

IMPLEMENTATION ON ELECTRIC ENERGY MONITORING SYSTEM USING IoT

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Abstract—The electricity usage is increasing day by day as observed in the statistics. User comes to know about the electricity consumption of his house after a month. Till then he is not aware about it. After receiving the electricity bill, user starts worrying. To reduce the wastage of energy and money as well as use the electricity efficiently, this device had been designed. The device notifies the user about his home electricity usages by sending alerts, suggestions, statistics, graphs, etc., which will tend to save energy. This device uses the concept of IoT (Internet of Things) i.e., collecting the devices to the Internet and transferring the data collected by them to store at server. The user can then read and decide his actions and act accordingly. The aim of this system is to help user to monitor the electricity consumed by its devices and if the device is malfunctioning, it will ultimately consume large amount of energy, and this can be detected and user would be informed about the malfunctioning of the device.

Keywords—IoT, Arduino UNO, Node MCU

INTRODUCTION

The internet of things (IoT) is the network of devices and home appliances that contain electronics, software, actuators and connectivity which allows these things to connect, interact and exchange data. Internet of things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The 'things' in IoT could be a person with a heart monitor or an automobile with built-in-sensor, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken.

In our system, Android is used for receiving the alerts from the device and also to display the energy consumed by each device. Android is a universal front end from which developers can work. Android has risen quickly as a software platform mostly because Google (the company behind it) chose to give it away to developers and device makers.

The number of devices that rely on Android as an operating system today are numerous. With such a large number of devices run on Android it is easy to see how Android acts as a front end for IoT. It is easy and cheap to develop devices for IoT making them even more affordable for consumers.

The big issue is that the devices consume a lot of energy when we forget to switch off them. Hence, there is a need to develop an alert system which can monitor such devices so that the wastage of electricity can be reduced. Our system not only provides monitoring of electric energy but also allows a remote access to user.

OBJECTIVE

The main objective of the system is to get rid of the electricity crisis that is being faced by the people all over the world. Many technologies have been developed to ensure efficient power usage to deal with such power crisis. Controlling home appliances using technology or Android phone or website gives users the ability to control the home appliances anywhere, anytime in their home and saves the time spent searching for the remote control unit of home automation systems since the user's phone is usually kept close at hand. The system uses IoT for monitoring electric energy.

In this system, we use Arduino UNO to monitor the electric energy that provides real time update of the energy consumption at the device level. The proposed system uses current sensor and LCD. The user interface of the device is to be developed using an Android app and the data is transferred from Node MCU to the mobile via Cloud. Data on energy consumption can be used to identify energy efficiency of the devices and thus the abnormal behavior of those devices can be easily monitored. The system provides energy monitoring at the device level remotely. Each device is monitored by providing a device id which acts as unique signature for each device.

IMPLEMENTATION

With the increase in demand for power, the world is dealing with power crisis. The solution for this is to develop new technologies for efficient power usage so that the relation between power generation and power usage will be maintained. In our system, we can monitor and control the devices for energy consumption. The system uses Arduino board and current sensor which provides electric energy monitoring and remote access to the device.

The current sensors allocated for each device consistently monitors the electricity consumption of the device, and generates a signal to that current. The generated signal could be analog voltage or current or even a digital output. The present current signal can be read via analog I/O port of Arduino. Arduino will take the input from the sensors and converts into equivalent power using serial port and then the data is displayed on 16 x 2 LCD and it is also being send to the cloud through a wifi module that is connected with Arduino, Node MCU.

Users have to login with the help of username and password. Android acts as an interface between the user and devices as the Android application provides the information about the energy consumption and remote access of all the devices. The data is sent to the app after successful login. A relay, an electric switch that is

connected to all the current sensors and all the devices.

