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Home Automation System Using Raspberry Pi And Wi-Fi Based.

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Abstract: *The main goal of this project is to make a system that actually controls the home appliance, lights as well as motors remotely with the help of Android smart phones. This project is based on both hardware and software implementation. The hardware part consists of Raspberry pi mother board, Relay board and Wi-Fi. And the software part consists of PHP/HTML programming. By using this kind of system user can utilize the electric power effectively and in the secured manner.*

Keywords: *Raspberry Pi, Relay Board, Switch Board, Wi-Fi Adapter, Home automation.*

I. INTRODUCTION

The main provision of the user is to control the home appliances remotely via android phone. The proposed system can actually perform the actions as per user request. This project is closely related to the "Internet of Things" through which a user can control the machinery this by sitting on one place. The main advantage of this proposed system is it utilizes the electricity effectively and in the secured manner. It also reduces the human efforts and helps in saving the electricity. The popularity of the home automation is increasing from last few years. As this system is very affordable and user friendly. This kind of system can be implemented everywhere. This system provides a user interface for the user to interact with the system and control the system from wherever he wishes. For Example: In large hotels, industries and organisations there may be several floors which consist of appliances or lights. There may be a situation where he/she turns the appliances on and mistakenly forget to put it off. By doing such kind of mistakes it leads to the wastage of electricity as well as increase in the human efforts to keep aside the hand work and climb through the various floors and switch off the appliances. To overcome this kind of problems automation systems can be implemented to keep control on the appliances and monitor the organisation by sitting on one place without any human effort.

II. Work Related to System

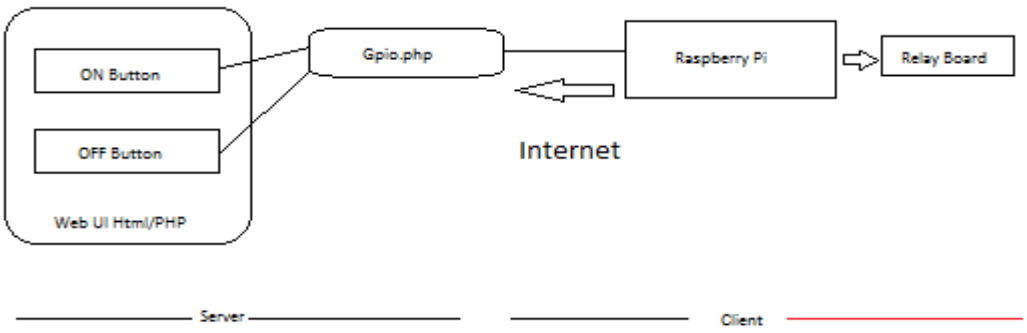

Fig.1 Raspberry Pi Home Automation System Block Diagram.

The client side consists of a Raspberry Pi with a relay board circuit connected to its GPIO pins. When the IP address is entered in the browser of smart phone its requests for the PHP page that is placed in the HTML directory of the apache web server. The PHP file serves as an UI to read the contents of the file. When the user clicks on the ON/OFF buttons it reads the string that is received from the user and based on which it switches ON/OFF the relay respectively via its GPIO pin.

Raspberry Pi Home Automation System:

Step 1: Preparing the HTML/PHP file:

Firstly the server side has to be set up. If you are having your own domain, you can use the file manager service to drop these files in to your server and can be used to control your IOT system from anywhere else around the world. The files to be dropped in the server are gpio.php. This project will need only a basic understanding of the languages i.e. Programming in HTML and PHP. The HTML code consists of a basic GUI with two buttons i.e. ON/OFF. And the PHP code is used to interact with the general purpose I/O pins of the Raspberry Pi.

If you don't have any domain, you can simulate a domain in your local network or Wi-Fi using a service called Apache web server. Using Apache web server you can use your Raspberry Pi as a local web server. However, the IOT systems can be operated in the limited range within the Wi-Fi of your home network. Drop the gpio.php file in the /var/www/html directory of Apache web server.

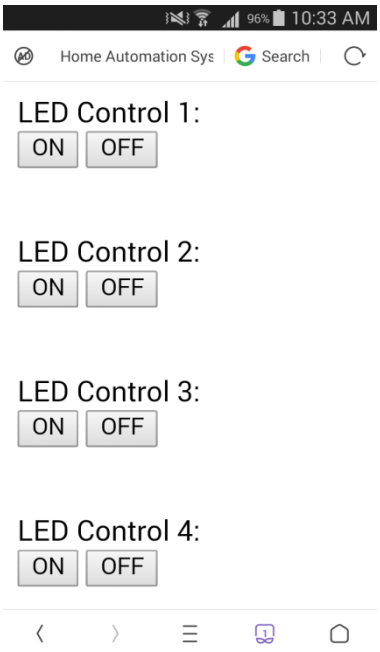

Fig. 2 User Interface Screenshot.

