Wireless Projector With Camera Interfaced With Raspberry-Pi

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Abstract- **Nowadays using multimedia applications is common in classroom teaching. As we know that use of chalk produces dust, which pollutes the air and causes hazardous effects on health. Teacher still have to write on a blackboard with chalk though it cannot fulfil the needs of efficient teaching and learning. The proposed project work is designed to replace hefty desktops and laptops with a pocket sized chip for convenience. This will reduce the system cost and also will help to provide same quality of education. We have to design an Android Wi-fi application from which we will connect with Raspberry Pi's Wi-fi and display our files on projector which is connect with Raspberry Pi. Moreover the ongoing lecture is recorded by a camera and can be uploaded to the android application so that it can be accessed later on.**

Keywords- Teaching; Projector; Raspberry-Pi; Android

I. INTRODUCTION

A. Prelude

The proposed system will be controlled by using a smart phone based remote control. We have to design an Android Wi-fi application from which we will connect with Raspberry Pi's Wi-fi and display our files on projector which is connect with Raspberry Pi.

Why android?

The main purpose is ease of use and availability. Android smart phones are easy to use and are widely available in market. Android applications are easy to develop and so they offer wide range of compatibility. Emulator such as Eclipse can be used for this purpose.

B. Motivation

As we know that, nowadays everything is being digitized and so is the teaching system. Teachers use laptops to teach via PDFs and PPTs in spite of chalkboards. this creates a problem of carrying a laptop always and that is costly system.

C. Problem Statement

Laptop weighs around 2-3 kilograms which is heavy in day to day usage. One laptop averagely costs around INR 40000. For a department on 10 classrooms and 5 departments in each institute, the investment becomes INR 2000000. This is a big amount which should be reduced and can be used otherwise.

D. Objectives Of Proposed Work
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- We are interested in using raspberry pi in place of laptops to control the digital projectors and show the PDFs and PPTs in lectures. Raspberry pi can be

connected to proctor via its HDMI port through a HDMI-VGA converter.
- Also we aim at using Smartphone to control raspberry pi. Smartphone has a android application which is used to send the required files for projection to the kit.
- Another aim is to record whole lecture through a camera and send the recorded file back to the application so that the lecture can be accessed later on by the students who need to listen to it again.

System requires 650 mA@5v power supply. System works on Raspbian Os and programming is done in python scripting language. Whenever hand held device detects raspberrypi's Wi-fi id it will be request for connection or pairing after that device will be ready for transfer files in real-time as it opens in Android Wi-fi application.

II. BACKGROUND

Raspberry Pi is a small credit card sized pocket computer developed by Raspberry Pi foundation in United Kingdom. It was mainly targeted to teach students basics of computer science but it become largely famous. The first model Raspberry Pi 1 B was a huge success and later on Raspberry Pi A was released. By 2014, more advanced and upgraded versions A+ and B+ were released. Today Raspberry Pi shoes an integrated SoC and peripherals such as keyboards and mice are available at extra cost. Kit has an onboard Wi-fi 802.11n port for internet connectivity. Also it has HDMI port. Raspberry-Pi model 3 B has 4 USB ports and also an Ethernet port. Camera pins are also available for camera interfacing. In all raspberry pi is a micro computer.
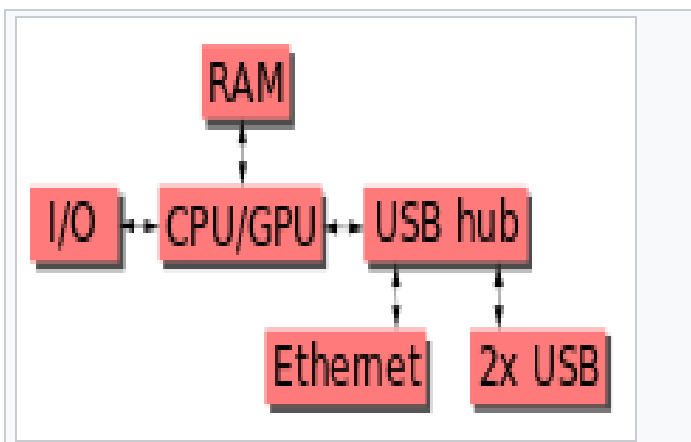

Figure 1- Basic Blocks [1]

This block diagram depicts Models A, B, A+, and B+. Model A, A+, and the Pi Zero lack the Ethernet and USB hub components. [1] Raspberry-Pi has Raspbian OS which is

Debian based Linux OS and is very easy to use. By 2016, Raspberry -Pi has sold over 11 million kits worldwide.

