Power Management System Based on Predefined Schedule Using Control App

Amel Yousif Ali Mohammed[a], Vrajesh Dinesh Maheta[a]

In large organizations devices operating on electrical energy are manually switched and remain ON throughout the day. Most venues are seldom used or used according to predefined schedule. When the energy devices remain ON, even when the venue is not being used, a lot of energy is wasted. The proposed approach suggests development of automatic ON or OFF switching devices to avoid wasting energy for each venue depending on the time table. The proposed project intends to conserve energy consumption by optimizing scheduling of load to optimize utilization. Considering the importance given to energy conservation by the Sultanate of Oman, to save energy, a study on the present prevailing system has been carried out. The results of this study provide an insight to the energy consumed in a sample venue. The project approach has significant improvement to save energy. In order to overcome the energy wasted over manually switching, this project is designed to load devices according to using time by android application. The android application has been designed to gather all essential timetable details of each room. Which connected directly with microcontroller through Wi-Fi communication. According to received data, the signal which received by microcontroller may include ether high voltage or low voltage. The microcontroller detects the voltage and based on the data which received from android application, its activates the relay driver to switch particular relay.

Keywords: Android Application, Microcontroller and Wi-Fi communication.

I. Introduction

Theme of energy conservation is an important part in the plans and strategies of any country. In the Sultanate of Oman, demand for electric power has been fast rising due to rapid economic and population growth as we observe in recent times. Rationalization of energy use and work on energy conservation projects is itself a way to a reduction of the consumed energy. In most of the organizations where the normal switching is used, the electrical energy remains ON throughout the day, therefore there is a high possibility of energy being wasted. Energy conservation is directly linked with growth of communities. It is necessary for the economic development of the country. There are many functions totally dependent on energy, and they directly stop when the supply of energy stops. Therefore, it is our responsibility to create a system to save energy.

The aim of the power management system based on predefined schedule using control app is to developing energy devices scheduling control based on predefined time table.

II. Existing technology

1. Scheduled virtual machine shutdown/startup - Microsoft azure.

This project proposes to configure automated power schedule for shutting down and starting the VMs. The automation scheduled startup and shutdown of Azure virtual machines allows to implement multiple granular power schedules for virtual machines, by using simple tag metadata in the Azure. This tag is used to define shutdown schedules [1].

The time range is a two times of the day or absolute dates that define a period of time when VMs should be shut down. In this project, external devices are not controlled. The schedule is not flexible and does not handle variable time schedule during the day or different days of the week. It does not also have an option to control the schedule through control app. In addition, there is no possibility to run the shutdown and startup for several VMs at the same time.

2. Controlling appliances using Bluetooth from mobile phones.

This project proposes to control any home appliance from the PC or a mobile using Bluetooth. The application will connect to a device. The Bluetooth module in the device will receive and send the data received to an AVR microcontroller which controls a relay [2].

This project only control the devices which are in the room. It does not communicate with Wi-Fi. As this project uses Bluetooth, the range of controlling devices is limited.

3. Power management for shopping mall with bidirectional visitors counting.

In this paper project, refers to provide a method for automatic control of devices such as lights, fans, AC and other device in a shopping mall. By using a microcontroller which used to carry out the task of controlling the room lights as well as for counting the number of visitors in the room. When somebody

a)   Department of Electronics and communication Engineering, Middle East college, Muscat, Oman 11f7600@mec.edu.om
Correspondence: Dr.Anilloy Frank@mec.edu.om

enters into the room then the counter is incremented by one and the light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The light will switch OFF only after all the persons in the leave [3].

This project is based on power management by switching the devices ON and OFF. Therefore, it saves power consumption. It does not work for wireless. The sensors used also increase the cost of the project.

III. Design of the proposed system

A. System Block Diagram

The representation of all major functionality system components and interfaces between subsystems is shown in Figure1.
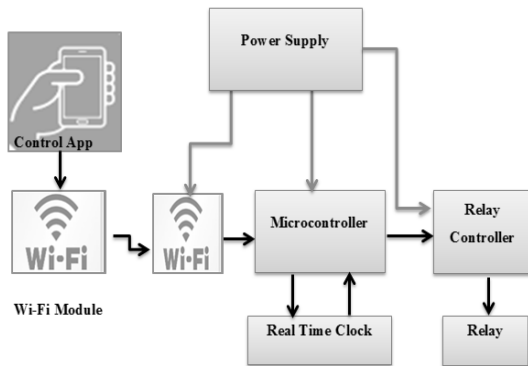

Figure1. System Block Diagram

The android application has been designed to gather all essential timetable details of each room. Which connected directly with microcontroller pic16f887 through Wi-Fi communication. Different relays which operate with 230V are connect with delay driver. The delay driver is connect with pic16f887 which operate with 5V, the purpose of relay driver is to provide isolation between high voltage and low voltage circuit. In addition microcontroller don't have enough current to drive the relays there for relay driver is used to derive relays properly.

