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Smart Screen Using Raspberry Pi

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ABSTRACT

This Project introduces a system which focuses on cost reduction and provides quality of services in the field of technology and teaching aids. The project uses Raspberry pi and its web interface to store and retrieve files which will be send via remote sources. The proposed system aims to convert a simple monitor screen or any television sets into a smart one by providing a high processing power using Raspberry pi. In return this will lead to drastic cost reduction of smart television sets as well as in teaching technique and helps achieving quality of services. The complete system is wireless which can be controlled remotely.

Keywords— Monitor, Raspberry pi, Remote Access Storage, Smart phone, Television.

I. INTRODUCTION

In this project we came across the problem scenario and proposed an efficient solution to that problem by using Raspberry pi and its web interface. Here we have mentioned technical details of Raspberry pi. Further, every step of the proposal is mentioned in detail including the OS installation and the Linux commands to be followed for configuration of the Raspberry pi.

In 21st century every day new technologies and concepts are being introduced in field of teaching and entertainment such as television sets. Schools and colleges use Portable Document Files (PDF) and PowerPoint slides to teach students, this includes laptops, projectors and portable devices such as pen drive. There are inefficiencies in this practice, mentioned below:

1. Laptop is required in each and every class, resulting in increased cost.
2. Portable device is mandatory [4].

As advanced technology is vastly developing the smart televisions are being introduced in market with high prices. These smart television sets are a complete package of various functionalities which is not affordable by everyone. With the upcoming smart TV's the past TV's are being outdated which are of no use today.

Thus, there arises a need to create a device which promises to reduce the overall cost as well as provides the same functionalities as smart televisions and laptop does.

To better understand the problem, consider a situation of a department in any institute has five labs and professor in each of this lab uses projector, which leads to a need of one laptop in each lab. Now, five labs need five laptops at a same time. The total amount estimated by the department for five laptops would approximate will cost rupees 2 lakh. Thus a university spending a huge amount of money which when compared to the intent behind it does not seem to be efficient. In turn the saved amount can be used for some research and any other beneficial work [4].

Now, consider another situation, where a person having a traditional television set which is outdated as new technologies has overcome the market. He needs to upgrade the same television to a latest version but he cannot due to certain limitations of the present system. So he is forced to buy a smart television set, the amount to be invested by him would approximately account to Indian Rupees 80,000 - 1 Lakh Rupees. This is a huge amount that he invests. If this amount is reduced it would help him to save a large amount of money, which could be further used by him for any other beneficial task.

The proposed system makes use of Raspberry pi as a web server which provides energy-efficient and cost-effective solution to the above stated problem. The Raspberry pi will host a website which will be used by teachers, students or by any person, where they will be able to upload their data and retrieve the same when needed and can also be able to view those files on monitor or projectors. With the help of this device teachers will not have to carry bulky laptops every time to the class they just

need to carry a portable device i.e. Raspberry pi and connect to a monitor or projector upload study material and start teaching, students are also able to download the uploaded study material .

The device can also be used by a person who cannot afford a smart television. The traditional television has only the USB and HDMI connectivity whereas the smart TV has a number of functionalities. It has an advanced operating system, various multimedia applications installed and can also be used for Internet browsing. It has comparatively high processing power than traditional television but by using our portable device i.e. Raspberry pi we can provide the needed processing power and functions to the traditional TV sets and make them capable of performing the tasks that the Smart TV can perform. The website is used to communicate with each other over wireless network.

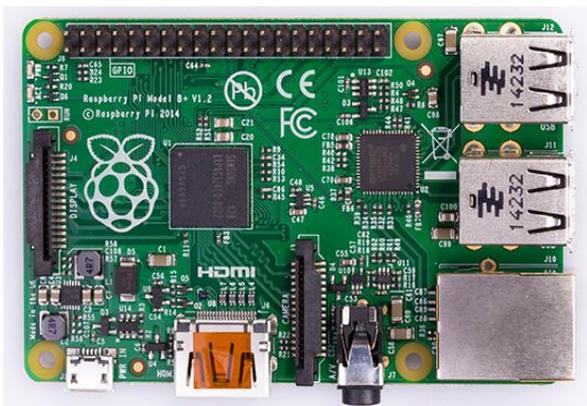## II.   DETAILS ABOUT (RASPBERRY PI)

Figure 1: Raspberry pi

Raspberry pi is a small board computer developed in the United Kingdom by Raspberry pi Foundation. It is a small PC which provides all the basic functionality like desktop PC. It is a small but efficient credit card size motherboard which has Broadcom processor (BCM2836), Videocore IV graphic processing unit (GPU) and 1 GB of RAM. It also consist HDMI port, through which it can be connected to any display device, like the monitor, TV's and projector. It has 4 USB ports, where one can connect his pen drive or USB mouse/Keyboard. It also has an audio jack for audio output, Ethernet port for internet access [6].

