

# Implementation of Web Enabled Notice Board using SOC

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**Abstract** - Notice boards can change the way communication with each other, using notice boards is a constructive method of promoting important information to a large number of people. Notice board is ideally useful tool for organizing and displaying information, these are used in multitude of businesses such as schools, colleges, hospitals, railway station, bus station, hotels, shopping malls etc. As they can be used over and over again to displaying important notices or advertise forthcoming events or meeting. In this paper, we proposed an advanced wireless notice board in which at any time we can add or remove or alter the message according to our requirement. The main aim of this proposed project is to design low-cost notice board using development boards like Raspberry-Pi which is cheapest than its counterparts.

**Key Words:** Assets, HDMI, LAN, LCD, PC, Raspberry-Pi, Wi-Fi.

## 1. INTRODUCTION

Notice Board is used in various institutes to display notices and these boards are managed manually. It is a long process to put up notices on the notice board. This wastes a lot of resources like paper, printer ink, man power and also loss of time. In this paper we have proposed a system which will enable people to wirelessly transmit notices on notice board using Wi-Fi. The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. The original Raspberry Pi is based on the Broadcom BCM2837 system on a chip (SOC), It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spread sheets, word-processing, and playing games<sup>[1]</sup>. Here this work proposed to design a low-cost notice board using development boards like Raspberry-Pi(R-Pi) which is cheapest than its counterparts. The Debian Wheezy OS supported by R-Pi support full version Java-SE Java Virtual Machine (JVM)<sup>[3]</sup>. We will use java programming for communication between Advertisement Board and a remote server which can manipulate the notices currently being displayed. The notices must be in video form that to encoded by H.264 codec. The server will have GUI for communication with notice board<sup>[2]</sup>.

## 2. METHODOLOGY

This section deals with how the system is formed, how it works and the working algorithm of the concept.

## 2.1 System Design

The block diagram of web enabled notice board is shown in figure 1. A Raspberry Pi connected to an HDMI display which is our Digital Notice Board. A windows PC is used to publish the notice on the digital notice board through the internet. A server is fixed by setting up a local server on Raspberry-Pi. A LCD display is attached to Raspberry Pi using HDMI interface. The server continuously listens for a incoming message from a client. The user needs to enter server IP address and port number in order to connect with server. Once the connection established between the client and server they can send message to each other. 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. Uploaded Media allows user to see their own media library at this page.

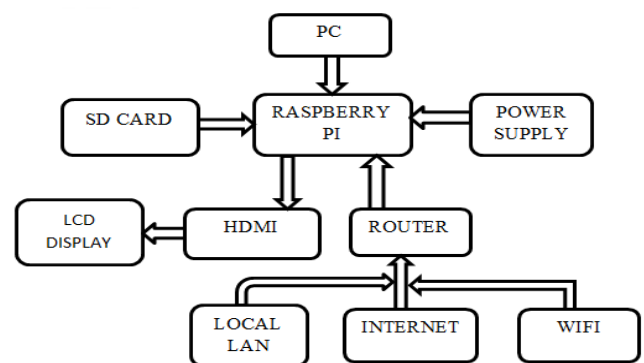


Fig -1: Block diagram of Web Enabled Digital Notice Board

Digital Signage system integration consists of basic elements. There is a display connected to HDMI out of Raspberry pi, power cable and Ethernet also connected to related ports of Raspberry pi. So the Raspberry pi can reach to digital signage web server. The administrative side of the system accessible by any device which can be connected Internet. It is simple to manage the digital signage system by our responsive design for laptops, smart phones and tablets.

