

# Design & Implementation of Remotely Managed Embedded Digital Signage Using Raspberry Pi for Railway System

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**Abstract**— This paper describes the digital signage system using Raspberry pi based on embedded system. Digital Signage is a system of electronic displays installed in public places. Its aim is usually to display news, traveler information or location-specific information as image or text& advertisements - photos, video etc. This paper describes about the Digital signage system using Raspberry pi for Railway system. The Raspberry Pi is a credit-card sized single-board low cost computer. The aim of this paper is to provide the required information to the Railway passenger.

**Index Terms**—Digital signage system, Raspberry Pi

## I. INTRODUCTION

The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is a able little computer which can be used in such projects, &for lots ofof the things that desktop PC does, as spreadsheets, games & word-processing . Therefore plays high-definition video too.

Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker project works, from music machines & parent detectors to weather stations & tweeting birdhouses along with infra-red cameras. With the changing needs and time management a delay in Train schedule affect the passengers daily schedule in big way, and affect the timings of passengers schedule and at present system time Tables are displayed at Railway Station providing quite delayed information which created chaos in passengers. Trains are often delayed and passengers didn't informed about the schedule of trains on time and thus created a chaotic and this creates various troubles to passengers to have smooth and timely travel.

This paper is about a remotely managed digital signage system design considering embedded system design providing advertising and information to people in public areas.

Current Digital Signage techniques are explained, relevant concepts & architectures are discussed and specifications of digital signage systems are given. A novel, effective, fast and cheap remotely managed embedded Digital Signage System architecture is developed, designed, implemented & presented in detail. Each level of design detail does not commonly appear in the theory. This is a significant contribution especially for compact size embedded digital signage systems.

The strength of our work lies not only in developing a compact size embedded digital signage systems. Therefore in implementing and presenting this within the hardware and Therefore software engineering technology.

## II. DEVELOPMENT TOOLS

The simplest definition of this study is "remotely managed digital display, typically tied in with sales and advertising". In this paper, the aim is to develop a dynamic, web- based, low cost, effective and small sized digital signage system which can be controlled and modified by the users. Digital signage management interface gives the opportunity to users, customize their own web marketing panel over any device which can access to Internet. This implementation brings practical This design brings practical solutions to digital signage sector. Simple web browsers can act like adigital advertising panel.

### 1.PHP

PHP is a server-side programming language. Created by RasmusLerdorf in 1995, PHP is a Therefore software development tool which is designed for filling the gap between SSI and Perl, intended to develop web applications [2]. Its basic principal is to bring web pages in dynamic content. We use PHP v5.3 in this project. As a web server, we have chosen Digital Ocean's VirtualSub-sectionPrivate Server. When we have installed LAMP Stack v5.3, it comes by default. Version 5.3 is suitable to run this study.

### Apache Web Server

Apache HTTP Web Server is a web server in basic manner [8]. On our cloud server we are using LAMP stack. Therefore we're using Apache as web server for this project. And Apache supports a variety of features lots ofof which implemented as compiled modules which extend the core functionality. They can range from server-side programming language support to authenticationschemes.

### Twitter Bootstrap

Bootstrap is a free development tool which contains HTML and CSS based templates. Twitter was published by Bootstrap which was designed for front-end development of web applications & web sites. Bootstrap is a stable framework Therefore it reduces the chances to make mistakes while developing the code [4]. We have chosen Bootstrap 2.3.2 because our template written by this version.[7]

### CSS3

CSS3 is used in this study to customize the front-end. CSS; that means Cascading Style Sheet defines how to display HTML elements [6]. Cascading Style Sheets custom, colours, margins, fonts ,lines, width, background images, advanced positions height and lots of more things. CSS gives the benefit

of controlling the layout of multiple documents from a single style sheet.

### JavaScript

JavaScript (JS) is one of the most popular dynamic web programming language in the world [8]. JavaScript is used for making web pages interactive. syntax of Javascript was inspired from C. JavaScript is used in this work due to the following reasons;

- Uploading and submitting data and posting new content to the server without refreshing the page.
- Creating web page contents for resizing them and fading them in and out.
- Interactive content like audio and video.

### jQuery

jQuery is a light-weight "write less, do more" JavaScript library. Main purpose of using jQuery in our project is to make the use of JavaScript easier while developing our web application [4]. jQuery is one of the most popular and extendable JavaScript framework. Most of companies like Google, Microsoft and IBM use jQuery. Digital signage system is developed with jQuery version 1.7.2 due to template of the system supports the version. CSS frame work used here includes this version as default.

### Ubuntu Server 12.04 LTS

Ubuntu is a Debian-based Linux os, along with Unity as its default desktop environment. Ubuntu Server to be used in servers. The server's installation CD allows the user to install Ubuntu permanently on a computer to be used as a server. It does'nt install a graphical user interface.

### NetBeans

NetBeans is an open source integrated development environment for developing; Java, PHP, C++, XML, Groovy and other different programming languages. NetBeans can run on different OS like Ubuntu which was our OS while developing the project. NetBeans IDE 7.4 is used on Ubuntu 64 bit version in this project. It can handle features like user settings, NetBeans visual library, storage & framework wizard.

### HTML5

HTML, in other words Hyper Text Markup Language, is a programming language for describing web sites. HTML5 is used here because Twitter Bootstrap theme supports HTML5 [6]. This languag brings practical solutions to development process. e.g<video> element was used very effectively here. Data attribute is a crucial HTML5 features. Admin panel theme of Digital Signage System is very much responsive, it is an important reason for working with HTML5.

