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Raspberry Pi Based Intelligent Projector

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ABSTRACT: Projection technology plays vital role in school, colleges and conferences. Representing any thought visually makes more impressive than representing it orally. So use of projector is most important in our day to day life. In previous paper we implement the idea that is how to share the screen which is display on our laptop that screen we can see on projector as well as on our mobile. In this paper we further implement this idea and show the PDF, Word as well as Presentation files on the projector. Also we can remotely control it using mobile as well as from our laptop. Paper explains all the steps required for system creation. Further, it gives idea about the making of special remote control for the system.

KEYWORDS: Raspberry Pi, WIFI dongle, VNC, SD card, Project

I. INTRODUCTION

Nowadays different projectors are available. But they are costly to purchase also if we have old projector with us, then it is expensive to purchase another one. So this paper explains that how to make projector as an intelligent projector. In this paper we use raspberry pi and its interface connection to connect it with the projector. Also when we want to show presentation we have to connect our laptop to the projector. Projector and laptop has different inputs so there is problem arise. So in this paper the solution can be given. The Raspberry Pi can be used here to solve the problem of cables. Also it replace laptop so the cost is reduced. This paper gives idea to remotely operate the projector from mobile and laptop. To operate it remotely we use Virtual Network Computing System (VNC).

II. LITERATURE REVIEW

In [4] authors used the raspberry pi and its projection system .They can create system using Raspberry pi. In this system they can use NETIO application for controlling of the system. In [5] authors used Raspberry pi2 model can be used. The system makes the wired projector to wireless projector. The android application is created in this system. In [6] authors explain the process to access the computers with the help of android mobile phones. This process is based on VNC (virtual network computing) technique. In [7] author explains the use of Remote Desktop and Terminal Services interchangeably. In this paper, Remote Desktop Protocol (RDP) is used for remote desktop connections. In [8] author proposes a new architecture for remote control and access of android mobile devices, which allows sharing of displays between android mobile phone and computers. This should be done within Wi-Fi range irrespective of various platforms. In [9] authors explains about the Android based remote desktop client. It is a remote control system which allows you to view and interact with one computer (known as “server”) to another computer or cellular phones (Android OS) anywhere on the intranet. In [10] authors implemented a new design for remote control of Android mobile devices. They also explain the VNC protocol and working of that.

III. SYSTEM DESIGN

The proposed system can be divided in different parts. The system contains Raspberry pi2 Model B. It has 40 pins GPIO, Ethernet port,4 USB port, and full HDMI port. Also micro SD card slot is available. Projector is connected to

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raspberry pi to its HDMI output. WIFI dongle can be used for internet facility which is connected to USB port of Raspberry pi. The controlling of system can be done through PC or mobile.

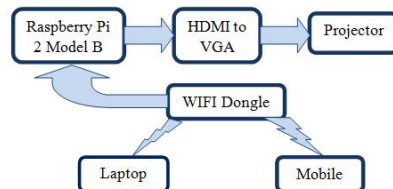


Fig. 1:-Block Diagram of the system

IV. WORKING OF THE SYSTEM

The working of the system can be explained in following steps:-

1. Connection of Raspberry pi to the HDMI:-

connecting the raspberry Pi to the projector there is HDMI port is available on Raspberry Pi. If the projector doesn't have HDMI input then by using HDMI to VGA converter we can connect projector with raspberry pi.

2. SD card Formation and Installation of OS on it:-

doesn't have memory .So we have to insert SD card in it. Before inserting SD card in RPI first we have to install OS on it. There are different OS are available on Raspberry Pi official website. In this system we installed Raspbian OS. The OS is available on its official website. This OS can be downloaded and then that can be installed on SD card using Win32diskimager. Then SD card will be inserted into Raspberry Pi.

3. Switch on Raspberry Pi and Create Network Connection:-

After inserting SD card into the Pi, 5V power supply can be given to Pi using adapter. Also for network connection use Ethernet cable or USB wifi dongle can be connected to one of the USB's of Raspberry pi. On Raspberry Pi window the WIFI icon can be available. Turn it on and connect to the network.

4. Installation of Software's required for the system:-

creating the system we require to install some software on it. Install Libra office on Raspberry Pi. For that enter instruction in terminal window '`sudo apt-get install libraoffice`'. Also to install python instruction is '`sudo apt-get install python`'. Install other software's like VLC player, Adobe reader by entering commands.

5. Connection of Mobile and laptop to the Raspberry Pi:-

the connection between mobile and laptop to the raspberry pi is the goal of our system. So VNC system can be used in our system.