When the android application is connected with accesses point of ESP8266 it allows the user to enter the room details and send those details to the microcontroller. According to received data, the signal which received by microcontroller may include ether high voltage or low voltage. The microcontroller detects the voltage and based on the data which received from android application, its activates the relay driver to switch particular relay.

B. System Flow Chart

The system flow chart is shown in Figure2, which represent the flow of data through an information processing systems, the operations performed within the system and the sequence in which they are performed to get the solution of a problem.
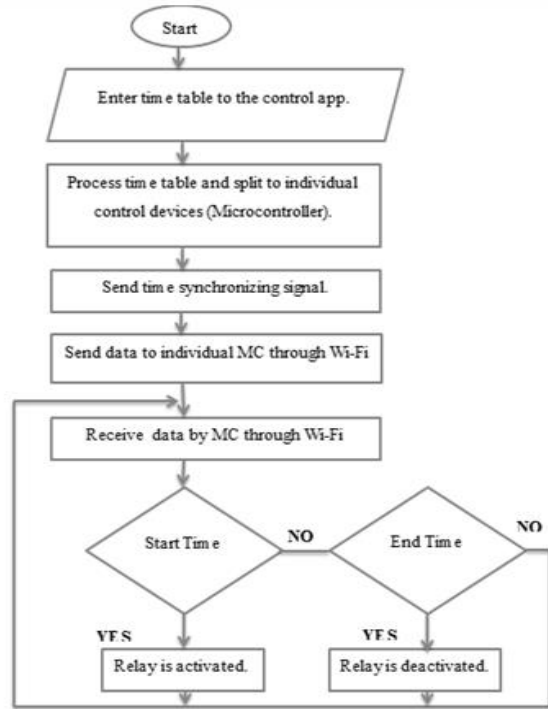

Figure2. System Flowchart

IV. RESULTS AND DISCUSSION
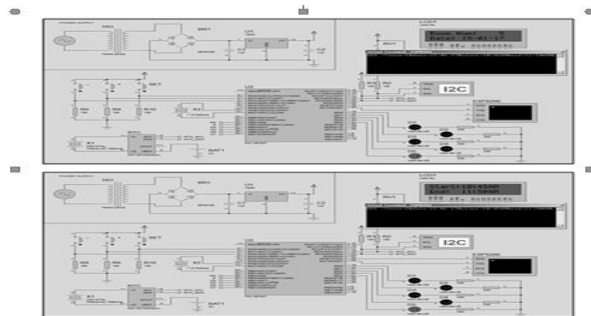
The system simulation is shown in Figure3&4.

Figure3. simulation of control unit section

Figure 4. Simulation of android unit section

The implementation of this system is shown in Figure5.

V. CONCLUSION

The project develop an automatic mechanism that configures device switching ON or OFF based on schedules. That by programming the control app and the control device to turn devices ON or OFF. Feature of this project it use Wi-Fi communication between microcontroller and app. The benefit of this project is reduce wastages of energy and cut the electrical consumption due to manually switching. In addition this project will improving organizations efficiency in the using of electric power.

VI. Future Scope

In future this project can include option of gradient which will also work for reducing energy consumption. Also the android application to be designed to read the x-mal file.

Acknowledgment

References

[1]   Stahl. Scheduled Virtual Machine Shutdown/Startup - Microsoft Azure. 2016. https://automys.com/library/asset/scheduled-virtual-machine-shutdown-startup-microsoft-azure (accessed March 15, 2016).

[2]   Bhonwal. Controlling Appliances using Bluetooth from Mobile Phones. 2012. http://createanddevelop.blogspot.in/ (accessed April 26, 2016).

[3]   Pulakala. Shopping Malls Security and Power Management System using IR1_2 (1) (1).doc. 2016. https://www.scribd.com/doc/122129443/SHOPPING-MALLS-SECURITY-AND-POWER-MANAGEMENT-SYSTEM-USING-IR1-2-1-1-doc (accessed May 15, 2016).