

Digital Signage Using Wireless Network

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Abstract--- this document gives Basic instructions for Digital signage system using Wi-Fi. This paper gives basic introduction how to operate with Digital Display wirelessly. In recent days we have digital signage system which basically needs to change their contents using pen drive or using internet but this paper gives introduction How to play with digital signage system wirelessly and enjoy good advertisement. So for that we try to find some solution regarding this research topic

I. INTRODUCTION

This Document gives basic introduction to Digital signage which can operate using Wi-Fi. Now a day we have very less option for advertising and it is very lengthy and boring process to advertise and also we have very less efficiency of that. so we have one good option to reach over a people is Digital signage system. Recently we have a digital signage but we have to change its content using USB drives or using internet when we are in the local or in wide area network. So this document gives us better idea how to change the contents of Digital display using Wi-Fi. So for that we use some Embedded as well as communication idea and using Raspberry pi board we try to implement our system.

II. WHY USE OF DIGITAL SIGNAGE

Many factors contribute to the skyrocketing popularity of digital signage in meeting a variety of communications goals. We can see as a novelty among media, digital signage exponentially increase into its own as a highly efficient and effective communications medium. Digital signage leverages demographic efficiency, viewer familiarity and even interactive control to communicate marketing, advertising, informational and promotional messages in a manner that is effective and growing in popularity.

Another good measure of the popularity of digital signage as a communications medium is the amount of money marketers are willing to spend to communicate their message via digital signs. A recent media forecast from PQ Media reveals spending will grow at a compound annual rate of 9.4 percent in the United States through 2014 on out-of-home (OOH) media. The research organization defines OOH as including video advertising networks, digital billboards and alternative ambient ads.

– Anybody who needs to display dynamic content in a public environment can benefit from digital signs. While retailers are arguably adopting signage networks in the largest numbers, the technology is also being used to deliver dynamic messages to customers and employees alike in financial institutions, travel hubs, auto dealerships, corporate offices, and other venues.

III. COMPARISON OF CONVENTIONAL AND DIGITAL SIGNAGE

There are basically two types of Signage which we used in our day to day life and that is Digital signage and Conventional signage. Basic difference of that is given as below table.

Table-I Comparison Between Types Of Signage

CONVENTIONAL SIGNAGE	DIGITAL SIGNAGE
Conventional Signage can only Display only static content.	Digital Signage can display dynamic information and advertisement.
It can supports audio, video, flash animation and web contents.	It can support audio, video and animation and graphics and also web contents.
Conventional signage required a team of humans to distribute and install to signs ones they have been produce.	Digital content can be controlled centrally by any authorized employee.
Cannot support content scheduling, zone, or a region.	Can support content scheduling. The screen can be dividing in to the zone or region to simultaneously display multiple elements of information.

Conventional signage is a widespread and traditional advertising method that is used to deliver different messages and information in specific locations. There are different groups of advertisers/companies working to deliver conventional signage. These advertisers use large numbers of signs both indoors and outdoors to broadcast their messages. Traditional signage is used near roads, markets, large shopping centers, bus stops, airports, railway stations, casino, and hotels. These signs are typically made from plastic, steel, aluminum, vinyl, glass, and paper.

Digital signage is a wide spread solution allowing reliable centralized management and publishing of digital media to networked, digital displays. This technology is now gaining popularity and becoming more ubiquitous. Digital signage has many advantages over traditional signage. It can display more dynamic messages, videos, animation, web contents, and even real-time video broadcasts. This dynamic signage can attract and retain more viewers. Digital signage consists of a display device and a display controller. This display controller can be a PC/Board. A simple digital sign display is shown in “Figure1”.

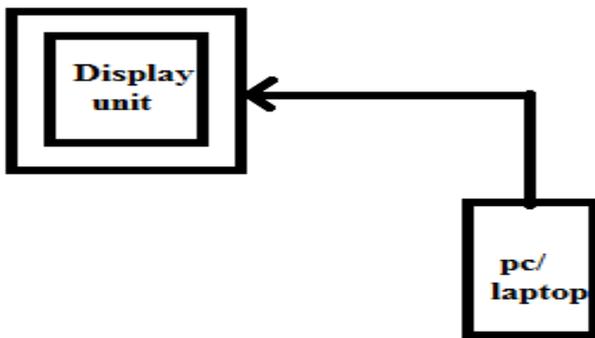


Fig. 1: the simplest form of Digital Signage.