5.1VNC:-Virtual Network Computing

Virtual Network Computing (VNC) is a graphical desktop sharing system. It uses Remote Frame Buffer Protocol (RFB) for controlling of another computer remotely.VNC transmits keyboard and mouse events from one computer to another, relaying the graphical screen updates back in other direction, over a network. In VNC, enhanced encoding technique can be used to improve system performance. Using this technique user can transfer the files between mobile devices, laptops and raspberry pi. User can execute services provided by the server. Remote VNC application can perform remote control of mobile devices with the help of thin client [12].

To perform this operation, remote VNC application must be installed on mobile. Also the VNC server can be installed on Raspberry Pi.

Following figure describes VNC architecture. The server and client operation can be performed in following manner:-

- 1) VNC server keeps the client requests in a separate frame buffer that is RFB (Remote Frame buffer) protocol.
- 2) After receiving screen update request, server captures screen image from frame buffer.
- 3) The captured screen image data is encoded and send form server to client with a frame buffer Update message.
- 5) The client then decoded and receives the updated bit stream.
- 6) The procedure continues until the connection between client and server is finished or the connection is lost. [10]

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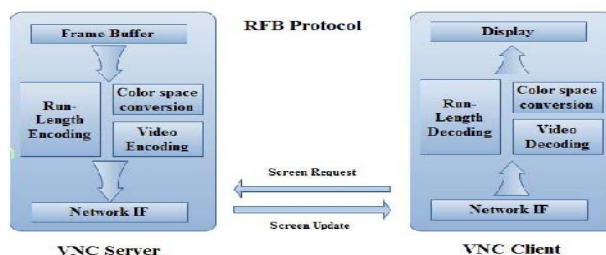


Fig 3: Overall architecture of VNC[10]

5.1.1 Installation of VNC server on Raspberry Pi:-

In this system we designed the program for the VNC server. The program contains the all the functions which are required to perform the application. Three different codes can be created they are Network code, Controller code and Main code. It performs the operation of controlling the networks, data inputs. And main code controls both the codes. These program files can be installed on raspberry pi.

5.1.2 Setting of VNC Client or VNC viewer application on Mobile and Laptop:-

For connecting to the server using mobile or laptop we must have to install VNC viewer application on our mobile or laptop. This application free version is available. We can directly download it from Play store for mobile. Also for laptop VNC viewer application we can download from official website by checking which operating system is installed on laptop. For different operating system this application is available. [10]

6. Operate Raspberry pi from our mobile and laptop:-

To operate Raspberry pi from laptop or mobile it is necessary that VNC client is connected to the VNC server. For that we must have to start the VNC server. The server will be started using the command '`sudo/etc/init.d/vncserver-x11.serviced start`'.

After starting the server client connection can be done.

Following are the steps from which we know that how to set up VNC client application for connect with the server:-

- 1) Enter IP address of raspberry pi.
- 2) You will get a warning message.
- 3) Enter the 8 digit password which was entered in VNC server installation on raspberry pi.
- 4) Finally, the raspberry pi desktop itself should appear as a VNC window on our laptop and mobile. After the successful connection the presentation screen will be available on our mobile as well as laptop.

7. Show PPT, PDF, Word file for the Presentation:-

To show the presentation file, word file as well as PDF files on the Projector we make use of software's installed on raspberry pi and we can show it on projector. The controlling of the screen can be remotely done using mobile as well as from laptop.

V. RESULT

In result we take different screens which are displayed on projector, mobile and laptop. Here the same screen can be shared with laptop and mobile using VNC. The screen can be controlled from laptop as well as from mobile. We can do typing, slide sharing and etc. All the functions can be done same as traditional system.

1) Display of the starting window:- This window can be displayed when the raspberry is switched on and after all the processing the window will be opened. It displays logo of raspberry pi and all menus.

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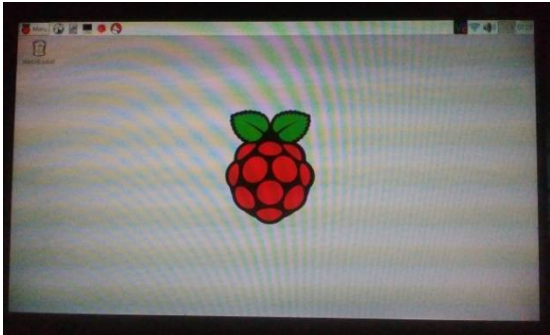


