

DEVELOPMENT OF SMART ENERGY METER FOR BILLING SYSTEM USING ESP32

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Abstract:

Application-based communication and information exchange through the web is one of the foremost effective and progress strategies. The Internet encourages people to stay connected both inside and outside of the organisation. Physical gadgets and objects utilized for the association through the web are called the Internet of Things (IoT). These gadgets are coordinates with remote switches that allow communication by utilizing cloud administrations to store, recover and analyze the data. Headways in different innovations have been accomplished day-by-day utilizing IoT for online examination, utilization, and Sensors control, inserted frameworks, and mechanization. A mechanized domestic through IoT innovation is called Canny family, The Exertion of collecting, power utility meter perusing. IoT presents a proficient and co-successful to exchange the data of vitality customer wirelessly as well as gives to distinguish the utilization of power the most deliberate of this extension is to degree power utilization in domestic machines and create its charge naturally utilizing IoT. The vitality network must be actualized in a disseminated topology that can powerfully retain diverse vitality sources. IoT can be utilized for different applications of the keen lattice with dispersed vitality energy plant meter, vitality era and vitality utilization shrewd meter, vitality demand-side administration, and different zone of vitality generation. Moreover, this paper concentrate on the estimation of imperativeness utilization. In this work, energy is measured in units additionally item arrangement is given to form a bill for energy utilization and usage in a computer program. An IoT-based stage is made for inaccessible checking of the metering framework in real-time. The information visualization is additionally carried out on the webpage and the information bundle misfortune is examined within the inaccessible checking of the parameter. The major purpose of this project is to use IoT to automatically measure electricity use in home appliances and generate invoices on Android phones using an IoT App. The energy grid must be built in a dispersed topology suitable for dynamically integrating various energy sources. With distributed energy plant meter, energy generation and consumption smart meters, energy demand-side management, and different sectors of energy production, IoT may be used for a range of smart grid applications.

Keywords: IoT, Smart Energy Meter, ESP32, Google Firebase.

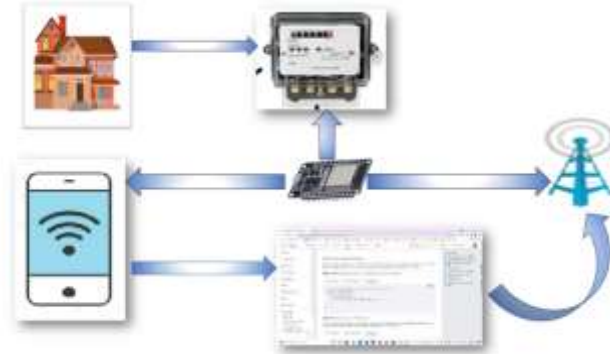
Introduction:

The energy utilization can be checked by utilizing an electric gadget called an energy meter. The expense and the ordinary use of Force utilization are educated to the client to defeat high bill utilization. The Energy meter shows the number of units devoured and moves the information to both the client, what's more, the electrical board so these aides in decreasing labor. The client can view their Force usage at any time and from any location. The IoT is utilized to Wind down on/off the family apparatuses utilizing transfer and ESP32 interfacing. The target of this framework is to screen the measure of power devoured. The wholesaler and the buyer will be benefitted by in the long run diminishing the complete force utilization. The solution to all of these problems is to track consumer load promptly to ensure accurate billing, track peak demand, and identify thresholds. These are all the characteristics that must be taken into account when designing an efficient energy billing system. The article offers especially a smart power meter that measures the properties of embedded systems, that is, the mixture of hardware and software is used to enforce the preferred functionality. This system enables the electricity department to read the meter readings monthly without a person visiting each house. [1] This may be carried out through the usage of ESP32 μ c that constantly displays and information the electricity meter analyzing in its permanent (non-volatile) reminiscence location. This gadget constantly information the analyzing and the stay meter analyzing can be displayed on the website to the customer on request. This device can also be used to turn off the house's power supply while it's not in use.

Proposed Work:

When various appliances consume energy, the smart meter continuously reads the value, The smart metres can show you how much energy you've used. We can observe that the meter's LED blinks repeatedly, counting the metre reading. Based on The blinking, the units are counted. [1] In this project, we're attempting to create a system using the ESP32 μ c because it has WiFi and Bluetooth modules. So, this controller can be easily access to the internet. With the help of WiFi, we managed able to connect this controller to Google Firebase. Google Firebase is a free data bus provided by Google that could be used to store data in our controller. The data contained in it can be displayed to the customer by a graphical representation of that data we have captured in App mobile with the help of the internet. IoT links anything from anywhere in the universe [2] (Sulthana, Naziya; N, Rashmi; Y, Prakayathi N; S, Bhavana; Kumar, 2020) By automating remote data collection, the IoT saves consumers time and money. We developed our own id-based electricity energy meters while smart energy meters have received a lot of claims all around the world in recent years.

Instead of current and voltage sensors, we used meter reading pulse data in this project. IoT cloud computing is being used to store IoT data and is used as part of communication. A cloud is a server computer providing computer resources that can be accessed by anyone at times. Cloud computing is a simple technique to transfer huge amounts of data, packages generated by the IoT through the internet.



The Android App, Firebase database, and Wi-Fi Node MCU are the three major elements used in this project. The serial data 1 or 0 has been sent to the firebase database by that of the android app. The firebase database interfaces with the Wi-Fi node MCU, which also acts on the data received from the firebase database. IoT is used by Google because, the Google Cloud IoT platform helps in predicting when equipment quality enhancement and Improves actual improvement by predicting downtime, detecting, and monitoring device status, state, and position. With the help of an IoT App, you could measure and monitor power usage from anywhere. The web page makes more use of Google Firebase Analysis to perform power consumption analysis using JavaScript. That means we'll utilize Google Firebase analytics to measure our mobile app and Google Analytics to record browser significantly with an increase in HTML. Model has been proposed. The Firebase cloud can be used to connect the power board and the smart metre over internet. It eliminates human input in collecting monthly reading and saves time and costs the process of collecting electricity utility smart energy meter to use a mobile app. Any meter that consumes pulse can compute and show on an Android-based phone app.

Conclusion

The smart energy monitoring system includes ESP32c, IoT, and an energy metre. The system reads the energy meter automatically and provides home automation through an app that has been developed, along with power control. The proposed system uses less fuel and eliminates the need for physical work. We will receive monthly energy consumption data instantly from a remote location and transfer it to the central office. This reduces the number of human works required to record energy meters, which were recorded by visiting each home individually. This concept could be expanded in the future to include prepaid power users, with the supply becoming turned on and off automatically once a customer reaches their limitation. This method can cut down on energy wastage and spread awareness among all consumers. This approach can reduce manual intervention in this situation of Covid-19 and social remoteness.

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