Smart Projection System Using Remote Controlled Raspberry Pi
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Abstract—Now a days the world is digital. Everywhere we use digital applications. The multimedia application is common trend in today’s classroom teaching. So the use of projection system in teaching process helps in better learning and understanding. Traditional projection system requires projector, laptop and USB module. It is very difficult to carry every time at lectures. So we introduce a new technology which reduce all these problems and give cost effective solution. This paper gives the idea about the use of Raspberry Pi and its web interface in projection system. The raspberry pi substitute laptops and gives cost effective solution. It will not only reduce the cost but consumes smaller amount of power. The system will be controlled using mobile based remote application.

Keywords: Raspberry Pi,Projector, USB dongle, SD Card

I. INTRODUCTION
The main task of projection devices is to project videos or images on a local screen for the use of many people. Recently, it has widespread usage at the places intended to reach crowds such as education and training environments, stages or squares in addition to conference rooms. Users who are going to present, connect their own laptops to the projection device respectively by cables in some standards such as DVI, HDMI, VGA. However that brings some limitation and challenges. Necessity of connecting cables means not only time but also effort consuming. Also, some computer’s output and projection device’s input standards may be discrete. Also, some users who doesn’t have own laptops and intends to make presentation over flash discs request to use USB ports on projection device. In that situation some problems reveals such as inadequate software support to play or maybe device has no USB ports as integrated [2]. Local computer system connecting the projection device is needed at that point. But this is also a costly solution. All those obstacles are encountered at mostly former type of projection devices.

This project is an effort to tackle this problem. The system proposed here is referred to as “Smart Projection System using Remote controlled Raspberry Pi”. It makes use of a Raspberry Pi – a credit card sized computer which would provide cost-effective and energy-efficient solution to the above stated problem. Cost-effective as Raspberry Pi costs only one tenth of a laptop (35-40 USD) and energy-efficient as it consumes much less power (5V) as compared to required by a laptop[1]. It proposes the use of Raspberry Pi and its web interface, to store files that have been sent from remote sources and view these power point files or Portable Document Files (PDF) on the projector[1]. The proposed system aims to substitute laptops with Raspberry Pi which will not only drastically reduce the cost involved, but also will help achieving quality of service as the system will consume a smaller amount of power, yet will provide the same functionality as any other similar system does. The proposed system will be controlled by using a smart phone based remote control, thus adding to the convenience.

II. RASPBERRY PI
A. Raspberry Pi:
Raspberry Pi is a series of credit card sized single-board computers[1]. It is developed in the UK by the Raspberry pi Foundation with the intention of promoting the teaching of basic computer science in schools and developing countries. It is widely used for learning programming.

B. Specifications of Raspberry Pi 2model:
The Raspberry Pi is a 3.370 X 2.125 motherboard with a 700 MHz CPU and a 250 MHz GPU [2]. The Ethernet LAN port is present for internet and remote access. It also has an HDMI port, through which it can be connected to any display device, like the monitor or the projector. Another great facility which Raspberry Pi provides is the presence of two USB ports, where one can connect his pen drive or USB mouse/Keyboard. General Purpose Input/output (GPIO) are a set of generic pins on a Raspberry Pi whose behavior can be controlled as well as programmed through software[4]. The Raspberry Pi also has an SD card slot, which can act as an internal storage and can also store an image of Operating System.

Raspberry Pi2 Model b is the second generation of Raspberry Pi. It has 900MHz Quad-core ARM Cortex A7 Processor as well as 1 GB RAM. The Raspberry Pi[2] has a Broadcom BCM2835 system on a chip (SoC), which includes Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB[3]. It does not include a built in hard disk or solid-state drive, but uses an SD card for booting and persistent storage. Model B has two USB ports and a 10/100 Ethernet controller.

C. Model B of Raspberry Pi2:

Fig. 1: Raspberry Pi2 Model B
On the model B the Ethernet port is provided by a built in USB Ethernet adapter. As typical modern computers, generic USB keyboards and mouse are compatible with Raspberry Pi. The Raspberry Pi [2] does not come with a real-time clock, so an OS must use a network time server, or ask the user for time information at boot time to get access to time and date for file time and date stamping. In order to install an
operating system, platform has a micro SD connector to use micro SD cards [3].

III. PROPOSED WORK

Raspberry Pi is connected to the projector using HDMI Cable and if HDMI is not present on projector then HDMI to VGA connector is used. Audio jack is also connected from Pi to projector using 3.5 mm cable [6]. The SD card will be formatted using SD formatterv4 application. The SD card is inserted in the Pi. The Pi is given power supply of 700mA and 5V output adapter [6]. The USB Wi-Fi adapter or Ethernet connection is connected to the Pi. The Raspbian OS is used.

A Server is created with a suitable IP address and Port number using Python Programming. The control rate depends upon the speed of the strength of the signal. By entering the details of the address of IP in PC or android Phone. The projector can be operated from a mobile and laptop using an internet browser with use of VNC(Virtual Network Computing) system.

IV. VIRTUAL NETWORK COMPUTING (VNC)

VNC was originally developed at the Olivetti & Oracle Research Lab in Cambridge, United Kingdom [5]. The original VNC source code and many modern derivatives are open source under the GNU General Public License. Virtual Network Computing (VNC) is a graphical desktop sharing system [5]. It uses Remote Frame Buffer Protocol (RFB) for controlling 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. VNC is platform-independent system. There are clients and servers for many GUI-based operating systems and for Java. At the same time multiple clients may connect to the VNC server. Mostly uses of this technology include remote technical support and accessing files on one's work computer from one's home computer, or vice versa[4].

Operation of VNC:-
- The VNC server is the program on the machine that shares its screen. The server passively allows the client to take control of it[5].
- The VNC client is the program that watches, controls, and interacts with the server. The client controls the server[5].
- The VNC protocol (RFB protocol) is very simple, based on one graphic primitive from server to client [5].

V. CONCLUSION AND FUTURE WORK

The proposed system can use Raspberry Pi instead of laptop. This system requires only Raspberry Pi and its web interface. It gives video as well as audio output. This system doesn’t require any touch screen interface which is cost effective. The system will be controlled using smart phone or laptop by entering valid ‘IP address’.

The system can further improved by add-ons which can be installed on Raspbian OS like Google, Gmail etc., which can be accessed directly from the Raspberry Pi which makes this projector as a smart projector also by using GPIO pins we make the room automation.
REFERENCES