Fig 4: Screen display on the projector when start

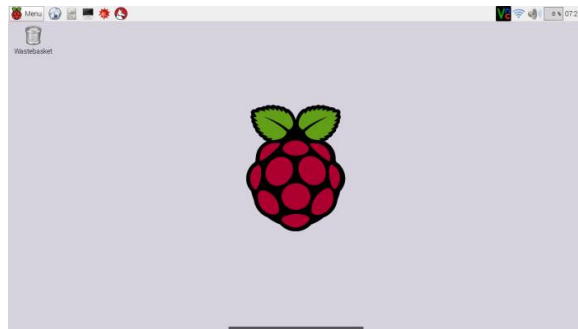


Fig 5: Same Screen display on laptop like projector

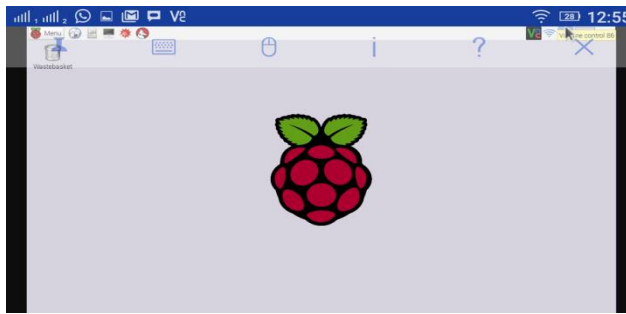


Fig 6: Same Screen display on mobile like display on projector

2) **Display of PDF file:-**This screen is displayed when PDF file is opened on raspberry pi and on laptop and mobile same screen will be displayed.

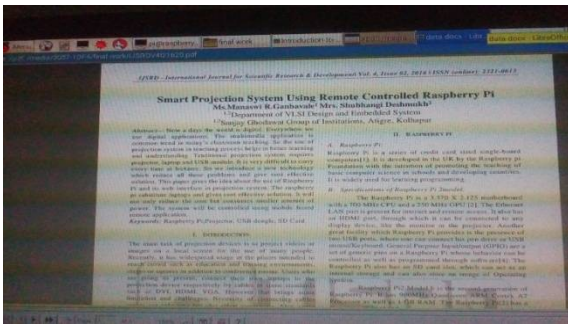


Fig 7: PDF file display on the projector

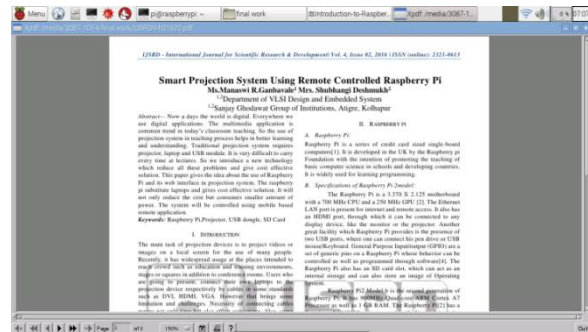


Fig 8: Same PDF file display on laptop like as projector

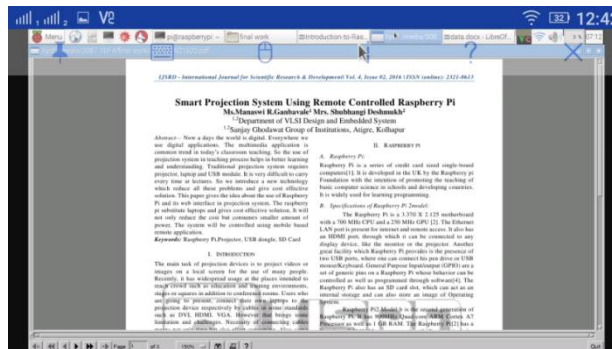


Fig 9: Same Screen display on mobile as like projector

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3) Display of Word file:-

This screen will be displayed when word file is opened. The word file can be opened using Libra office installed on raspberry pi and the same screen can be shared with laptop and mobile using VNC.

