IoT based smart energy meter monitoring and controlling system

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ABSTRACT

In recent scenario, energy saving holds prime significance because of inequality between demand and power generation. Using Wi-Fi module entire system will be controlled. Internet of Thing (IoT) is internally related to computing tricks transferring the data under the network with no any help of a human to human or human to computer interrelation. The load to the consumer is to consume regularly with regular monthly payment of the bill. When the electricity bill is paid then the supply will continuously flow or provides.

Keywords: *IoT, Electrical Energy Monitoring, Electrical Energy Consumption*

1. INTRODUCTION

Energy conservation is the important needs in these days. Increasing the demand for energy consumption there energy monitoring will be taking important role hence it is considering as the research focusing on both electricity consumer and provider. This paper provides the ability to get the electricity bill, electricity providing days, and the previous bill also. Using the Internet of Things technology the transferring data is very easy to see for both the providers and consumers and even easy to make payment of electricity bill and to keep the continuation process and discontinuous process easily.

2. LITERATURE SURVEY

In 2010, using Multi-appliance power disaggregation technology implementers implemented the linear detection algorithm to determine which appliances are active in their power contributions. Problems are robust to errors in this database. [6]

In 2011, using cloud computing technology found the solution for efficiency calculation of individual equipment. [10]

In 2012, using three feedback system, monitored the energy in residential Real-Time. It is critical to the continuing engagement and use of the device to save energy. Residences to determine the feedback provided by real-time energy monitors results in lower residential consumption rates during the 30 days after installation. [8]

In 2013, using GREEN technology is the smallest Zigbee-compatible node in existence. This technology will possible in every place sensing of a different data types, from energy metering to environmental monitoring. [9]

1n 2014, GSM technology implemented automatic power will be reading. [11]

In 2016. Using wifi technology application can develop for Apple and BlackBerry 10 OS, thus providing multiple platform users support [2]

In 2017, using IOT technology An IoT device was created for measuring the voltage, current, power and energy of a three-phase four-line power line in a laboratory building [12]

3. METHODOLOGY

The smart meter will monitor by using Arduino nano microcontroller that is ATMEGA328. It maintains 8bit data size, operating range will be 3.3v to 5v. Wi-Fi module (ESP8266) works under six AT commands. First is "AT+CWMOD=3" to set the Wi-Fi module. Second is "AT+CIPMUX=1" to make enable multiple connections. The third is "AT+CIFSR" to get an IP address from the router. Fourth is "AT+CIPSERVER=1, 80" to set up the server. Last is "AT+CIPSENT=0, 1754" to set date length which could send. The last one is "AT+CWJAP" is to plus access point which requires SSID and password to join the access point.

Fig. 1: Block diagram for energy monitoring

Interfacing the Wi-Fi module, liquid crystal display, buzzer, and meter pulse by using C language on Arduino ID1.6.9. LCD is 2line 16 characters, here providing 5v to activate and then it displays the IP address which needs to connect the Wi-Fi module to send the data to processor. The crystal oscillator is used to convert the digital current signals to alternate current signal which requires maintaining the entire module of energy monitoring system. Load takes 5v power from the power transformer. Energy meter will read the pulse to calculate the amount of consumed power. Here meter pulse will be counted for calculating how much power is consumed by the consumer. One example to calculate the amount for consumed power is:

Fig. 2: Hardware prototype with module

Last month reading=10units
Live reading=20units
Present consumed power=(live reading-last month reading)
Present consumed power =20-10
Present consumed power =10units
Taking 5rs per unit power, then
Bill = (power consumed x rate per unit)
Bill = 10 x 5
      = 50Rs/-

3.1 STEPS FOR WORKING METHODOLOGY
1. Download and install Arduino nano (Atmega328).
2. Compile the code. It generates hex file.
3. Burn the hex file in Atmega328 using an external burner.
4. Make power supply ON. Wi-Fi module activates, IP address will show on LCD.
5. Search same IP address in a server with AT commands and port number. The power supply will be ON.
6. The server starts counting days with power consumption.
7. The calculation will be done.
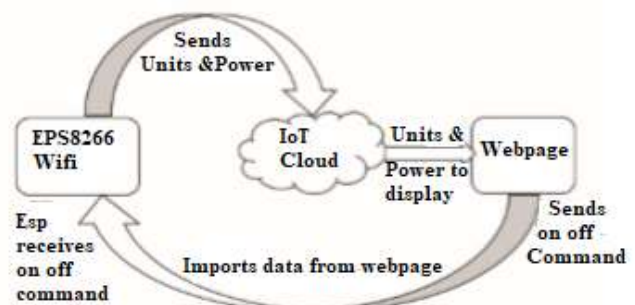

Fig. 3: Obtaining IP Address

Fig. 4: Implementation of IoT based energy monitoring system

8. If the bill is paid supply will be given continuously. If not then disconnect the line. Providing extra 5 days to pay the bill before disconnecting. After two months buzzer will be ON for alert purpose.

9. Stop and refresh the page.

Fig. 5: Energy meter monitoring setup.

4. RESULT

The IOT based smart energy meter monitoring is shown in the fig6. Considering as 5seconds equals to 1day and 1pulses equals 0.1unit power consumption. By taking 5Rs per unit power the bill for two months will be calculated. The same amount will be paid for two months if the user paid the bill the supply will be given continuously after two months. After two months if he doesn't pay bill buzzer will be ON for alert purpose. Until and unless paying bill the supply line will be disconnected. Using Wi-Fi technology is more advantageous for both user side and provider side. There is no need to go at consumer side to disconnect the supply line, using IoT it can be monitored by online only.

Fig. 6: Results for energy monitoring

5. CONCLUSION AND FUTURE SCOPE

Energy monitoring through the internet is easy. It gives the real power consumption as well as accurate reading. Also, it requires fewer labors and less time to monitor the energy. It can transmit the data to the utilities and also can receive information from utilities. After two months electricity bill will be paid otherwise supply line will be disconnected through the internet. After two months validity for alert purpose buzzer will be ON. It is easy to know the two months validity. By making this thing the energy will be monitored. The future scope will be on PC side one server software is required for automatic data collection. In this project, HTML knowledge is taken for demonstration purpose.

6. REFERENCES

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