## 2.2 Working Algorithm

The working algorithm for digital notice board is shown in Fig -2. In this paper, it is aimed to develop a user-friendly, web based, cheap, effective and compact 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<sup>[4]</sup>.

installed. The various software's that required for this project is:

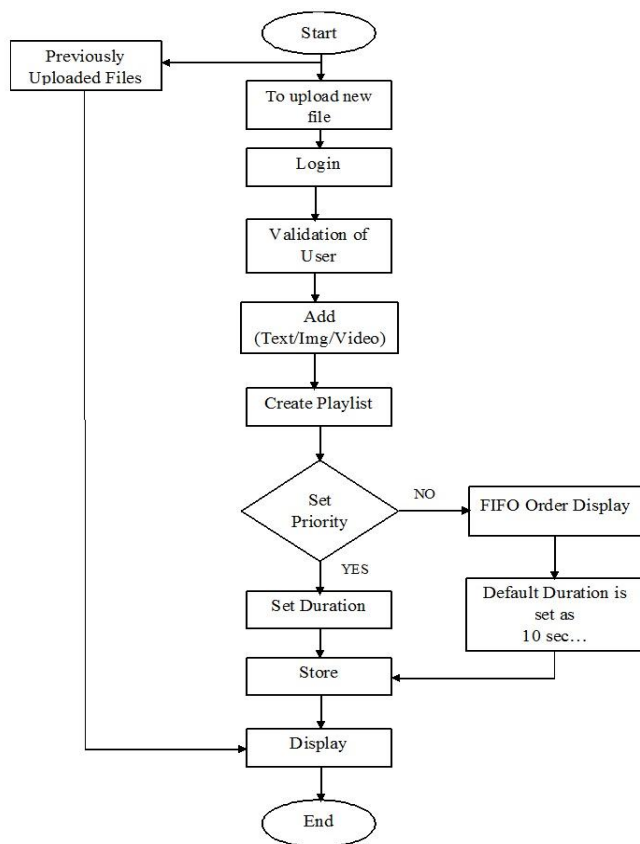


Fig -2: Working Algorithm

In order to start the uploading of information login is required. If the user enters valid user ID and password, then it will take user to access and upload the information, if not user can not access the system so can't able to upload any information. Once user access the system, required information will be uploaded by setting the priority and required duration. All those information will be stored in the memory. Then it checks each and every information for the priority, if priority was set information will be displayed based on the priority or else FIFO order will be followed. Then while displaying the information if any other information comes, then it checks the priority of new message. If that has the highest priority it will be shown first or else FIFO method will be followed. All those information will have its own duration time, till that time it will be appearing on the LCD display.

### 2.3 Development Tools

Software requirements deals with defining software resource requirements and prerequisites that needs to be installed on a computer to provide optimal functioning of an application<sup>[5]</sup>. These requirements or prerequisites are generally not included in the software installation package and need to be installed separately before the software is

**PHP:** PHP stands for Hypertext Pre-processor. It's an open source, server-side, scripting language used for the development of web applications. By scripting language, it mean a program that is script-based (lines of code) written for the automation of tasks. Web pages can be designed using HTML. With HTML, code execution is done on the user's browser (client-side). On the other hand, with PHP server-side scripting language, it's executed on the server before it gets to the web browser of the user. PHP can be embedded in HTML, and it's well suited for web development and the creation of dynamic web pages for web applications, e-commerce applications, and database applications. It's considered a friendly language with abilities to easily connect with MySQL, Oracle, and other databases PHP scripts can be used on most of the well-known operating systems like Linux, Unix, Solaris, Microsoft Windows, MAC OS and many others. It also supports most web servers including Apache and IIS. Using PHP affords web developers the freedom to choose their operating system and web server. In PHP, server-side scripting is the main area of operation.

**Apache Web server:** Apache Web Server is the most widely used web server software. Developed and maintained by Apache Software Foundation, Apache is open source software available for free. It runs on 67% of all webservers in the world. It is fast, reliable, and secure. It can be highly customized to meet the needs of many different environments by using extensions and modules.

