

Embedded Linux Computer based on Wi-Fi

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Abstract— The aim of this work is to develop a system which controls the appliances of home, office, industry, etc. from remote location. Now a day's hundreds of products available in market that allow us to control and monitor devices automatically with using raspberry pi model either by remote control or even by webpage. By considering their results we have designed a system which employs architecture of client and server. Also response of appliances can be monitored and controlled by client through different switching commands for the appliances. We access the device using the web page and the switches provide on the web page help us control the information. This system gives the liberty for control of appliances from remote locations connected through Wi-Fi. A novel embedded system has been designed, implemented on Raspberry Pi.

Key words: Raspberry Pi, Appliance Automation, Sensors, Relay, Wi-Fi, Webpage

I. INTRODUCTION

The arrival of internet reduced the communication boundary of whole world to that of a single village. After the "everybody in internet wave" now obviously follows the "everything in the internet wave". As the embedded Devices are provided with internet access, it is of no doubt that demand will rise due to the remote accessing capability of the devices. The paper includes complete design and implementation of embedded Linux computer with web server in Raspberry-Pi is presented. That can be used for appliances controlling and monitoring system. Here embedded systems and Internet technology are combined to form a new technology –the Embedded Internet Technology, which developed with the popularization of computer network technology in recent years.

The system should also provide a user friendly interface on the host side, so that the devices can be easily setup, monitored and controlled. Communication of Network is performed by the IEEE 802.11 g/b Wi-Fi standard. It is the most modern technology of embedded systems. Since ARM embedded web server based on Raspberry Pi has fast execution capability and Wi-Fi standard can provide internet access with reasonable speed, this system is suitable for enhancing security and remotely monitoring various appliances.

This system can be use in several places like home, offices, apartments, school, banks, hospital, labs or another sophisticated automated system, because it reduces the hazards of any unauthorized entry. One more reason to develop this system is to save time and man power along with maintaining security and convenience.

II. SYSTEM OVERVIEW

This system uses Raspberry Pi as the base. Appliances are connected to Raspberry Pi board through relays for controlling and monitoring. A web page is designed using Html language in android mobile as an APP. The raspberry

pi itself behaves as a computer. For implementation of this system we have used Python coding for the booting process of Raspberry Pi and also the main coding of relays is also done using it. Relays are used for switching and controlling of multiple appliances. To obtain the IP address of the raspberry pi board Putty configuration is used. You can access that using the web page using Android mobile through which if you put IP address of raspberry pi then you get live feed plus though which you can control the appliances. Wi-Fi is used for long distance communication and transfer the information of appliance to android mobile. Then using android APP this information will upload to web page so client or end user can access this from anywhere in the world. A system has its own IP address so, it provides high security.

III. BLOCK DIAGRAM

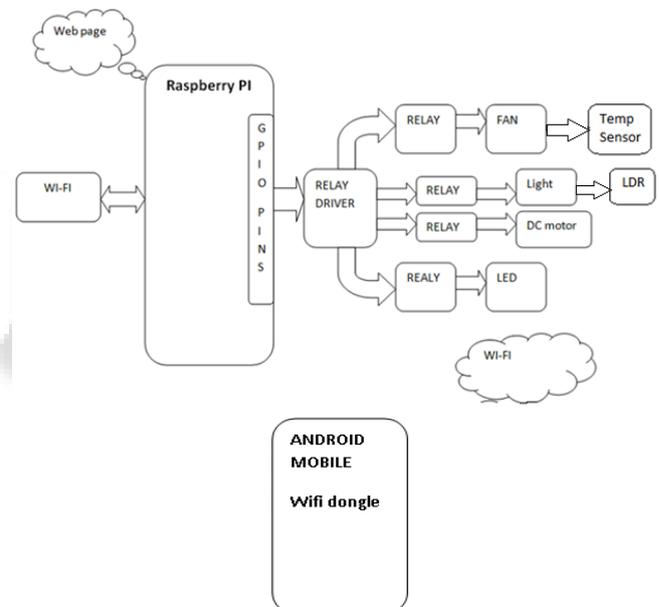


Fig. 1: Block Diagram of system

IV. SYSTEM DESIGN

According to our work, we are using Raspberry Pi and Wi-Fi as the main important components of our system. Raspberry Pi is the advance version of CORTEX A-7 processor. Using putty configuration it is interfaced on computer and commands are written using Python. We are using latest version of Raspberry Pi that is Model B PI 2 because it provides us with Ethernet and Wi-Fi interface. Relays are provided for the connection of the appliances and their control.

