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Raspberry Pi based Wireless Interactive Display

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Abstract— This paper deals with the design and implementation of Wireless Interactive Display using Raspberry pi . It primarily focuses on college environment but can be designed for any industrial needs. It minimises the manual process of circular distribution system and provides wireless access to the display boards and distributes the information right from the workplace. The proposed information distribution system receives information and transmits it via a USB WIFI Dongle to a TFT display board by web hosting. Raspberry pi operates and controls TFT display for interaction and live news updates. It is also provided with additional features like Seminar or function Hall bookings, attendance distribution system, Placement news updates. For example, when an information is shared on the domain, the raspberry pi automatically initiate refresh process and the TFT display notify the users by displaying a NEW icon above the new information. Raspberry- Pi has two main components interacting with each other: one is the domain that loads on the browser and the transmission side process to display it on the TFT display.

Index terms— Raspberry Pi, USB WIFI dongle, Web Domain.

I. INTRODUCTION

In the recent years, proliferation of technologies like IEEE 802.11, 3G and Bluetooth has directed much attention to wireless information sharing. Nowadays information sharing via radio waves and Bluetooth has particularly gained momentum. But these technologies have limitations such as, the destination device for the sharing system can't go too far from the source and their range cannot exceed 10 meters.

In particular, IEEE 802.11 WLAN has become the prevailing technology supporting many real-time applications. This project intend to integrate Raspberry pi and TFT module and a Web domain which will be connected via WLAN. The Raspberry Pi is a credit-card-sized single-board computer developed for many of the things that a standard desktop does. It is designed to be plugged into a TV or HDMI monitor. This project has been implemented with a Raspberry Pi 2 which is shown in Fig. 1. It has a Broadcom BCM2835 SoC, which includes ARM1176JZF-S 700 MHz processor, 512 Megabytes of RAM and does not include any built-in hard disk or solid-state drive; instead it relies on SD card for booting and long-term storage. This board can run most of the Linux kernel based operating systems. This model has two USB port, an HDMI port and a 10/100 Ethernet controller. This module doesn't have a dedicated switch for powering it on. Therefore, it has to be plugged in to a power source of 5V 1.2 Amp with a mini USB connector. There have been various SD Card images released that can be loaded onto an SD Card to produce an operating system.

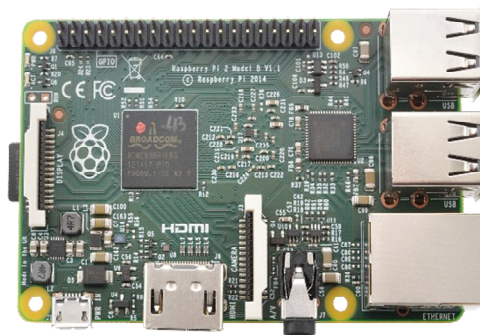


Fig. 1. Raspberry Pi 2 Board

II. FUNCTIONAL DESCRIPTION

Raspberry pi is a small credit-card sized computer capable of performing various functionalities such as in surveillance systems, military applications, etc. a complete system design is shown in Fig. 2. The various functionalities of the components are given below

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A. SD Card Slot

SD card slot is used to install OS/booting/long term storage .The total memory of the SD card is about 8GB.

B. Micro USB Power Port

Micro USB Power Port provides 700mA at 5A.

C. RCA Video Out

RCA Video Out connected to display if HDMI output is not used. It is mainly used to carry audio and video signals. They are otherwise called as A/V jacks. Audio Out Digital audio is obtained if HDMI is used to obtain stereo audio. Here analogue RCA connection is used.

D. Ethernet Port

Ethernet Port is used to connect to the Internet. It also plays a role in updating, getting new software easier.

E. HDMI OUT

High Definition Multimedia Interface is used with HDTVs and monitors with HDMI input. Also HDMI-HDMI is used here.

F. BROADCOM BCM 2835

It is otherwise defined as System on chip .It is a 700 MHz Processor. It has a Video core IV GPU. GPIO allows us to control and interact with real world .