Another thing used in this project is a light weight transmission protocol MQTT (MQ Telemetry Transport or Message Queue Telemetry Transport). It is an ISO standard (ISO/IEC PRF 20922) publish-subscribe-based "lightweight" messaging protocol for use on top of the TCP/IP protocol. MQTT is targeted towards embedded system for file transmission and reception. It is a TCP/IP based protocol like Zigbee and a mobile phone system like Bluetooth but with better connectivity, range and reliability of data transmission. MQTT servers are available online for usage and can be accessed for transmission and reception. [2]

III. SYSTEM DESIGN

Size of Smartphone can provide uneasiness while watching movies or playing games. Thus there's a need of a bigger screen. But bigger screen adds to heftiness and limits portability, So we use screen sharing. For that we develop an android app which can be used as screen sharer. So bigger screens like that of TVs or Projectors can be used anywhere available.

Proposed android application here is used to project PPTs and PDFs onto Projector screen through hardware which is raspberry-pi. This acts like screen sharer. Whatever is on the app can be directly seen on the projector. transmission takes place through internet protocol. Here MQTT acts as server which sends data from app towards the kit. Kit sends data for projection on to the digital projector. The quality of service solely depends upon the speed of internet service and the processor of smart phone.

Then we use a camera to record the whole lecture. The whole lecture recording is stored onto the inbuilt memory of raspberry-pi. Later it can be sent to the server and forwarded to the application on the Smartphone.
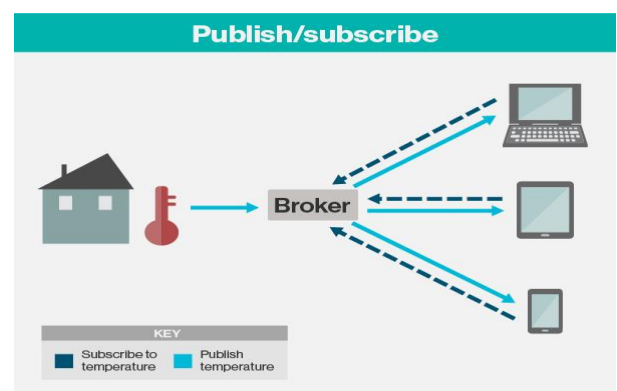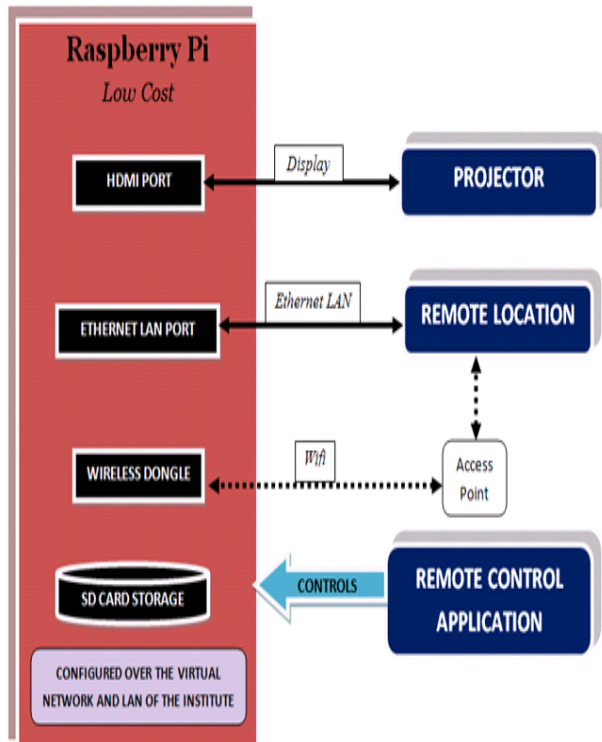
IV. BLOCK DIAGRAM

Figure 2- MQTT [3]

Figure 3- Data Flow

In modern world effort of teaching is reduced from use of chalk and duster towards the use of PDFs and PPTs. This makes use of laptops compulsory. But laptops are only used as storage and display devices thus the wide range of functions available on laptops are untouched. Due to this laptops are rendered useless in some cases. Also laptops consume huge power and require time to time charging and maintenance. We want to use raspberry pi for this purpose as they can efficiently be used as storage and display devices and that too in very less cost. Moreover, raspberry pi can also be controlled using smart phone. This system can be used to give seminars or to give lectures. All in all, this device offers all the features that a laptop offers, but at a price which is very less.

1. At present we aim at replacing laptops with raspberry pi which is smaller and cheaper and yet serves the purpose of classroom teaching at low power.

2. As future scope we are thinking of replacing power cord of kit with battery so that the system can be used at further lower power and in situations where an extra socket for power is not available.

REFERENCES

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[3] https://internetofthingsagenda.techtarget.com