### Raspbian OS

Raspbian is an OS which is distributed by Linux. Linux specially developed this OS for Raspberry Pi devices [16]. Last version was published in January 2014. We used the latest version in this project. The most popular OS for the Raspberry Pi is Linux. Several Linux distributions are available for the Pi,

and chose Debian. Nowadays the Debian team has frozen the latest version named Wheezy, and due to the great efforts of the Raspbian team, and is available for the Pi. Raspbian supersedes Debian squeeze, which has been the reference OS for the Pi for long time. The Raspbian distribution has lots of advantages over all its processors. It is much faster and has more recent and be will be more stable. ATherefore, it is most preferred solution of the Raspberry team, Therefore the focus is on Raspbian.

### MYSQL

With over 10 million installations, MySQL is the most popular database management system for web servers. MySQL was developed in the starting of 1990s, now it's the most common used database engine [5]. Main reason for its success, like PHP, it's free to use. MySQL is fast and it can run on basic hardware easily. MySQL is a database system. Data is stored on tables. We used MySQL in our project because it can run stable with Apache WebServer and PHP. It's one of the elements of LAMP stack.

### Digital Ocean:

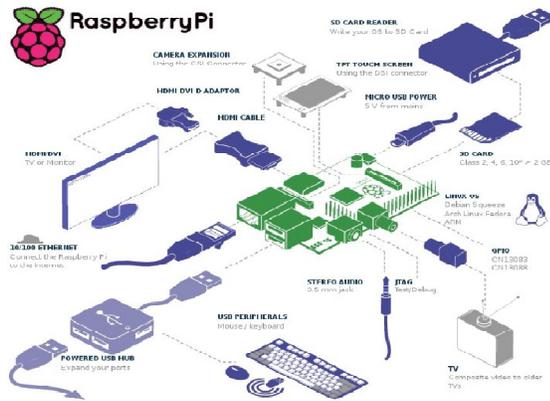
Solid State Drive (SSD) only cloud hosting company – Digital Ocean is becoming much popular among web developers. Digital Ocean gives all users with high-performance SSD Hard Drives, flexible API& the capability to select to nearest data center location. It is possible to rent a 512 MB of RAM & 20GB of SSD-powered disk space in Amsterdam for five dollars. manuscript in different sections. Fill the text from manuscript in different sections.[1]

## III. TECHNOLOGY & METHODOLOGY

This Project includes digital signage, Raspberry Pi, Raspbian, Linux OS, HTML, CSS, JavaScript and PHP programming technologies. The back– end side of the project is based on PHP language and the front–end side is HTML5 bootstrap. Server side of the system has to be developed on Web Server client side is on ARM board. About the ARM board we research and decide to use Raspberry Pi.

### Development of Digital Signage System

There are 3 phases of development. They are Development of front-end, development on back end and development on Raspberry pi.



**Raspberry Pi Model B System [1]**

#### Development on front end

Pages like Login page, Register page, Dashboard which allows users to see their devices, active slides and media library, Uploaded media which makes user to see media library, Add media which makes user to add new media by clicking the add media button, Add new device which makes user to see devices and also add new device features.

#### Development of Back end

In back end development new slide of either photo or video is created depending upon the requirement. user selects the media from his library which will be shown in the related slide. After this the system inserts slide info into database. In the last stage user arrange the slide order with the drag/drop feature and the system inserts the slide order to related database.

#### Development on Raspberry Pi

Raspbian OS wants a username and a password from user to login. This phase removed, because it is improper for end-user. therefore, changes are made in terminal by using some scripts which are developed by the project team. Raspberry Pi has a Midori web browser, but it doesn't have a capability of supporting HTML5's video element. Therefore, that issue is solved with an open source project which called PiViD. PiViD is a browser extension which developed with JavaScript. Footnotes should be typed in single-line spacing at the bottom of the page and column where it is cited. Footnotes should be rare.[5]

#### Technical specifications

Main part of the study is the embedded system design which runs on Raspberry Pi. Raspberry Pi electronic board provides much more affordable digital signage system. User interface is easy to learn and creating basic media is much practical. It is not necessary to install an extra program on client device to run the mechanism. Unluckily, Raspberry Pi has limited features in terms of speed and boot processes. Initial boot process is very slow and multitasking is not available. The Raspberry Pi is a credit-card sized single-board low cost computer as shown in Figure. It is implemented on an ARM board and have I/O ports. It can be implemented in electronics projects, and for

lots of other the things that any computer does. Besides it can play HD video. As shown in Table 1, there are two different models available in the market: Model A and Model B. In this system, the Model B is used, due to Internet connectivity over Raspberry is desired. Model A does not have an Ethernet port and the RAM is less than Model B. On the other side, the Model B has an Ethernet port and has 512 MB of RAM.[3]

## IV. CONCLUSION

This paper is about a remotely managed digital signage system design considering embedded system design rules and characteristics. Digital signage system design is based on various methods of using computer and television screens as well as other kinds of display devices in ways that are as efficient as possible to provide advertising and information to people in public areas. By using this system the passenger can get the required information regarding railway and data can be easily managed and synchronized over the server. This system is very secure and easy to access to user due to technology used in this system.

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