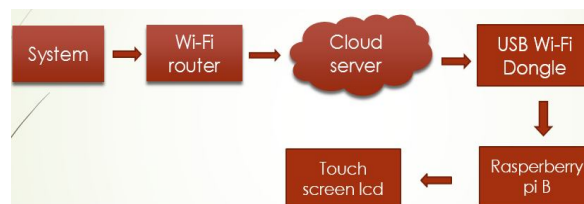


Fig. 2. System Design

III. HARDWARE ARCHITECTURE

In the Fig 3,Raspberry Pi is connected to the TFT display with the help of GPIO pins. Raspberry-pi works only on Raspbian operating system ,Linux., Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run.

Fig. 3. Connection Of TFT display With Raspberry Pi However, Raspbian provides more than a pure OS, it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

Putty configuration and VNC viewer are needed to install Raspbian OS. Putty configuration is SSH and Telnet client .It is an open source software that is available with source code. Virtual network computing is a Graphical desktop sharing system that allows us to remotely control the desktop interface of one computer from another.

The Raspberry Pi primarily uses Linux kernel-based operating systems (it is not possible to run Windows on the Raspberry Pi). The ARM11 is based on version 6 of the ARM on which several popular versions of Linux no longer run (in current releases), including Ubuntu. The install manager for Raspberry Pi is NOOBS. The OSs included with NOOBS are Arch Linux ARM, Open ELEC ,Pidora (Fedora Remix) ,Raspbmc and the XBMC open source digital media center ,RISC OS.

Raspbian based on the ARM hard-float(armhf) Debian 7 'Wheezy' architecture port originally designed for ARMv7 and later processors (with Jazelle RCT/ThumbEE, VFPv3, and NEON SIMD extensions), compiled for the more limited ARMv6 instruction set of the Raspberry Pi. A minimum size of 2 GB SD card is required, but a 4 GB SD card or above is recommended.

A. Steps For The Putty Configuration

The Fig. 4.depict the the Putty configuration and the steps to follow are given below

- 1) Obtain a copy of Putty pre-configured for use at Columbia from the Putty download page.
- 2) Save the installer file to your download directory or desktop.
- 3) Important: Exit all applications before you begin the installation process.
- 4) Double-click on the file Putty-install.exe to begin the installation.
- 5) At the Choose Destination screen, Click Next to accept the recommended default destination location for installing Putty.
- 6) Click Next on the Select Program Folder screen to select Putty as the recommended Program Folder name (Putty should already

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be displayed in the Program Folders text box).

- 7) Click Finish on the final screen to complete the installation.



```
pi@raspberrypi:~$ sudo apt-get install xterm
Reading package lists... Done
Building dependency tree
Reading state information... Done
xterm is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 0 not installed.

pi@raspberrypi:~$ sudo apt-get install python3
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3 is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 0 not installed.

pi@raspberrypi:~$ sudo apt-get install python3-tk
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3-tk is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 0 not installed.

pi@raspberrypi:~$ sudo apt-get install python3-idle
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3-idle is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 0 not installed.

pi@raspberrypi:~$ sudo apt-get install python3-games
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3-games is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 0 not installed.

pi@raspberrypi:~$
```

Fig. 4. Putty configuration

B. Steps To Install Raspbian Os

In order to install Raspbian OS as shown in Fig 5, first next out of box software(NOOBS) has to be installed.

- 1) First step is to allocate the drive for installing OS
- 2) SD adaptor can also be used for this purpose
- 3) Download WINDISK 32 utility from source forge project which is a zip file 4.Extract and run the zip file
- 4) Select the file and click run as administrator
- 5) Select the image file which was extracted above
- 6) Select the drive letter of the SD card in the device box
- 7) Click write and wait for write process to complete
- 8) Exit the image and eject the SD card