**Twitter Bootstrap:** Twitter Bootstrap is a free, reliable and open-source front-end web framework for creating websites and web applications. The basic programming languages used for Bootstrap are HTML, CSS, and JS. Twitter Bootstrap allows web developers to create their beautiful and responsive website and mobile apps. Here we used Twitter Bootstrap to reduce the time of development process. Also Bootstrap is a stable framework so it reduces the chances to make mistakes while developing the code.

**CSS:** Cascading Style Sheet is a style sheet language used for describing the presentation of a document written in a mark-up language like HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript. CSS is designed to enable the separation of presentation and content, including layout, colours, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .CSS file, and reduce complexity and repetition in the structural content. CSS gives us the advantage of controlling the layout of multiple documents from a single style sheet.

**JavaScript:** JavaScript is one of the most popular dynamic web programming languages in the world. JavaScript is used for making web pages interactive. Its syntax was inspired from C. JavaScript is used in this project because the following reasons:

- Loading and submitting data and posting new content to the server without refreshing the page.
- Customizing web page elements 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. JQuery is one of the most popular and extendable JavaScript framework. Many big companies like Google, Microsoft, IBM and Netflix use JQuery. Digital signage system is developed with JQuery.

**HTML5:** HTML, in other words Hyper Text Markup Language, is a programming language for describing web sites. HTML5 is used in this project because Twitter Bootstrap theme supports HTML5. This language also brings practical solutions to development process. For example, <video>element was used very effectively in the project. Data attribute is also one of the crucial HTML5 features. Admin panel theme of Digital Signage System is responsive, this is an important reason for working with HTML5 by its own.

**Raspbian OS:** Raspbian is an operating system which is distributed by Linux. Linux specially developed this operating system for Raspberry Pi devices. The system is based on Debian Linux and is optimized to work efficiently with the Raspberry Pi computer. We used the latest version in this project. The most popular operating system for the Pi is Linux. Several Linux distributions are available for the Pi, and we chose Debian. Recently the Debian team has frozen the latest version named Wheezy, and because of the great efforts of the Raspbian team, it is available for the Pi already. Raspbian supersedes Debian squeeze, which has been the reference operating system for the Pi for a long time. The Raspbian distribution has many advantages over all its predecessors. It is much faster, it has more recent software, and it will soon be more stable. The Raspbian includes tools for browsing, python programming and a GUI desktop.

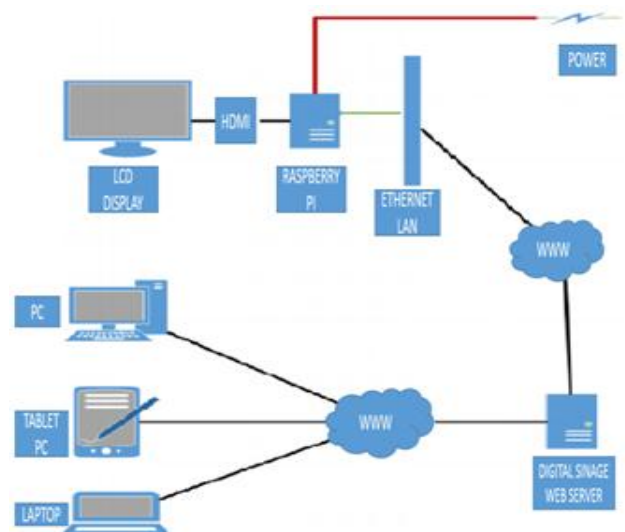
**MySQL:** MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). SQL is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use. MySQL is an essential part of almost every open source PHP application. MySQL is a relational database system. Data is held on tables. We used MySQL in our project because it can run stable with Apache Web Server and PHP.

**File-Zilla:** FileZilla is powerful and free software for transferring files over the Internet. It is a very popular FTP client and is used by webmasters from all over the world. One of the main FileZilla advantages is that the application is very user friendly and you can easily upload, download and manage files and folders. The software provides security solutions which encrypt and protect your data during the connection to the server.

**Python:** Python is a general purpose and high level programming language. We can use Python for developing desktop GUI applications, websites and web applications. The simple syntax rules of the programming language further makes it easier for you to keep the code base readable and application maintainable.