III.   LITERATURE REVIEW

Sanjana Prasad and others proposed a Smart surveillance monitoring system using Raspberry pi and PIR sensor for mobile devices.The key feature of this system is that the home security system captures

information and transmits it to a Smart phone using web application. When motion is detected, the cameras automatically starts recording and the Raspberry pi informs the owner through web application [3].

Jiwa Abdullah introduced a mobile controlled car security system that offers higher level of car security features. This is able to notify the car owner immediately when intrusion is detected. Any of the car feature can be controlled remotely via a mobile phone from anywhere at any time. It is based on GSM positioning system and has the potential to assist in stolen car recovery [2].

Dhaval Chheda and others proposed a system which aims to substitute laptops with Raspberry pi will. It will help achieving quality of service and consume small amount of power. The proposed system will be controlled remotely by mobile phone [4].

P. Bhaskar Rao and S.K. Uma proposed a project for home control and monitoring system using a microprocessor and microcontroller, with IP connectivity for accessing appliances and controlling devices remotely using Smart phone application. It does not require a dedicated server PC and offers communication protocol to monitor and control the home environment with switching functionality [1].

IV.   PROPOSED SYSTEM

The objective of the proposed system is to use Raspberry pi as a web server to store and retrieve files that have been sent from remote sources and view these files on the monitor or TV. Once Raspberry pi is configured, applications can be installed on it to open various files. The next step is to use remote control to open these stored files. Here, smart phone is used to control monitor of Raspberry pi, through various applications like VNC, which are readily available on Google play store.
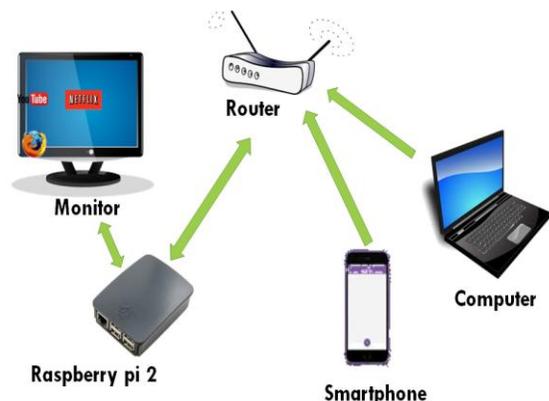

Figure 2: Hardware infrastructure

The basic Hardware infrastructure of proposed system is mentioned in above figure 2. In the figure 2, Raspberry pi is connected to the monitor with the help of

HDMI cable it is also connected to a home router through Wi-Fi, further configuration of Raspberry pi is described below.

The various user devices such as smart phones, laptops, etc are also connected to the same home router as shown in figure 2. All DHCP request is handled by a home router, it acts as a mediator between various users and a Raspberry pi web server. The Raspberry pi will acts as a web server which host a website, consisting of upload and download sections.

The website will be accessed be various users through their smart phones where they can upload and download the uploaded data. The users will also be able to open the uploaded file on a monitor, TV or projector through android application i.e. VNC which is readily available on Google play store.

The developed website will be used by various users i.e. students, teachers, etc. The utilities provided by the website are:

UPLOAD:

The website will have an upload section. To upload a file hear user have to mention the details of the file which is to be uploaded. Click on choose file button select a file and hit on upload file button.

DOWNLOAD:

The website will have a download section which contains a list of stored files with its description. To download a file here user have to click on the file name and file will be automatically downloaded.