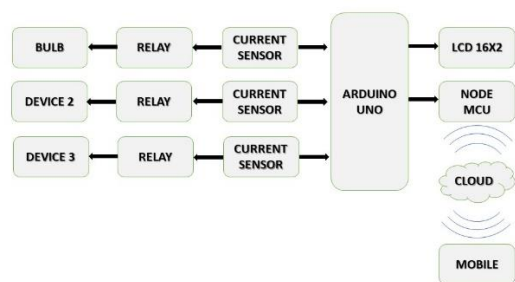


Fig 1. Block Diagram for energy monitoring system

Each of the devices are connected to Arduino board and sensors. The current sensors used are connected with the relay which act as electrically operated switch. The current sensors measure the energy consumed by each device and sends this information to the mobile via cloud from Node MCU. The system helps in monitoring and reducing the energy consumption of the devices in the house and from the energy consumed by the devices, we can find whether the device is working abnormal or not. The energy consumed by the devices are represented using a graph which shows the increase and decrease of current usage. The graph is plotted using power P in kW against the time in sec.

CONCLUSION

A system that uses android app as the interface has developed for the monitoring of energy consumption. It can also be used to control all the devices connected via this system remotely. The system provides the user with the details of energy consumed and alerts to the system via graphs. Thus, the user can view the complete details of energy consumptions and what must he do to reduce the usage of electricity of those devices which uses a lot of electric energy.

The advancement on technology and the need of electricity in every aspect of life has made the electrical power irreplaceable. Taking advantage of IOT monitoring system has developed and took various shapes and types. Consequently, the design of a low cost, low power and user- friendly system which helps in the conservation of energy can be of great importance. The proposed system design helps the users to track their energy consumption from LCD display and Android application. The users' data are saved and sent to the users' database through the mobile application, where the database is always updated by each current sensor's data.

REFERENCES

- [1] Maha Aboelmaged, Yasmeen Abdelghani, Mohamed A. Abd El Ghany (2017), "Wireless IoT based Metering System for Energy Efficient Smart Cites". 2017 29th International Conference on Microelectronics (ICM).
- [2] Luís M. L. Oliveira, João Reis, Joel J. P. C. Rodrigues, Amaro F. de Sousa (2015), "IOT based Solution for Home Power Energy Monitoring and Actuating".
- [3] Guneet Bedi, Ganesh Kumar Venayagamoorthy, Rajendra Singh (2016), "Internet of Things (IoT)

Sensors for Smart Home Electric Energy Usage Management".

- [4] Wesley Tyler Hartman, Alexander Hansen, Erik Vasquez, Samy El-Tawab, Karim Altaai (2018), "Energy Monitoring and Control Using Internet of Things (IoT) System".
- [5] David Ball, Nitin Naik and Paul Jenkins (2017), "Small Scale Mobile Energy Management System using Raspberry Pi and Python". 2017 IEEE International Symposium..0.3.65585on Signal Processing and Information Technology (ISSPIT).
- [6] Tai-Yeon Ku, Wan-Ki Park, Hoon Choi (2018), "Self-Learning Mechanism for Prediction of Energy Consumption and Generation". International Conference on Advanced Communications Technology(ICAICT), ISBN 979-11-88428-01-4 ICAICT2018 February 11 ~ 14, 2018.
- [7] Tai-Yeon Ku, Wan-Ki Park, Hoon Choi (2017), "IoT Energy Management Platform for MicroGrid". 2017 IEEE 7th International Conference on Power and Energy Systems.
- [8] Jasmeet Chhabra Punit Gupta (2016), "IoT based Smart Home Design using Power and Security Management". 2016 1st International Conference on Innovation and Challenges in Cyber Security (ICICCS 2016)
- [9] Siriwat Wasoontarajoen, Khwanchai Pawasan, Vithaya Chamnanphrai (2017), "Development of an IoT Device for Monitoring Electrical Energy Consumption". 2017 9th International Conference on Information Technology and Electrical Engineering (ICITEE), Phuket, Thailand.
- [10] Tui-Yi Yang, Chu-Sing Yang, Tien-Wen Sung (2015), "An Intelligent Energy Management Scheme With Monitoring and Scheduling Approach for Iot Applications in Smart Home". 2015 Third International Conference on Robot, Vision and Signal Processing.