### 3. ARCHITECTURE

After these explanations and developments on raspberry Pi system, it is now possible to design suitable system architecture for successful and effective digital signage system<sup>[6]</sup>.



**Fig -3:** Digital Signage System Integration

Dashboard allows users to see their devices, active slides and media library<sup>[7]</sup>. Uploaded Media allows user to see their own media library at this page. End-to-end digital signage

system integration structure is given in Fig -3. Digital Signage system integration consists of basic elements. There is a display connected to HDMI out of Raspberry pi, power cable and Ethernet also connected to related ports of Raspberry pi. So the Raspberry pi can reach to digital signage web server. The administrative side of the system is accessible by any device which can be connected to Internet. It is simple to manage the digital signage system by our responsive design for laptops, smartphones and tablets.

### 3.1 Entity – Relationship Diagrams

Entity – Relationship diagram of database design for digital signage system is given in Fig -4. The structure consists of five tables as User, Media, Device, Slide and Slide Order. User information is stored in the USER table, every user has their own media so media\_owner attribute is stored in MEDIA table. System can access to devices through the owner\_id attribute in the DEVICE table and active slide of the device is also stored in the Device table. Slides are stored in the SLIDE table with their slide owner attribute. Finally order of the slides is stored different table which is SLIDE ORDER.

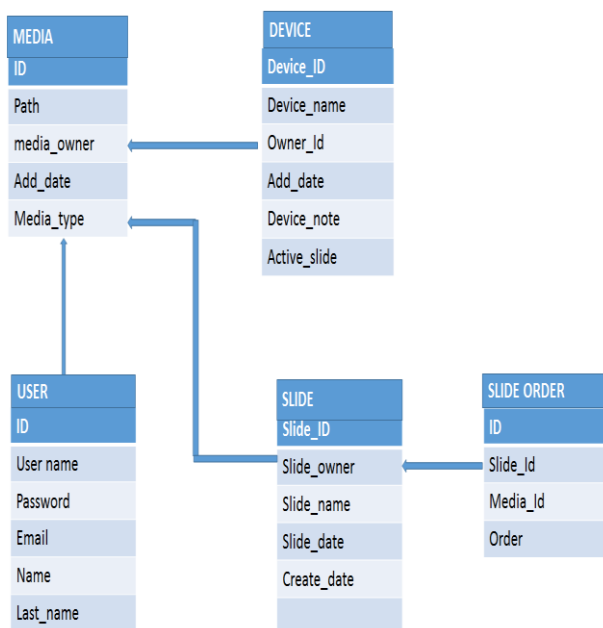


Fig -4: E-R Diagram

### 3.2 Use Case Diagram

Use Case diagram of digital signage system is given in Fig- 5. User can use seven different facilities of digital signage system. These are log in, register, Add/Delete Media, Add/Edit Device, Create Slide, Profile Edit and Dashboard Media, Device, User, Slide and Slide-order. User can add or delete photo or video files, and also add or edit device activation or select slide for related device. User can also create slides by selecting or arranging media or widgets. Propd Remotely Managed Embedded Digital Signage System can be usable at many different areas. It has variety of

solutions for different sectors by simple modifications. Digital signage systems are mostly used at communal areas like public transportation. Local buses and bus stations, subways and ferries can use digital signage technology. By using this method; informing citizens about the next departure, daily news, weather, traffic conditions and exchange rates can be easier. There are also some alternatives such as indoor and outdoor advertisements, entertainment; cinema, theatre and exhibition centers, education, and corporate information. Digital signage solutions are preferred by tourism sector too. Daily activities, specific tours, historical information about the local area can be easily explained to the visitors.

