

# Up-gradation of Wired to Wireless Projector using WLAN

PRANEETH M S S R, NIKHILESH M, THARUN REDDY P, PRIYA B.K

Dept of Electronics and Communication Engineering,

Amrita School of Engineering, Bangalore

INDIA

praneethmunuganti@gmail.com

bk\_priya@blr.amrita.edu

*Abstract-* Wireless projection technology has made a quantum leap forward in terms of portability, ease of use, performance and functionality. Today, slide projectors have become a part of the wireless LAN, and the user planning to project his/her desktop is just one click away from projector. This makes the projector easily accessible similar to other wireless equipments like printer, scanner etc. available on WLAN. These current generation wireless projectors have made real-time interaction between a room full of business executives or students a reality. An adapter to convert a wired projector to wireless projector will help the community who might have already invested money on high end wired projectors. With this, owners of the wired projectors enjoy almost all the benefits of the wireless projectors with minimal investment. This project involves design of such an adapter for wired projectors with the necessary software for the user Laptop and an Android mobile.

*Keywords:* Raspberry Pi, projectors, USB Wi-Fi module, RCA connectors, File Zilla, Yatse.

## 1. 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 crowd 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 constraints and challenges. Necessity of linking cables means not only time but also effort consuming. Secondly, damages on the cables obstruct to carry out the presentation. Even more, some computer's output and projection device's

input standards may be distinct. That entails a conversion process on the cable ends. Furthermore, 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 scenario some problems reveals such as inadequate software support to play or moreover maybe device has no USB ports as integrated. 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. In order to not having these problems, advanced projection devices with built-in full supported operating system and USB ports should be used in stages. But this orientation will be expensive. There is a 5 times difference in price

between old fashioned types wired projection device and new generation technology device with full functionality operating system and USB ports. Previous study written about the issue which is made by Hamza Osman Ilhan[1] and Ahmet Akbas[1], the real time implementation is very difficult as the cost of the setup will be more. So, our proposal will reduce the cost of implementation by a huge margin. Our setup will not price more than 64\$ (approx.) which can be implemented in real life and enjoy more features than the casual wireless projectors. Our adapter can be operated from a laptop as well as an android mobile which are now used widely.

## 2. MATERIALS

In this study, The Raspberry Pi which is a credit-card-sized single board computer developed in UK is used which is a microprocessor by nature. One laptop having Windows 7 operating system were used to apply tests about transmitting videos, pictures and audio files from laptop to PI which is connected to the projector via USB Wi-Fi adapter as there is no internal Wi-Fi module in Pi.

### A. Raspberry Pi in details

The Raspberry Pi[2] has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. 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. On the model B the Ethernet port is provided by a built-in USB Ethernet adapter. As typical modern computers, generic



**Figure 1 Raspberry Pi Single Board Computer**

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 as well.

### B. Laptops with Windows Operating System

Laptop having a speed of 2.4 GHz i5 processor and capacity of 4 GB RAM is used for Window 7 based system.

### C. USB Wi-Fi adapter

Wireless N USB Adapter TL-WN727N[3] allows you to connect a desktop or notebook computer to a wireless network and access high-speed Internet connection. Comply with IEEE 802.11n, they provide wireless speed up to 150Mbps. Supports 64/128 WEP, WPA /WPA2/WPA-PSK/WPA2-PSK(TKIP/AES), supports IEEE 802.1X. Supports Windows 8 32/64bits, Windows 7 32/64bits, Windows XP 32/64bits. Supports ad-hoc and infrastructure mode.

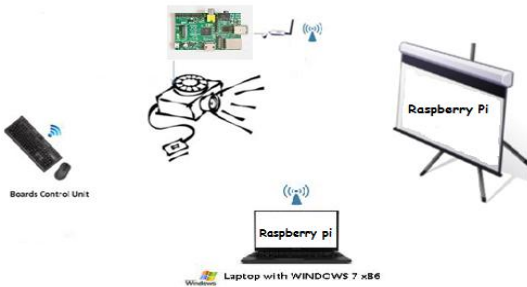
### D. Cables

An RCA cable is used in connecting Raspberry Pi and projector. Pi has RCA out and audio out, from where the video and audio can be streamed on the screen from projector.

### 3. SYSTEM DESIGN

An Operating System named Raspbmc is installed in the SD card of suitable size (8GB) before which the SD card is formatted using SD formater v4 tool. This tool leaves no cache files in the SD card. The SD card must not have any files during the installation of OS. This OS is installed as per our requirements for the project.

We are interested in projecting videos, to play audio files and project images on the screen as well project a presentation file which can be converted to .wmv file using MS Office 2010 which gives the user an option to convert a ppt files to wmv format.



**Figure 2 System Design Block Diagram**

This problem arises as ‘bmc’ OS does not support ppt format files, so we can convert the ppt file to wmv format and play it like a video and project the same on the screen.

We are using a tool named ‘Connectify Me’ to connect laptop and Raspberry Pi which creates a hotspot, which is nothing but a network to connect different devices. The Raspberry Pi is connected to laptop via TP-Link[3] adapter through Connectify-Me which has created a Wi-Fi hotspot. A network is created in Connectify-Me. Both the USB adapter and android mobile are connected to the network. Or a wireless local LAN can be used for getting connected to the network. Wi-Fi adapter, Laptop and Android mobile are connected to the wireless Local network if not connected by connectify-me application. An application in Google play named ‘Yatse’[4] is installed in an android mobile and this application

can control the projector like a remote which is connected to the Raspberry Pi[2] via Connectify-Me. The Yatse[4] application is configured with appropriate IP address and Port number. The android mobile is now connected to the Raspberry Pi[2] which is in-turn connected to the projector and acts like a remote in controlling the projector.