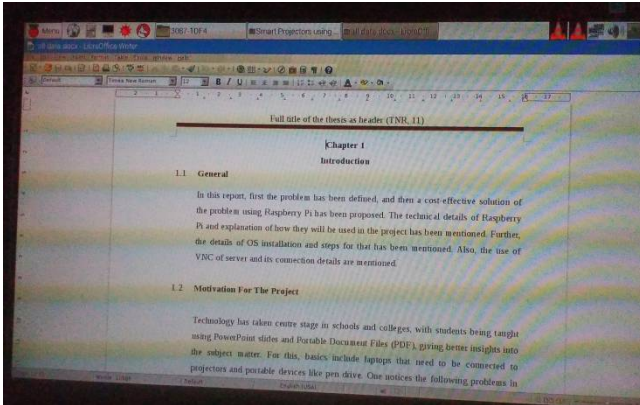


Fig 10: Word file display on the projector

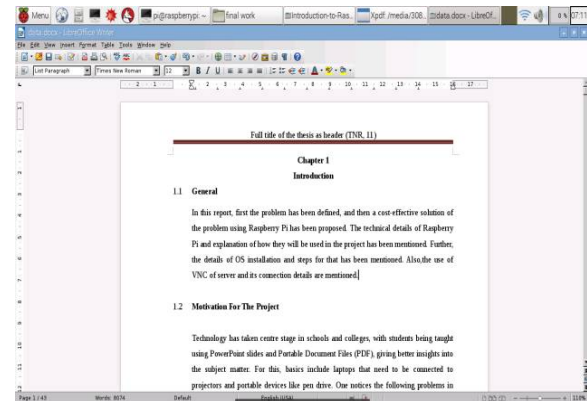


Fig 11: Same Word file display on laptop

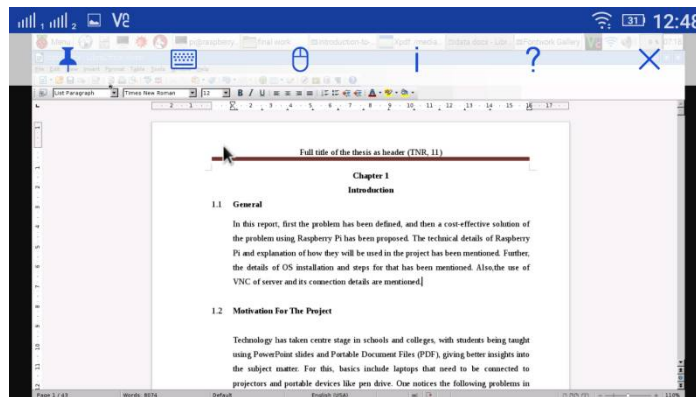


Fig 12: Same Word file display on mobile

4) Display of Presentation file:-

This screen will be displayed using Libra office power point application. The same screen will be shared on mobile as well as on laptop.

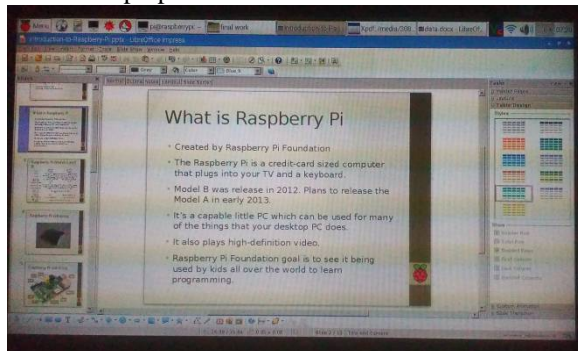


Fig 13: Presentation file display on projector

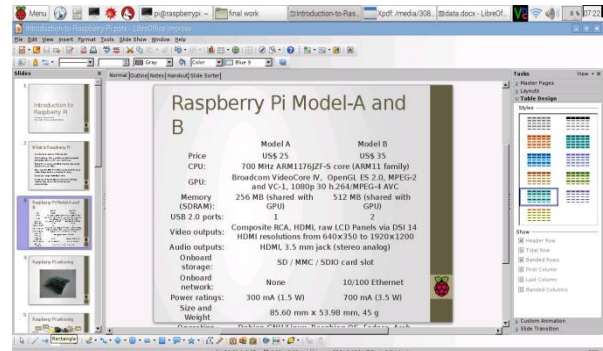


Fig 14: Same Presentation file display on laptop

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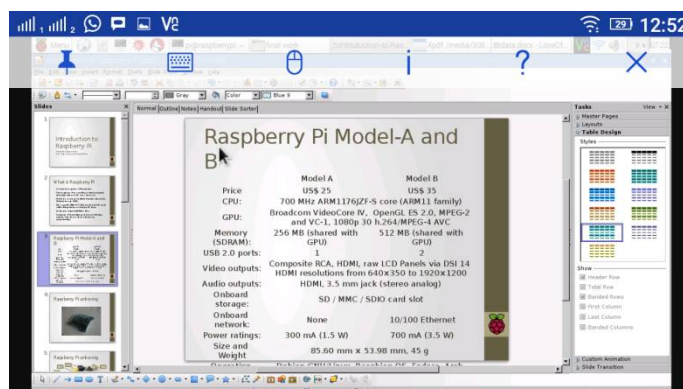


Fig 15: Same Presentation file display on mobile

VI. CONCLUSION AND FUTURE SCOPE

Conclusion:-

The proposed system can replace the laptop with Raspberry Pi. So the system cost will be reduced. The system requires only 5V power supply so it is cost effective as well as power consuming system. Also system can be remotely controlled using mobile as well as laptop that gives us best solution. Due to use of mobile and laptop, controlling can be done from anywhere when the Raspberry pi and mobile/ laptop connected to the same network. So there is no need to stand near the projector. It's beneficial in classroom and conference. The system is user friendly. Also system use VNC application which is readily available on play store as well as it is available for different operating systems. On the system we can show all presentation, PDF and word file. The entire system is very useful and gives best solution of the problem.

Future Scope:-

The system can show the word, PDF, presentation files. This can extend to show video on the projector. Also system can be operated from mobile using VNC. Further we can create special remote for controlling of the system. So it makes the system much better. Another future scope of the system is we can do controlling of the room using GPIO pins.

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