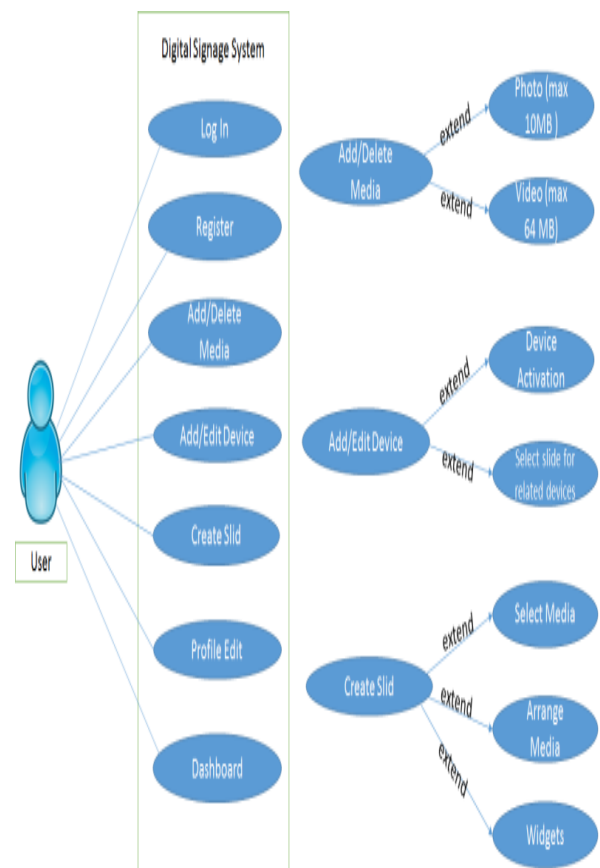
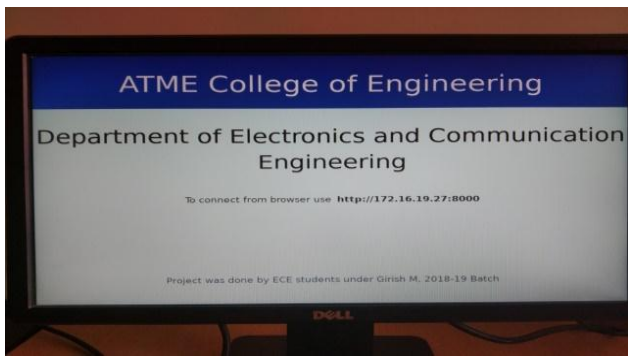


Fig -5: User case diagram

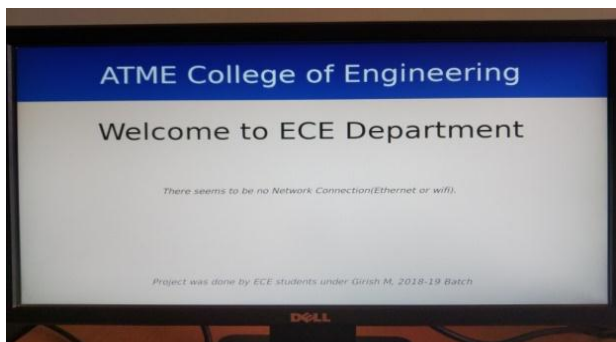
## 4. RESULTS AND DISCUSSION

In this chapter the Results of this project is discussed and outcome is shown in below figures.

- Connect the lan cable to raspberry pi & it will automatically connected to the college network and shows URL link .



- If Raspberry Pi is switched on without connecting lan cable or to a network then it doesn't show URL link.



- Copy the URL from display board and browse it in chrome using mobile or PC, Authentication Page will be displayed and type username & password and login.