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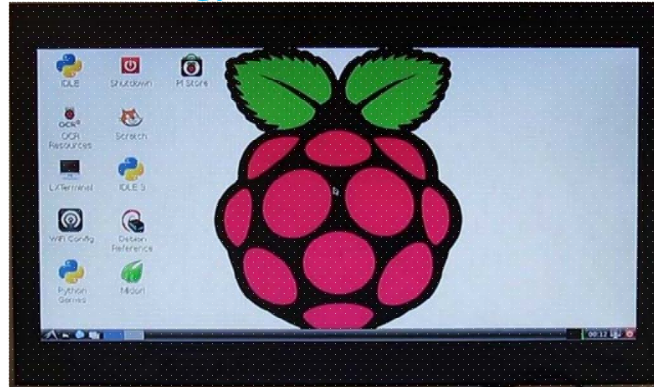


Fig. 5. Installed Raspbian OS

IV. SOFTWARE ARCHITECTURE

This project is geared up by the software part. The basic web page layout is build using .NET, HTML and CSS programming languages. The website is built and hosted on a specific domain as shown in Fig 6.

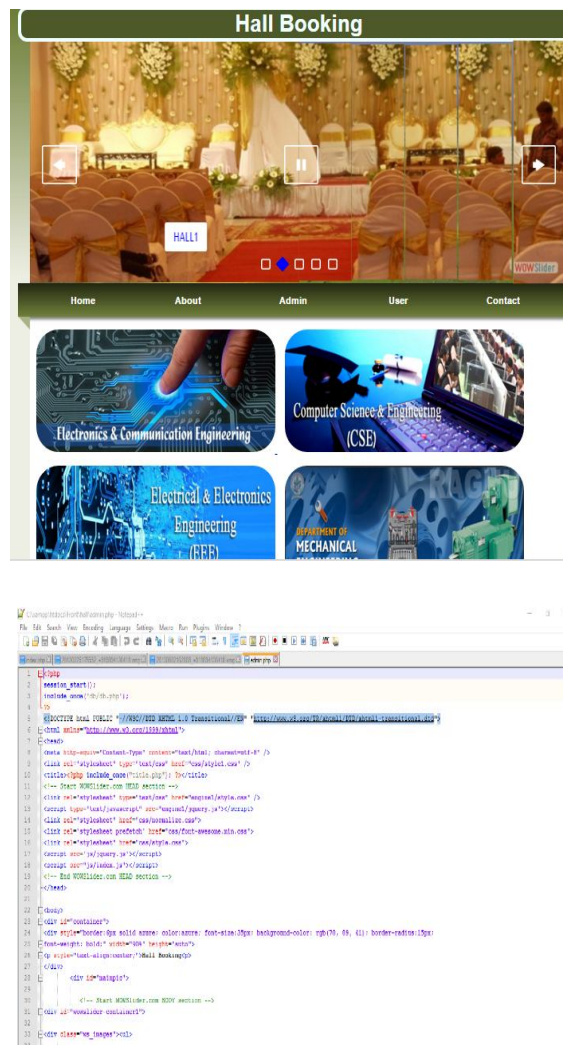


Fig. 6. Website and its coding for hall booking and circular

The attendance distribution process involves sharing and viewing the list as excel files in the domain. And in order to differentiate

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the new circular with that of older one a 'NEW' icon is updated above the news.

V. RESULTS AND DISCUSSION

Raspberry Pi has enough power for HD video and image manipulation. So the information can either be plain texts or image. All the devices are connected to WLAN. And if the user wants to view circular on the display then there is a direct access. But for hall booking process the user has a login id to complete the booking process. After successful booking reports will be generated as proof as shown in Fig 7.



Fig. 7.Hall booking procedure.

VI. CONCLUSION AND FUTURE WORK

Thus we have designed an interactive display system capable of sharing information wirelessly to n no of devices connected. Image/news is uploaded to the domain and is transmitting to a TFT display. It is advantageous as it offers reliability and privacy on both sides because only authorized admin can put information on the domain, hence it offers only the person concerned to update the details. Manual distribution and paper works are reduced over large scale and sharing time is reduced. Future work is to bind additional features like attendance monitoring system, adding audio system for text to speech interaction, and extending its application for industrial needs.

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