

IOT Based Load Monitoring and Auditing System

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Abstract

With the advent of Internet and computational era, not only opportunity to send and receive data between humans, but also among the devices without human control over it. This is known as Internet of Things (IoT's). The proposed design is to implement a very low cost wireless sensor network and protocol for smart energy and load monitoring which is used to calculate the amount of consumption of power that electrical or electronic device consumes. This paper is useful to obtain meter reading when desired, so meter readers don't need to visit each customer for the consumed energy data collection and to distribute the bill slips. Microcontroller can be used to monitor and record the meter readings. In case of a customer defaulter, no need to send a person of utility to cut-off the customer connection. Utility can cut off and reconnect the customer connection by short message service (SMS). The system consists of a digital energy meter, ESP8266 WiFi module and web applications for management system.

Index Terms- Arduino, Current and Voltage Sensor, Electronic/Electrical Devices, ESP8266 Wifi Module.

1 INTRODUCTION

The internet of things is a network of ever growing physical objects (such as connected devices and smart devices), embedded with electronics, software, sensors and network connectivity that enables these objects to collect and exchange data. Utility billing is yet unavoidable in the World as for concern post-paid energy meter. In various countries utilities are using a conventional way of billing. A meter reader goes Home to home takes the meter reading and note down it, manually. These readings are brought to utility administration office. The criterion of utility billing is applied according to the utility service rules and regulations. The employee of the utility goes door to door again and gave the bill slips of the utility to the respective consumer.

The main objective of our proposed system is to implement and develop very low cost WiFi-based single phase digital energy meter with IoT's concepts. By using low cost ESP8266 Wi-Fi module, the system can provide data communication between digital energy meters and web server gateway, so that it can monitor for the energy management system and current sensor,



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load for the load management. By using this system, the billing of the power users can be based on actual consumption rather than estimate based from the previous consumption. This paper is organized as follows. In section 2, literature survey and related works will be described. In section 3, the explanation of the whole system architecture will be showed. In section 4, the system implementation of the proposed system examined. The last part is the conclusion.

2 LITERATURE SURVEY

“Implementation of Wi-Fi based Single Phase Smart Meter for Internet of Things”, this paper provides details about data communication between digital energy meters and web server gateway using low cost ESP8266 module. [1] “Automatic Energy Meter Reading using Smart Energy Meter”, this paper is useful to obtain meter reading when desired, so meter readers don't need to visit each customer for the consumed energy data collection and to distribute the bill slips. [2] “Coexistence of ZigBee and WLAN”, this paper is a wireless technology developed as an open global standard to address the low-cost, low-power wireless IoT networks. [3] “Non-intrusive load monitoring applied in energy efficiency of the smart manufacturing industry”, this paper analyzes the voltage and current data, so as to distinguish the working state of equipment for fault detection. Thus, helps the user to repair, renew, and eliminate the electric equipment for energy efficiency. [4]

3 SYSTEM ARCHITECTURE

The idea behind our proposed system is to develop a very low cost WiFi-based digital energy meter and integrate the IoT gateway for the industrial and commercial energy monitoring. For the energy management system, our proposed system will develop the web-based application software for reading meter parameters such as current, voltage, power in kW and kVar, and energy in kWh and kVar and also it contains relay to enable or disable the connection if the bills are not paid and also provides daily message service about the consumption to the customers.

Figure 1 shows the system architecture of the proposed IOT based load monitoring and auditing system. The system consists of two electronic/electrical devices that are connected to the load of 230V. The ESP6288 WiFi-based single phase meter with TCP/IP protocol for communication. The proposed system integrates the embedded digital energy meter, IoT gateway, and web-based system in the purpose of achieving an effective energy management and also current sensor to sense the amount of consumption and relay to enable or disable the connection.

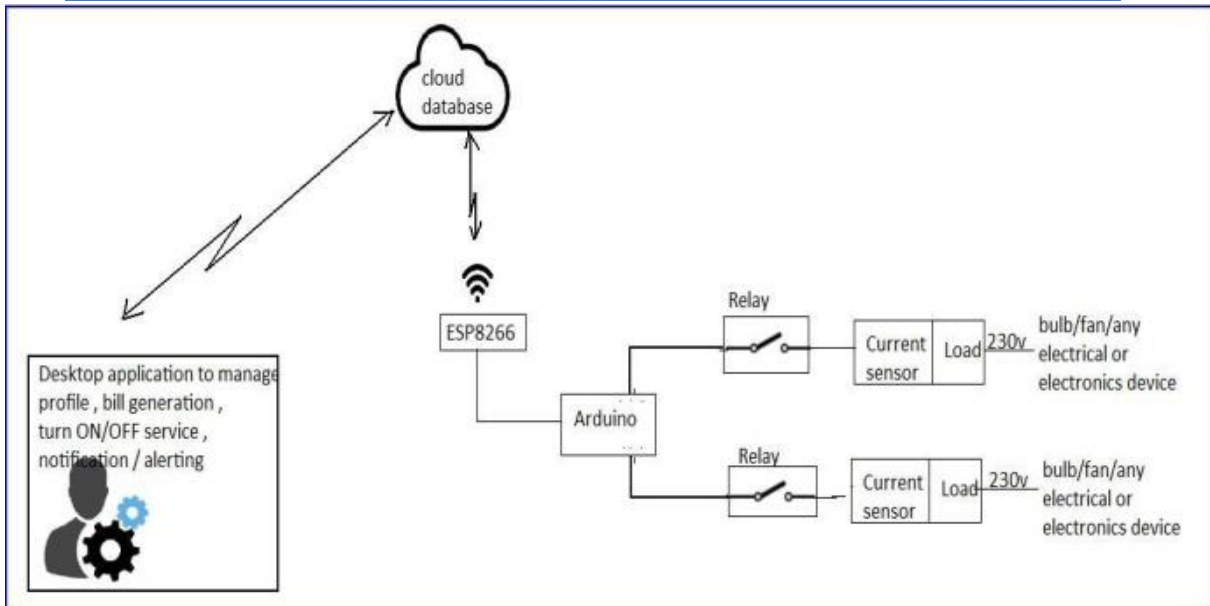


Figure 1: System architecture of the proposed IoT based load monitoring and auditing system

4 PROPOSED SYSTEM

- The proposed system is to implement and develop very low-cost Wi-Fi based single phase Digital energy meter with IoT's concepts.
- The system is capable of automatically reading the unit and Sending the data automatically for the power users through message service.
- The system can achieve very high reliability.
- The system also manages to identify which electrical/electronic devices consumes more Electricity.
- The system provides daily message service to the customer about the consumption.
- It also provides web-based application which make easier for payment with multiple option.

5 CONCLUSION

In this paper, we have proposed the WiFi-based energy meter for internet of things (IoT) with the low-cost implementation. The proposed system can overcome and improve the challenges of energy efficiency and manageability. It also describes the design and working of SmartEnergy Meter and represents how Smart Energy Meter can be used for Automatic Meter Reading. This paper also shows that how customer can manage the load by using Smart Energy Meter. It provides ease in taking the meter readings, accuracy, detection of faulty conditions, power factor calculation, less operation cost and removal of possible corruption related to

meter reading. In summary, we can achieve the very high reliability digital energy meter with very low cost, and it can be monitoring just like standard energy meter.

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