### Sign in

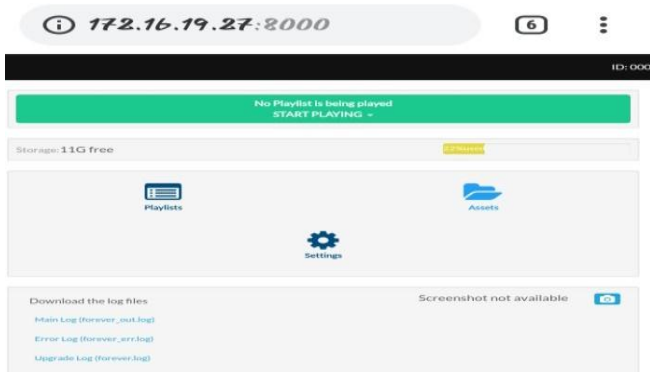
*http://172.16.19.27:8000 requires a username and password. Your connection to this site is not private*

Username  
**pi**

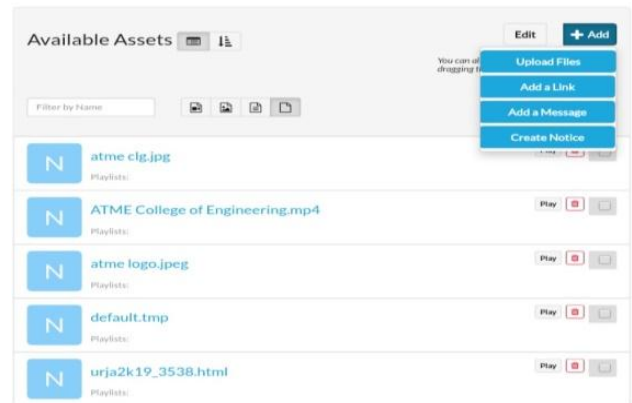
Password  
**..|**

**CANCEL SIGN IN**

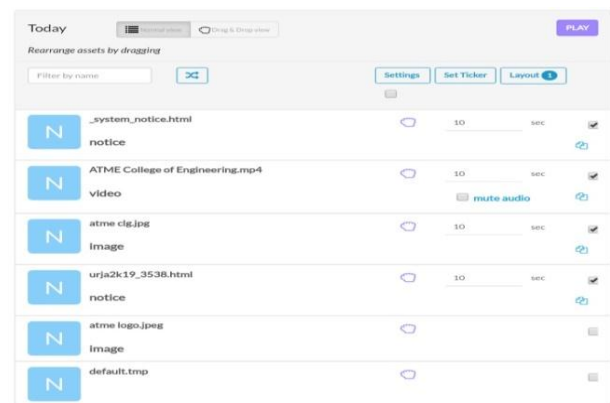
- After login the Home Page will be displayed in the display.



- Click on Assets and click on Add button to add images, videos or text information.



- Go to Home and click on Playlists then click on checkbox which needs to display and press play button.



- The displaying procedure is mainly depends on priorities. In the playlist first priority is given to the video, so it will play the uploaded video.



- In the playlist second priority is given to the image, so it will play the uploaded image.



- In the playlist third priority is given to the text message, so it will play the uploaded text message.



- The LCD display will displaying these informations till the stop button is press. And if user wants to upload more information again go to assests then add the files.

## 5. ADVANTAGES AND APPLICATIONS

In this section we have discussed about advantages and various applications of Web Enabled Notice Board. The timeline for the process of completion of the project is tabulated below.

### 5.1 Advantages

- Low cost notice board
- Flexible
- More reliable
- Useful to mankind in several ways
- Complexity is less
- We can display paperless notices
- Low power consumption

### 5.2 Applications

- Very helpful in displaying notices in colleges, Schools, Organizations, Railway Stations etc.
- To transfer messages from one place to another without any data loss.

## 6. CONCLUSION

Now the world is moving towards automation, so in this world, if we want to do some changes in the previously used system, we have to use the new techniques. Proper information reaching to the user in time is a key to the good governance. Particularly in the institution, government office, public utility center, etc., information or circular or notices should be available for longer period. Hence this project concludes that digital notice board is requirement of the institution and public places. This board should also facilitate public to get the information on storage devices. Wireless operation provides fast transmission over long range communication. This is actual key solution to the queries raised through Right to Information Act. Such solution will definitely save lot of paper and ink too.

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