Another application named ‘Filezilla’[5] is installed in the laptop and is fed with IP address and Port number and connected to the Pi. We can send files like videos, audio and images to the SD card in the PI wirelessly using this Filezilla application with the speed of 3-4 Mbps from the laptop which ever file is likely to be projected on the screen.

### 4. IMPLEMENTATION

Raspberry Pi[2] is connected to the projector using RCA[6] cable to the composite in pin on the projector and from video out pin of the Raspberry Pi[2]. Audio jack is also connected from Pi to projector using 3.5 mm cable. The SD card will be formatted using SD formater v4 application. The SD card is inserted in the Pi. The Pi is given power supply of 700mA and 5V output adapter. The USB Wi-Fi adapter is connected to the Pi to one of the USB’s of the Raspberry Pi. The Raspbmc OS can also be operated using a mouse by connecting to the USB of the Raspberry Pi[2]. A network is created with a suitable name using connectify-me application. The File Zilla[5] application is given the details of the IP address and Port number and is connected to the Raspberry Pi[2]. The required files can be sent to the SD card wirelessly using Wi-Fi, the transfer rate depends upon the speed of the strength of the signal. By entering the details of the address of IP in Yatse[4] application, the android mobile is now connected to the Raspberry Pi[2]. The videos, audio and images can be simul-streamed with a minimum delay or lag. The projector can be operated from an android mobile, a mouse which is connected to the projector or from the laptop using an internet browser. The IP address and port number is entered in the format ‘IP address:portnumber/’, we can

connect to the network and now access the remote control of the projector wirelessly.

## 5. RESULTS

Any video, image or audio file is projected successfully with minimum time lag or delay. The file can not only be projected wirelessly but also sent wireless to the SD card of Raspberry Pi[2]. The transfer rate of sending a file from a laptop to Raspberry Pi[2] using File Zilla[5] is achieved up to the speed of 3-4 MBps depending on the signal strength of the Wi-Fi. The file can also be sent from an Android mobile by sending it directly using Yatse[5] application. The file can be simul-streamed without sending the file to the SD card, where the file is stored in the temporary memory and stream the videos and audio or images directly. There can be a maximum lag of 0.7-2 millisecond in streaming the file from android mobile to the projector directly. Videos of 720p resolution can be streamed with very less delay and sound also be heard using the in-built speakers of the projector. Thus, utilizing all the features of the projector and upgrading the existing projector with a minimal cost. There are other features which can be added by the user, there are add-ons which can be installed in the Raspbmc OS like Facebook, Gmail, Youtube and other websites can be accessed directly from the Raspberry Pi[2]. The Windows OS is more commonly used nowadays as well as android mobiles, so the projector is interfaced using Windows and Android as well as iphones.



Figure 3 Android remote (Yatse)

## 6. CONCLUSION AND FUTURE WORK

With the technology of wireless and microprocessor raspberry pi, this design of the adaptor that not only converts but also upgrades the existing wired projectors. The Pi can not only be operated using any laptop, but just mobile when connected to the wireless LAN. If the laptop is forgotten, then using just an Android mobile, the projector can be operated. The cost of upgrade is considered vital during this upgradation, which is around 64\$. Comparing the cost of wireless projectors to that of wired one it is drastically less, hence the huge advantage. Addition of add-ons such as Facebook, Google, Gmail, Youtube will convert the existing projector into a smart projector with the advantage of being wireless. Another advantageous feature of Android & IOS (Apple) interfacing has increased its scope rapidly with features of simul-streaming (through Wi-Fi). Overall advantages along with the cost makes this project a breakthrough in projector technology. And our future work mainly depends on projecting the Presentation files in ppt format and project word files directly without any conversion.

The scope of project is increased likely adding the above feature and thus can be implemented.

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### REFERENCES

[1] Uhan, H.O. ; Akbas, A. ,” Designing a System Allowing High-Definiton Video Transfer with Minimum Latency and Multi-use Access to Projection Device by Wireless,” Complex Systems (ICCS), 2012 International Conference on Digital Object Identifier: 10.1109/ICoCS.2012.6458596 Publication Year: 2012 , Page(s): 1 – 6

[2] Raspberry PI- open source embedded platform [online], 2012 [cit 2012-04-30]. Available <<http://raspberrypi.org>>

[3] Tp-link [online], 2014 [cit 2014-04-30], available <<http://www.tp-link.in/>>

[4] Yatse [online], 2014 [cit 2014-04-30], available <<https://play.google.com/store/apps/details?id=org.leetzone.android.yatsewidgetfree>>

[5] File Zilla [online], 2014 [cit 2104-04-30], available <<https://www.google.co.in/#q=file+zilla>>

[6] List of video connectors [online]. 2014 [cit 2014-04-30], available <[en.wikipedia.org/wiki/List\\_of\\_video\\_connectors](http://en.wikipedia.org/wiki/List_of_video_connectors)>