Thus, first of all we design web page using JAVA which includes the information of the appliances we are going to control. Now we use this web page design in that and android mobile we can handle the equipment from the remote place. Wi-Fi module is connect to raspberry pi via USB port, and relays to GPIO ports for appliances. We are

using android mobile for Wi-Fi so we can open the web page designed in raspberry pi from anywhere. Sensor can be used to check whether the operation is carried out according to the instructions given from the web page.

V. WEB SERVER

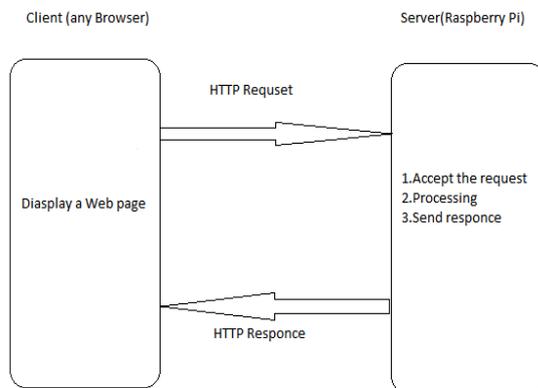


Fig. 2: Web server

A web server is nothing but a piece of software that enables a website to be viewed using HTTP (Hyper Text Transfer Protocol) it is the key protocol for the transfer of data on the web. Here in this paper, our android phone will act as a server. Client (i.e. any browser) can send request to the server (i.e. android phone) using IP address and port number (IP address: port number/Name of html page). Our website is not registered so we don't have domain name. That's why we need to send request to server using IP address & port number. For client-server communication both client (browser machine) and server (android phone) needs to be connected to the same network. Through HTML code we are designing web pages, using collection of web pages we create website and we are hosting that website on a server called as Web server.

VI. SYSTEM OUTLINE

A. Advantages

- Easy to implement.
- Security can increase.
- Low cost and expandable allowing a variety of devices to be controlled.
- Saves money and energy.
- All in one user friendly system.
- Can access from anywhere in the world.

B. Disadvantages

- Human error.
- Reliability.

C. Applications

- In industries.
- In schools/collages, hospitals, banks.
- In offices/home.

VII. CONCLUSION

In this paper, Design and Real Time Implementation of Embedded Linux computer based on Raspberry Pi Control is presented. This type of system are required for effective power utilization and also using raspberry-pi we are easily controlled electrical and electronics appliances through

webpage in secured manner. The operational cost of design and implementation of this system using Wi-Fi is low compared to Ethernet. In order to better understand the potential for using raspberry-pi2 model in various application areas, many of the different concepts are referred. We studied all the components that are to be used in development of this system.

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REFERENCES

- [1] Shaiju Paul, AshlinAntony, "Android based home automation using raspberry-pi"www.IJCAT.org, volume1, issue1, Feb 2014.
- [2] TarunKumar Patel, Utkarsh Wadekar, Aniket wabale' "Appliances control using Ethernet and raspberry-pi" www.ijarcsse.com volume5, issue 3, march2015(E&TC department) I.C.O.E. Pune.
- [3] Monika M Patel, "Home automation using raspberry-pi" www.ijiere.com, volume 2, issue 3, 2015.
- [4] About Raspberry Pi, <http://www.raspberrypi.org/about>
- [5] Early prototype of Raspberry Pi, <http://www.raspberrypi.org/raspberrypi-2006-edition/>
- [6] Raspberry Pi Hardware information, http://elinux.org/RPi_Hardware
- [7] Stevens, Tim, "The smart office", ISBN 0965708101(1994)