IV. LITERATURE REVIEW

Basically propose of a digital signage system with a new audience detection system using TV broadcasting waves. For audience motion detection, we use received level fluctuations of TV broadcasting waves by sensing physical movement. When our detection method detects human motion, a digital signage system will turned on its display. This flow grabs more attention to the signage display and effectiveness of saving electric power. Our detection method provides effectiveness for audience detection of digital signage with a big monitor and we can save the electric power of 60-70% of the signage display and one of 94% in business days and in holidays, respectively.

Our digital signage system is shown as “Figure2”. The player provides display control of the contents. The signage server has three functions, which are contents entry, contents delivery to players, and the database.

This system uses a monopole antenna as a receiving antenna, which has a broad directivity to be able to receive multi-path propagation waves widely. The receiver is monitoring TV broadcasted waves and the motion detection Part analyses its level. In this system, there is no transmitter since only TV receiving waves are used.

In entry of the contents, Meta information is entered for every content. This information contains an identification and attribute of the contents, contents body such as a title, text and images, and its displayed schedule. This information is stored in the database. Delivery of the stored contents to the player from the server is implemented Using HTTP. In the player, we use a Web browser to display the contents. Depending on the schedule information in the database, the corresponding contents at a time are displayed. To go to next contents in a browser, “refresh” tag of HTML is used. Then the system caches those contents in the browser. Examples of the contents are topics and notice from the university such as lectures information, and regional events information.

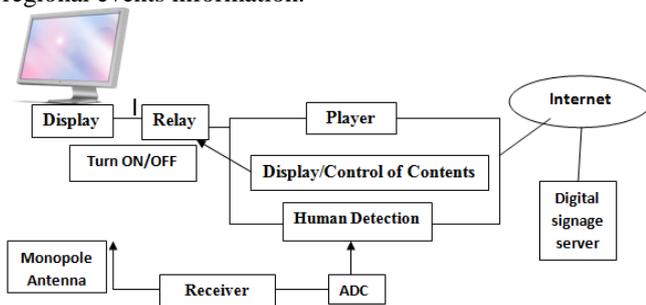


Fig. 2: System configuration of Digital Signage with Motion Detection

V. HARDWARE DESCRIPTION

A. Raspberry Pi:

- Raspberry pi is a credit card size Linux computer used for simple programming.
- It is developed by raspberry pi foundation.
- Large used of raspberry pi in the application both in developing and developed world.
- Basically raspberry pi have two models.
 - Model-A
 - Model-B
- Raspberry pi has a BCM (2835) Broadcom system on chip. Which have an ARM 1176JZF-S 700 MHz processor with 256MB RAM.
- Although Raspberry pi does not include hard-disk or SSD. They operate with SD- card with different memory size.
- Raspberry pi OS work with network time server and they does not come with real time clock. So Raspberry pi ask user for time information and also boot time for access of file time and date stamping.
- Raspberry pi GPU is basically have a Broadcom video core IV @ 250 MHz open GL ES 2.0 MPEG-2 and VC-1,1080p H.264/MPEG-4 AVC high profile decoder and encoder
- Raspberry pi also have input of video from (csi) input connector for the connection of camera module.
- Raspberry pi also have video output like HDMI resolution with 640*350 to 1920*1200 plus various PAL and NTSC standard.
- Audio output and input for Raspberry pi from 3.5 mm jack, HDMI port.
- Raspberry pi have on board storage like SD/MMC/SDIO card slot which is operate with 3.3V power supply.
- Raspberry pi have 5V Micro USB or GPIO header power source.
- Raspberry pi have support too many OS like Arch Linux ARM GNU/Linux as per the application.



Fig. 3: Raspberry pi (Model-B).

