Smart Energy Management Using Internet of Things

[1]R. Prashanth, [1]K.M. Viknes, [1]P. Yuvaraj, [2]Dr. C. Geetha
[1]IV Year CSE, [2]Associate Professor
R.M.K. Engineering College, Kavaraipettai, Gummidipoondi,Tamil Nadu,India

Abstract:*Variety of applications have been presented everywhere for our people needs. There is a problem in controlling and managing the energy for each appliance. This leads to additional power consumption problems and cost issues. To overcome this issue a smart energy management system has been proposed. When we talk about the Internet of Things (IoT[1]), there is a large number of distinct devices which are connected to different devices. These systems provide an open platform and so it is difficult to design for IoT[1] structure. To connect such sophisticated network on IoT[1] one need to have a centralized control either by smartphones, laptop, etc. The system includes a controller which connects through wireless to the centralized control which triggers the power regulation.*

Keywords: IoT[1], Arduino, NodeMCU[2], Automation, Relay Circuits.

I. Introduction:

The Internet of Things, IoT, impacts us in an enormous way and people are inventing new gadgets rapidly that enrich our lives. The price of microcontrollers keeps decreasing. The value of IoT is in both data and control. With Energy Management it is nice to have full control over the appliance and rely more than on switches and lot more on. The overview of IoT includes some details. Communication has a major evolution in last few decades i.e. Broadband Internet[1]. It is due to low cost of installation as more number of devices being equipped which thereby increasing tuff competition in Wi-Fi companies. On the other hand, technology related to smartphones is on peak due to its cost dropping. We can easily combine all these networks so that we can just configure it to on/off the devices. The devices include coffee makers, washing machine, lamps, wears, smartphones, etc., .We are also trying to enhance our understanding of opportunities and challenges in connecting devices to IoT. To get better knowledge about the potential impact, we should educate one-self with desirable features [1].

II. Related Work:

For smart energy management, it is significant to implement an automation system. Similar work is done by Lee et al. which is a research work held for BACnet low-level analysis. Another work is done by Zhang[1] et al. through which technology enhancement in energy line communication to connect entire network and other networking devices is achieved. Internet of Things can be described in one word a technology where human intervention is not involved on i.e. technological device can monitor the data and after analyzing that data device is capable of taking the decision in its own and that is what I have found and got motivation from different works and articles[1]. To develop background data and to arrange amenities for users by regulating wireless network actuators for home networking, they used wireless sensor network for the same[6]. Lots of research works have been done on various IoT projects.

## III. Proposed System Description:
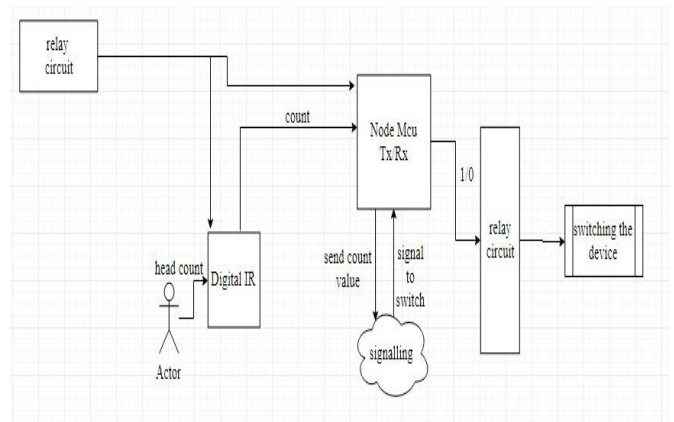
I. Fig 1:Proposed architecture

A. Summary of Proposed system

The objective of this project is to work on Energy automation and management system. It would enable us to control every device on our day-to-day activities through our smartphones and other devices. We have designed a proposed architecture given below in which components may slightly vary from the actual setup. We use IR sensors to calculate the head counts of the people and then we send it as a digital input to the NodeMCU[2] controller where the input signal is again sent to cloud where the control is done i.e. either ON/OFF state. The analysis is done via web pages which could be opened on any platforms. Communication is done through Wi-Fi shield. Relay circuit has been used for power the circuit. The Relay is called Driver-Circuit. NodeMCU[2] has an inbuilt Wi-Fi module which could be easy to send/receive signal. The whole system depends upon the threshold value and the communication setup for automating the devices[1].

IV. Technical Description:

A. Hardware Technology

The hardware here used is NodeMCU[2]. NodeMCU[2] is one of the Arduino board where Wi-Fi module is integrated into it. It combines the Arduino UNO board and esp8266[4] module. We used this board to send and receive the data signal at the low delay and using this we can reduce the circuit spacing. Our idea fully depends on the switching the devices based on the data count. This data count collected through the IR sensor and passed through Wi-Fi to the admin control. The output from the admin is sent to the controller to switch the devices.
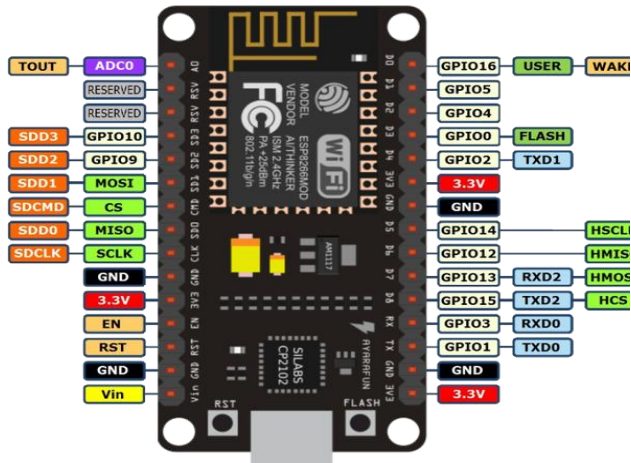
II. Fig 2:Node-MCU Arduino board

B. Software Technology:

An Arduino IDE is used to dump the coding section for NodeMCU[2]. We can also use several other programming ways to set the criteria for automation. The cloud section used here is Ubidots[3]. They have been used widely in more projects in real-time. A web page is used to enter into the cloud section. Using a site address or IP address we can communicate through the cloud section.

V. Conclusion:

When various appliances would be connected over the internet with the facility of being switched on/off through a common network system/server and also status about the device is being shared throughout the network then the new revolution would be in the world of internet. Short and basic controlling of appliances is modeled here based on Internet of Things and the lot more can an over that[5].

VI.Future Scope:

More advancement in this work could be achieved with the replacement of Raspberry Pi[7] boards in place of Wi-Fi shields. Other aspects is, we can interact with multiple sensors to switch the device accurately.

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