERING TRENDS

IOT BASED SMART ELECTRICITY METER

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Abstract: As the world's energy consumption rises, it's more important than ever to take steps to prevent energy waste by installing adequate metering infrastructure in buildings. In smart grid technology, a smart metre may be used to track consumers' power use. Appropriate energy demand management is necessary for distributing available resources. Various approaches for energy demand management have been used in recent years to accurately determine the energy requirements that will be required in the future. A large system has the ability to carry out energy conservation as well as new energy-related services, as long as a competent with the end user is carried out.

The utility's monitoring system specifies the interface of devices with substantial benefits, whereas contact with the home commonly proposes specific structures for a buyer-oriented smart metre network deployment. In addition, this research focuses on estimating vitality usage. Energy is measured in units in this work. An IoT-based platform is being developed for real-time remote monitoring of the metering infrastructure.

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I INTRODUCTION

A smart metre is a mechanical device that monitors a building's power use. The energy supplier received metre readings from these automated metre reading equipment. Smart metres provide customers with near-real-time information on how much energy they are consuming, allowing them to make changes to minimise their energy use and, as a result, their costs.

In developing countries, urbanisation leads to a growth in residential and commercial loads at a faster pace, resulting in a demand-supply gap in many countries. According to the author, global energy consumption would quadruple by 2030. Exponentially increasing energy consumption will have severe consequences for the environment. Naturally, the focus is not on producing more electricity through conventional and alternative resources, and demand may be controlled in order to improve management.When comparing direct real-time energy consumption feedback to indirect feedback, which is equivalent to month-to-month bills, the author claimed that direct real-time energy consumption feedback reduces the building's energy usage. Smart metres have now been deployed in the majority of wealthy countries.

In any event, monitoring energy usage in the home is insufficient to correctly realise the consumer energy usage design. As a result, a low-cost interactive energy management system has been presented, which allows users to learn about their electric power usage patterns and change their behaviour to reduce their energy use. Furthermore, such a method may be linked to generation estimation and monitoring in order to further optimise building-level consumption. Smart metres are the way of the future since they benefit both customers and manufacturers or suppliers. The major goal is to produce smart metres locally, increasing the amount of electronic devices that are created or developed locally. Smart metres will thus be able to counteract, if not all, most of the shortcomings of traditional metres, such as allowing for remote access and being user-friendly, as well as indicating whether the amount of electricity used is high or low, resulting in regulations and, as a result, energy savings. The heart of the design will generally be a microcontroller and a contactor, making it impossible to create an energy management system. An IoT-based real-time energy measuring and actuation framework is described in this paper, which may simply be connected with home monitoring systems. The need to monitor and manage the house remotely in an inexpensive manner spurred the creation of cloud-based home automation. The goal of this project is to provide a user-managed private cloud environment. This will prevent the user from feeling as though their privacy is being invaded, as opposed to when a third party is monitoring their home for them.

II EXISTING SYSTEM:

A simple electricity metre, also known as an electric metre, an electrical metre, or an energy metre, is a device that monitors the amount of electric energy consumed by a home, a company, or an electrically powered item, and is used to calculate the regular electric power usage.

III PROPOSED SYSTEM:

The data collecting layer, the pre-processing layer, the prediction layer, and the performance assessment layer are the four layers of our suggested technique for energy prediction. Sensors are utilised in the data acquisition layer to get voltage and current usage. The data will be sent to the Pre-processing layer, which will compute the real energy usage and send it to the cloud. The data will be read by the server, which will do real bill computations and predictions in order to display the metre readings on the user's web application.

IV LITERATURE SURVEY

Paper 1: Smart Meter Data Analytics for Optimal Customer Selection in Demand Response Programs. (MartinezPabon, (2017))

Method:

agglomerative hierarchical clustering

Nearest Neighbor

Decision tree

ANN

Random Forest

Paper 2: A Machine Learning Decision-Support System Improves the Internet of Things' Smart Meter Operations .(Joseph Siryani,(201 7))

Method:

Bayesian Network

Random Forest

Decision Tree

Paper 3: Forecasting of Smart Meter Time Series Based on Neural Networks.(Thierry Zufferey,(20 16))

Method:

SVM or more sophisticated ANNs like RNN Long ShortTerm Memory.

V SYSTEM DESIGN

To design energy meter for energy consumption prediction in residential buildings. The proposed method consists of four different layers, namely

- data acquisition
- preprocessing
- prediction
- performance evaluation.