TABLE 2 COMPARISON OF MODEL A AND MODEL B

Model A	Model B
One USB port	Two USB port
No Ethernet	10/100 Ethernet controller
Cost is less	Cost is higher than Model A
No Ethernet port so connect with USB Ethernet or USB WI-FI adpoter	In this model on board Ethernet port is available so no need for USB Ethernet
Compatible with USB keyboard and mice	Compatible with USB keyboard and mice
256 MB RAM	512 MB RAM
Power ratings 300 mA (1.5W)	700 mA (3.5W)

VI. MICRO USB POWER SUPPLY:

- Raspberry pi board have 5v input power supply
- Because of inadvertently plugging in out-of-range power input; that would be dangerous so 5v is given to HDMI and output USB ports.
- For the Raspberry pi have Polarity Protection diode, self-resisting semiconductor fuse and voltage clamp circuit. So here for
 - Model-A: 5v dc, 500-700 mA
 - Model-B: 5v dc, 700-1500 mA
- Power Consumption rating for Raspberry pi is
 - Board A: 5v, 500 mA (2.5 W) (Without any USB, Ethernet etc.)
 - Board B: 5v, 700 mA (3.5 W) (Without any USB, Ethernet etc.)

We also can power supply from rail of 5v at GPIO pin but we should Mind that those are behind the power protection circuit.

A. GPIO:

- Addition to other port like USB, Ethernet, and HDMI ports Raspberry pi offers Low level Interfaces which are intended to connect directly with chips.
- These GPIO signal on 2 x 13 header pins have SPI, I2C, and serial UART, 3V3 and 5v power.
- These are not basically plug and play interface. So basically we need to care of miswiring.
- Here CSI (Camera Serial Interface) can be used to connect a camera with 5MP.
- Yet there is no software enable is the flex cable connector with DSI (display serial interface) and a serial link inside the HDMI (high definition multimedia interface) connector called CEC (consumer electronics control).This Generic pin basically its behaviour can be controlled by software.

B. HDMI:

- HDMI is a compact audio/video interface for uncompressed video data and digital audio which is compressed or uncompressed.
- HDMI source is compatible with computer monitor, video projector and digital television or digital audio devices.

- HDMI basically replace Analog video standard by digital.
- It is implements EIA/CEA-861 standard which is basically define video format and waveform, uncompressed and transport of compress of VESA-EDID.
- Too many version of HDMI have been developed since initial release of technology but all use same connector and cable.
- Basically there are five HDMI connector like type-A, type-B, type-C, type-D, and type-E.
- All five connector are shown in the below figure. we use type A connector in our application which is compatible with our raspberry pi.

C. Edup Wi-Fi Adapter:

- [Edup 150MBPS Wi-Fi adapter] USB ID: 148f:5370 Ralink Technology, Corp. RT5370 Wireless Adapter. Driver is the RT2800USB module, I had to install the firmware as rt2870.bin in /lib/firmware.(requires firmware-ralink from Wheezy)
- Ultra-Mini Nano USB 2.0 802.11n 150 Mbit/s WI-Fi/WLAN Wireless Network Adapter USB ID: ID 0bda:8176 Works stable when using VLC for internet radio receiver. Works stable 24/7 on two of my Raspberries used as web server. Use method shown here for Debian. Seems to be the same as EW-7811Un using the RTL8188CUS chipset.
- Edup nano EP-N8508 Use method shown here for Debian. Requires powered USB hub for adequate power. When directly powered by Raspberry Pi, it fails after a few minutes. (B) Unusable with analog audio because when data is being send or received the audio get distorted. Use script from here for Wheezy.



Fig. 4: Edup 150MBPS Wi-Fi adapter

VII. SOFTWARE DESCRIPTION

- To work with Raspberry pi it is necessary to install or boot first the operating system in that.
- Raspberry pi have too many number of the Operating systems which are used differently for different application.
- There are basically two types of Operating systems which are
 - Stable operating system
 - Unstable operating system

- In the stable operating system basically the entire Support file are already installed while we installed main Operating system.
- So there is no need to install other peripherals driver manually.
- So when we plugging some external peripheral with raspberry pi its working directly so no need to configure them.
- Where unstable operating system is the system where basically only main operating system is only installed and we manually wants to configure and install other peripherals.
- There are number of Operating systems which are used for the different Application.
- Basic Operating system mostly used in raspberry pi is Raspbian and Debian (squeeze/6.X).
- There are several operating systems we can use for the digital signage which is listed below. In that first there is some general operating systems on which raspberry pi work very easily and not difficult to operate for beginner.