Step 2: Setting up the relay circuit for the Raspberry Pi Home Automation system:

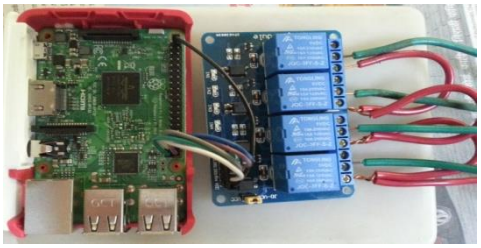

Fig. 3 Setting up the relay circuit for the Raspberry Pi.

A small relay circuit is made, to switch an appliance ON/OFF. The transistor triggers the relay when it receives a voltage of more than 2V at its base from the GPIO pins of Raspberry Pi. The circuit can be powered either using the 5V supply from the Raspberry pi or using an external battery.

Step 3: Setting up the Raspberry Pi:

Installing the OS in Raspberry Pi memory card. The default OS used for the Raspberry Pi is Rasbian. To use the GUI for pi, use the command "startlxde" in the terminal. To use the Raspberry Pi wirelessly connect a LAN cable from raspberry Ethernet port to the wireless router. To get connected to the raspberry pi use the ssh i.e. secure shell from your laptop. Install the putty software in your laptop. Open the putty Software and enter the required information related to the raspberry pi i.e. the Host name or IP address and click open. Enter the Pi's default user id and password in the terminal to use Raspberry pi.

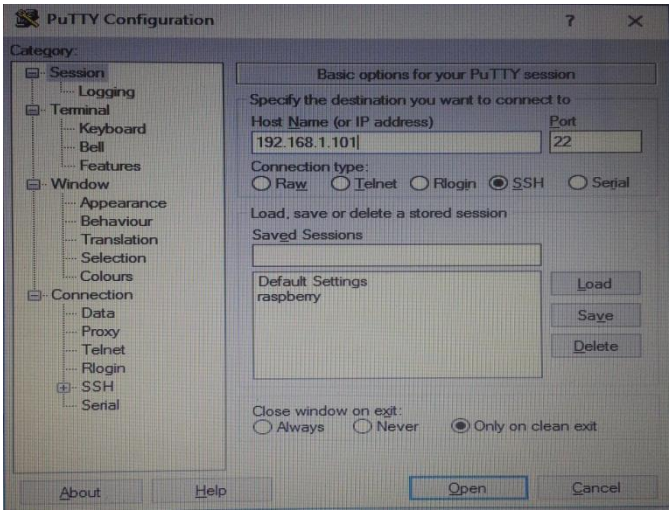

Fig. 4 Putty Configuration Screenshot.

III. Proposed System

The projected system is meant to avoid the wastage of electricity. The projected system supports more flexibility, comfort ability and security. The projected home automation system is functioning with the help of android phones. This system consists of three main components i.e. the Wi-Fi enabled android user device, a LAN router, and a Raspberry Pi mother board. The user provision is to regulate the home appliances through android device. This can improve the quality of system as there is no wired association. The requests from the user are transmitted through the LAN network. The Raspberry Pi mother board is connected with the house system and it will change the relay circuit as per user request. The relay circuit will manage the house appliances respectively. The main objective of the projected system is to utilize the electric power effectively, safely and in the secured manner.

IV. Block Diagram

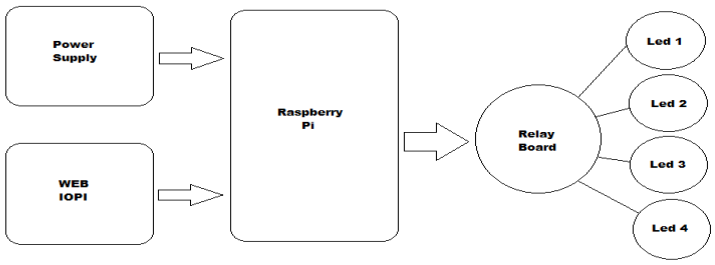

Fig.5 Block Diagram of Raspberry Pi and Wi-Fi based Home Automation System.

V. Methodology

The methodology of this project design are divided into two sections i.e. hardware and software implementations. The hardware implementation consists of the development of the main controller i.e. Raspberry Pi Mother Board, while the software implementation consists of the programming in PHP/HTML to provide the User Interface.

Hardware Requirement & Implementation:

The Relay Board is the most important part of the system in this project. It will be the interface between the user and the system. Raspberry pi is used as the brain of the main controller. It has 28 general purpose I/O pins and 64 bit processor. It is faster and more powerful. It is enabled with low power consumption.

1. Raspberry Pi 3 Model B with memory card preloaded with an OS.
2. 5V relay board.
3. Switch board.
4. WIFI Dongle: Jio Router.
5. 4 Bulbs.
6. Battery(Optional)
7. Fuse

Software Requirement & Implementation:

The software part consists of using Apache web server and OS Rasbian. The graphical user interface is designed by using HTML tags.

Programming languages, Web server and OS.

1. PHP.
2. HTML.
3. Linux / Rasbian.
4. Apache Web Server.

VI. Conclusion

These kinds of home automation systems are required because human can make mistakes and forgot to switch off the appliances when there is no use and in this case, they are useful in order to utilize the power effectively and also in a secured manner.

REFERENCES

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