To identified with machine learning based forecasting of customers electric power utilization from smart meter data.

VI SYSTEM REQUIREMENTS

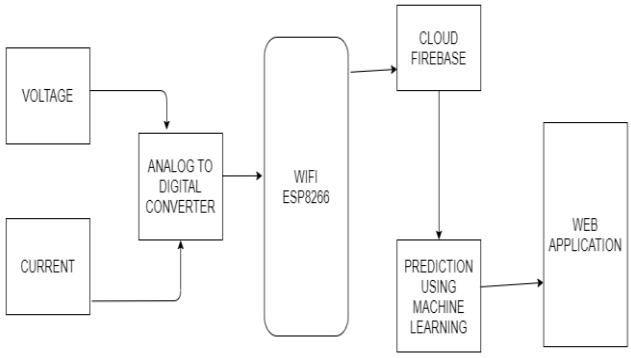
1. **Software Requirements**

- Operating System
- Python 3 IDE,Arduino IDE
- Sublime for html and css coding

2. **Hardware Requirements-**

- P Node MCU
- Wi-Fi Module (ESP8266)
- Analog To Digital Converter (ADC)
- Meter, Bulbs, Wires
- c/Laptop(4gb Ram/ above i3 processor)

VII BLOCK DIAGRAM



A smart metre is an electronic device that keeps track of data like electric energy usage, voltage levels, current, and power factor. Smart metres provide data to consumers for better understanding of usage patterns, as well as to energy suppliers for system monitoring and customer invoicing. Smart metres generally capture energy in close time and send out reports at regular intervals throughout the day.

It has a base node that can connect to multiple relays for controlling major appliances in the home and can read inputs from multiple sensors in multiple rooms of the house via RF. Because it is connected to the cloud, it can be accessed from anywhere in the world as long as internet is available in some form. Real-time monitoring system has been created in the Smart Grid Environment, and it provides a low-cost monitoring system that may be utilised for rapid and accurate smart grid monitoring. It entails real-time measurement of voltage and current waveforms, as well as the identification of power system disruptions while in operation. It is researched in that it provides a dedicated utility communication in a cellular network that guarantees good quality for low cost maintenance, dependability with lower operating costs, and good security. The billing of energy metres is an essential aspect of energy distribution [1]. The usage of manual systems is not a good idea. It is difficult for users to have human errors corrected at utility companies; customers must stop by the company offices, wait in line, and have the error corrected. The correctness of the bills has to be improved. An automatic reading metre system can be utilised to avoid human participation in the billing process [2—6]. Other issues with the system include the fact that it takes a large amount of labour, is time-consuming, and prone to errors. These problems can be solved by delivering services to consumers via SMS, as well as other built-in features like as tamper-proofing, defect detection, and so on. The energy metre uses a GSM module to track how much energy is used by the authority.

VIII ADVANTAGES

1.Far greater and more detailed feedback regarding energy use.

2.Ability to adjust habits in order to lower electricity bills.

3.Reduces the number of blackouts and system-wide electricity failures.

4.Monitors the electric system in real time.

5.Encourages more efficient use of power resources

IX RESULTS

As the world's energy consumption rises, it's more important than ever to take steps to prevent energy waste by installing adequate metering infrastructure in buildings. In smart grid technology, a smart metre may be used to track consumers' power use. The utility's monitoring system specifies the interface of devices with substantial benefits, whereas contact with the home commonly proposes specific structures for a buyer-oriented smart metre network deployment. In addition, this research focuses on estimating vitality usage. Energy is measured in units in this work. An IOT based platform is created for remote monitoring of the metering infrastructure in the real time

X CONCLUSION

A practical model of a "Smart electricity metre using IOT and ML" has been attempted. The system is simple to understand and dependable. The propagated model is used to calculate the energy consumption of the household, and even make the energy unit reading to be handy. Hence it reduces the wastage of energy and bring awareness among all. Even the manual intervention would be deducted. This smart electric metre is beneficial for efficient distribution and use of electric energy resources.

XI FUTURE WORK.

1. The System can be implemented in embedded processors such as raspberry PI and IOT also.
2. The System can be further extended using some powerful machine learning algorithm.
3. To reduce wastage of energy
4. Real time operation
5. Electricity consumption and cost can also be reduced
6. Highly accurate
7. Live billing display facility
8. Get bill details in one message

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