A. SCREENLY:

- This is basically developed in the UK Sweden.
- Its Screenly contents management services are free for open source developer.
- It has also paid version called pro-version with \$10/month.
- For this operating system basically need basic hardware like SD card with 4gb memory, Model B raspberry pi, HDMI cable etc.
- Basically benefit of this Screenly operating system is easier to write for regular desktop –class hardware.
- There is some performance trade off cause of low prise but it is give good performance.
- Some disadvantage of open source edition of Screenly is that it is fail to support web pages, lots of contents with java scripts.
- It is only designed for the one digital signage display
- Some Screenly pro is designed for the user who wants to work with multi screens.
- It also works on the same hardware but it provides us with central interface.
- Screenly OSE was developed for the Raspbian; A Debian derived Linux distribution for raspberry pi.

VIII. BLOCK DIAGRAM OF PROJECT AND PROCESS

- Here the flow of the set up the project is given below.
- Step-1:
Configure raspberry pi as we discussed in our previous chapter. And install/boot all necessary file in SD card.
- Step-2:
Now connect power supply with raspberry pi
- Step-3:
Now connect HDMI cable with raspberry pi and with display of port 3(or u can choose any one of them).
- Step-4:
After that check IP address of raspberry pi and router.
- Step-5:

Now u sees the Desktop or web page of the Screenly Operating System on your desktop when you put IP address of raspberry pi with port.

- Step-6:
Now you configure all these peripherals and raspberry pi so now there is no need to again configure the raspberry pi.
- Step-7:
Now you can connect with any Wi-Fi capable device using router which is provided near the display and you can change the contents of the display
- Step-8:
Enjoy Digital Display.

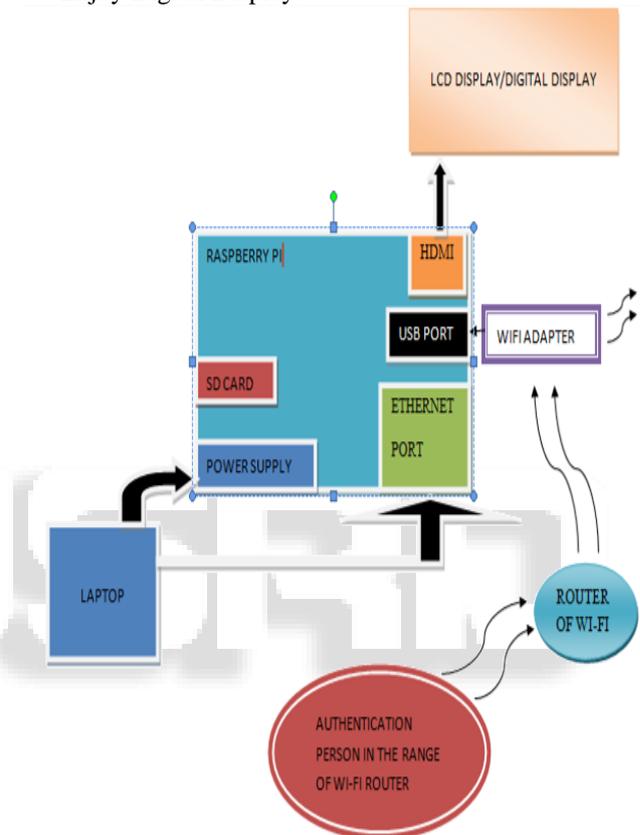


Fig. 5: Block diagram of project.

IX. CONCLUSION

- In Recent we have only work with Wired Digital signage because of we need more speed to connect with digital display.
- So this thesis has purpose of change wired connection to Wireless connection and maintains more speed to connect with digital display.
- In this thesis I used raspberry pi model and some software which basically support to Digital display and try to maintain a wireless digital signage.
- Advantages of this project are basically No need of internet connection while the system was already configure.
- We only need some wireless connection which is made by Wi-Fi router and we can change contents of digital display easily.
- No need of some extra hardware so system is not complex so we can easily mountain for personal advertisement.

- Unlike to stand alone and web digital signage we can have better technology using this Wi-Fi based Digital signage.
- And so for that I was try my best to get to reach up to that output.

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