IoT smart energy meter

Meghana Karri

Electrical and Electronics Engineering

Swarnandhra college of engineering and technology

Narsapur, INDIA

[Meghanakarri005@gmail.com](mailto:Meghanakarri005@gmail.com)

ABSTRACT

The effort of collecting electricity utility meter reading. Internet of Things (IoT) present an efficient and co- effective to transfer the information of energy consumer wirelessly as well as it provides to detect the usage of the electricity the main intention of this project is measure electricity consumption in home appliances and generate it's bill automatically using IoT. The energy grid needs to be implemented in a distributed topology that can dynamically absorb different energy sources. IoT can be utilized for various applications of the smart grid with distributed energy plant meter, energy generation and energy consumption meter smart meter, energy demand side management and various area of energy production.

# INTRODUCTION

The energy consumption can be monitored by using an electric device called energy meter. The cost and the regular usage of Power consumption are informed to the user to overcome high bill usage. The Energy meter shows the amount of units consumed and transfers the data to both the customer and to the electrical board so this helps in reducing man-power. The user can check their Power usage from anywhere and at any time interval. The IoT is used to Turn on/off the household appliances using relay and Arduino interfacing. The objective of this system is to monitor the amount of electricity consumed. The distributer and the consumer both will be benefitted by eventually reducing the total Power consumption.

PROPOSED METHODOLOGY

The smart energy meter monitoring system is shown in figure 1. The block diagram conssts of Arduino, energy meter, WIFI module and IoT, Relay and transformer.

Fig.1 Smart energy meter

Energy meter used here is clamp energy meter .230V AC mains is the input given to the transformer and AC mains is converted to low voltage.

Energy meter measures the live current, voltage and power in terms of KW-h. Microcontroller reads these parameters and send it to the cloud. NodeMCU is a Wi-Fi device which has a microcontroller in it. This connects the local router through IoT. The status of these parameters can be obtained through mobile or laptop.

WIFI is used for data communication. WIFI is configured with Arduino.

The Data from the Energy meter is sent to Arduino and to WIFI module and it reaches the users mobile phone. In this system the user can switch on/off the mains or home appliances from their Android smart phone app. The WIFI module trans and receives the data from cloud and sends to Arduino and the Arduino controls the relay to switch on and off the circuit of the home [8-9].

* 1. Transformer

Selecting a suitable transformer is of great importance. The current rating and the secondary voltage of transformer is a key factor. The current rating of the Transformer depends on the current needed for the load to be driven. The input voltage to the 7805 IC should be at least 2 volt greater than the required 2 volt output; therefore it requires an input voltage at least close to 7V. So, a 6-0-6V transformer with current rating of 500mA is use.

Fig.2 Transformers

* 1. Relay

Relay is the three terminal high voltage (NC, C and NO) devices which connect to control. Relay also has three pins with low voltage (ground Vcc and signal) which connect to the Arduino. Relay is a 120-240 switches are connected inside to an electro magnet.

F. Final Hardware

Fig.3 Relay Modules

* 1. Energy Meter

Energy meter is the meter which is used for measuring the energy utilized by electric load. The energy is the total power consumed and utilized by the load at a particular interval of time.

Fig.6. project model

The PIR sensor used in this hardware setup senses the human motion and Arduino information. It sends signal to relay and relay will cut of the power. The system operated through software application which consists of API read, read will interact with the user. Thing Speak is an open source application and API to store and retrieve the data.

1. RESULTS AND DISCUSSIONS
   1. Wi-Fi Module

Fig.4 Energy Meter Module

Wi-Fi module delivers highly integrated WI-FI solution to meet users for continuous demand of efficient power usage.

Fig.6 Expected Results

Here the graph is plotted between time and power units. It shows the energy consumption for a user at a time. Power consumed by the user reaches 90% then alert message will sent to the user [12].

* 1. Internet of Things

Fig.5 Wi-Fi Module

1. CONCLUSIONS

Smart energy monitoring system includes Arduino, WI-FI, energy meter. The system automatically reads the energy meter

Internet of Things (IoT) links anything from anywhere in the universe. It communicates with almost everything around the world. The communication can be a control signal or identified data from this world. It is a common internet data communication and is communicated in different ways. The Internet of Things (IoT) collects the data of automated objects and helps the machine learn where it needs. The data is stored in cloud and sends to the energy meter to switch on/off objects.

and provides home automation through an app developed and power management done through this application. The proposed system consumes less energy and it will reduce manual work.

We can receive monthly energy consumption from a remote location directly to centralize office. In this way we reduce human effort needed to record the meter reading which are till now recorded by visiting the home individually.

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