SMART ELECTRIC METER USING IOT

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Abstract:

The importance of electricity cannot be overstated. After China and the United States, India's electricity consumption accounted for 5.5 percent of the world's total in 2016. In India, the average individual consumes less than 0.7 KW of electricity per year. 9 percent of global energy consumption will come from India by 2035, according to a new report. A new industry called the Internet of Things (IoT) is bringing about a paradigm shift in electronics and information technology. It is the primary goal of this initiative to raise awareness about energy consumption and the optimal usage of household appliances for energy conservation. Our current power billing system suffers from a lack of automation. Using the Internet of Things (IoT), this system provides information on meter reading, power outages, and warning systems for triggering an alarm when energy use exceeds the stated limit. This notion is being implemented in order to lessen the need for human intervention in the collection of monthly readings and to limit the technical issues that arise in the process of invoicing. An Arduino microcontroller and a GSM (Global System for Mobile Communication) module are used in this project to expand the design and implementation of an energy monitoring system with pre-intimation of the power agenda. Using this technology, a user may learn how much power their electrical appliances use on a regular basis and take actions to save energy, which is a major benefit. The customer is informed of the bill amount, payment terms, and pre-scheduled power outages via the electrical board section. A notification is sent to the user if the consumer fails to pay the bill on time. If the client still hasn't paid the bill, an alert message will be delivered and the remote server's power will be immediately terminated. Using an existing smart energy meter, it displays the amount of energy used by the appliances since the meter was installed and the associated rupees. Using the Internet of Things (IoT), this suggested energy meter provides daily energy use, its associated rupees, billing information, and payment data for the user. Additional goals include a power schedule pre-warning and an alarm system for generating an alert when energy usage exceeds a certain threshold. As a result, the power supply may be cut off when its occupants are away from home. Using this method, not only does it prevent power outages, but it also improves energy conservation via the use of alarm systems and energy meter accuracy, which lowers the cost of billing errors and maintenance.

Introduction:

On November 30, 2017, India's utilities industry has a total installed capacity of 330.86 GW. 31.7 percent of the total installed capacity was derived from renewable sources. In 2016-2017, India's utilities produced a total of 1,236.39 TWh of gross electricity, bringing the country's overall energy output to 1,433.4 TWh. The average person used 1,122 kWh of power per year in 2016-2017. Despite being the third-largest power generator, India nevertheless consumes a significant amount. There was a 17.89 percent increase in agricultural energy use in 2015-16 compared to 2014. India's per capita power usage is lower than many other nations, despite the country's lower electricity tariffs. India has a surplus of power producing capability, but it lacks the necessary infrastructure to provide energy to all of its citizens. The government of India has initiated a program named "Power for All" in attempt to build the necessary infrastructure to provide enough energy to all of the country's low-income residents by March 2019. With this plan, all industries, residences and commercial organizations would have uninterrupted and continuous electricity supply. Increasing economic development is a cooperative effort of the Indian government and the states. Fossil fuels, primarily coal, account for nearly two-thirds of all power generated in India in 2016. However, the government is merely increasing its investment in renewable energy. After the completion of 50,025 MW of coal-fired power plants currently under construction and the installation of 275,000 MW of total installed renewable power capacity, according to India's 2016 draft national electricity plan, the country will have no need for any additional nonrenewable power plants until 2027.4.8%of the worldwide power market belongs to India, making it the world's third-largest electricity producer. Roughly 28.43% of the total electricity produced came from renewable sources, while about 71.57% came from non-renewable sources. Electricity is a need for a pleasant existence. It must be utilized and maintained appropriately. Currently, a human operator from the Electricity Board visits the residence to obtain the readings from the energy meter and manually generates the bill for the month in question.

Efforts are being made to lessen the need for human intervention in the collection of monthly readings and in the billing process. The customer is informed of the bill amount, payment terms, and pre-scheduled power outages via the electrical board section. The user gets notified by IoT if the client fails to pay the bill on time. If the client still hasn't paid the bill, an alert message will be delivered and the remote server's power will be immediately terminated. It notifies you in advance of a power outage and tracks your daily energy use. If the energy usage reaches a certain threshold, an alarm is triggered. In order to reduce energy waste, it may also cut off electricity through an automated message when people leave their homes. Improved billing may be achieved via higher accuracy. Energy meters are often located distant from the homes of apartment dwellers. Each unit has an LCD display that informs residents of power outages, daily energy use, payment information, and an alert for a critical limit.The Arduino Node MCU (esp8266) micro controller and a GSM module [1] are used to accomplish these capabilities. Wi-Fi module Esp8266 chip is used to transport data over the internet. In the event that the internet fails, a GSM is utilized as a backup.

Proposed Model:

The current model is labor-intensive and time-consuming. An effective and time-saving solution has been devised that removes the need for labor. Pre-intimation of shut-down details, alarm systems when energy usage exceeds the critical limit, and

the disconnection of power via a message if the residences are out of station to avoid wasted energy are all features of the proposed system.

System Description:

Using this technique, each energy meter has its own unique identifier. The customer's unique mobile Id number is connected to this unique ID number. The energy meter is continually monitored by this device. Data from each home's electricity use is sent through web server, and billing and power outage information is transmitted from the control station to each residential energy meter via the web server.

The Amount of Energy Used Each Day:

The date of installation is shown on the meter in the current energy meter. The arduino microcontroller calculates the amount of energy used each day and displays it on the LCD. In addition, IoT is used to provide it to the consumer's mobile device.

IoT-Based Billing and Payment:

Customers are notified through web server and GSM module each month of their energy use, which includes the amount of electricity they've used. The web server is also used to process the payment. This eliminates the need for manual data collection.

As a Prelude to Shutting Down:

Power outages in hospitals, industry, and the public sector may be disastrous. The power outage in hospitals is reported in advance so that patients and staff are informed of the situation and may take necessary safeguards. By combining IoT and the GSM module, EB sends the power outage information to the customer's unique ID and to the customer's mobile phone. After an alert, the LCD display also shows the information. When a new message is received, a sound is made to alert the homeowner.

Automated Warning Systems:

As a result of the way our power billing system is structured, multiple charges are collected when energy use exceeds a certain threshold. In order to raise public awareness, an alarm will sound when the consumer's energy use approaches a critical level. LCD display also shows the message.

By Sending a Message, Power Disconnection:

A message may be sent using the GSM module if residents forget to turn off their electricity while they are away from home. This ensures that no energy is wasted if any equipment is left on inadvertently.

Advantages:

- Thus, by comparing the daily consumptions, this approach helps to cut energy consumption.
- It decreases the amount of time and money it takes to obtain the monthly readings.
- With the aid of the shutdown information, you may take appropriate precautions and charge your vital equipment.
- Helps people understand how much energy they use and how much they will be charged for it.
- A message is sent to the inhabitants while they are out of town to turn off the electricity.
- In order for apartment dwellers who are distant from the energy meter to be aware of the messages shown on the LCD display, it is installed in the distribution board.

Conclusion:

The GSM module is used to assist the Arduino esp8266 micro controller achieve its goals. A new energy meter is being developed to address all of the current energy meter's shortcomings. As a result of the IoT and GSM module, all the information is delivered to the consumer's mobile phone and shown on the LCD. Using this method saves time and eliminates the need for human intervention.

Acknowledgement:

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