V.   SYSTEM DESIGN

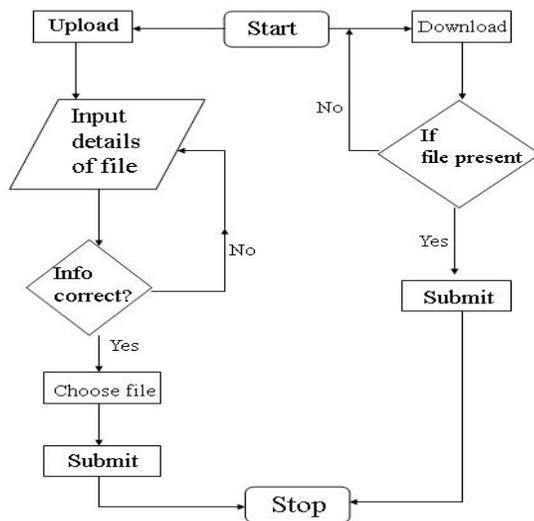This deals with the flow diagram of the upload and downloads section of website.

Figure 3: Upload and Download flowchart

VI.   CONFIGURATION OF RASPBERRY PI

To make Raspberry pi run it needs an operating system, which is the set of basic programs and utilities. Here we are using Raspbian OS based on Debian which is optimized for the hardware of Raspberry pi. The OS comes with 35,000 and more packages, pre–configured software which makes installation easy [3].

OS INSTALLATION:

Steps to install Raspbian OS are as follows [6]:

*   Download RaspbianOS.Zip (PIXEL) file from Raspberry pi official website
*   Download WINDISK 32 utility
*   Extract the zip file and run it
*   Run WINDISK 32 utility
*   Select the extracted file
*   Select drive letter of the SD card
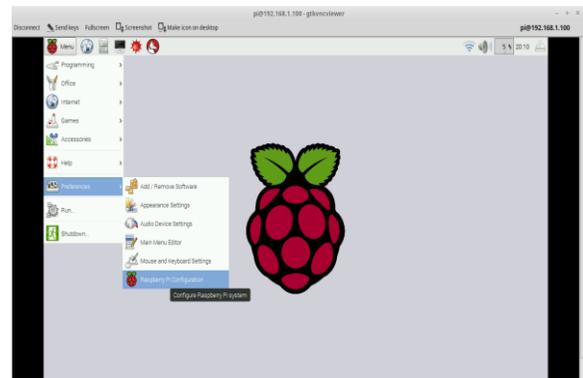*   Click on write and wait for process to complete
*   Eject the SD card

Figure 4: Installed Raspbion OS

SERVER INSTALLATION:

After installation of Raspbian OS. Open terminal and write the fallowing Linux command:

sudo apt-get install apache2

The above command will execute and packages of apache server will get installed on Raspbian OS. The apache is a server used to hot a website.

PHP5 INSTALLATION:

Open terminal in Raspberry pi and write following Linux command:

sudo apt-get install php5 libapache2-mod-php5

The above command will execute and packages of PHP5 will get installed on Raspbian OS. The PHP is a scripting language used with html to make a website. We have install PHP5 with apache in which website is hosted [5].

MYSQL INSTALLATION:

Open terminal in Raspberry pi and write following Linux command:

sudo apt-get install mysql-server php5-mysql

The above command will execute and packages of mysql will get installed on Raspbian OS. It will ask you to set a password for the same set the password and click ok. Mysql along with PHP5 is used to create database in which table is created to mention the record of uploaded files.

ENABLING (VNC) VIEWER:

VNC viewer is a inbuilt package of Raspbian OS it provide the services to access the Raspberry pi desktop remotely via Smartphone. We are enabling viewer to open the uploaded file on the monitor, TV or projector. To access remotely through smart phone we also need to download VNC.apk from Google play store.

Following are the steps to enable VNC viewer in Raspbian OS:

• Open terminal in Raspberry pi and write following Linux command:

sudo raspi-config

• Configuration window will pop-up, now click on interface option scroll down and select VNC and then click ok.

VNC is enabled on Raspberry pi, now to control the pi download vnc.apk on smart phone through Google play store enter the IP address of Raspberry pi, by doing so one can control monitor of Raspberry pi by smart phone remotely.

VII. CONCLUSION

Thus we have designed a device which is capable of doing all functionalities of a laptop and smart TV. The advantage of this system is that it can be accessed remotely by a smart phone. Because of this feature it helps to convert a simple TV into smarter one on which we can perform multiple tasks. The device can also be used as a laptop or it can be used for educational purpose to view presentation in any organisation or institute. The device replaces laptops and smart TV in cost efficient manner.

VIII. FUTURE SCOPE

• Video streaming can be done on Monitor which will replace cast screen in cost efficient manner.

• The Raspberry pi can be pre installed on Projectors, Smart TVs or Monitors.

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