



## **Implementation of Digital Notice Board using Raspberry Pi and IOT.**

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### **Abstract**

Notice boards are playing very important role in our day to day life. By replacing conventional Analog type notice board with digital notice board we can make information dissemination much easier in a paperless community. Here the admin can control notice board through internet. So information can be send anywhere in the world and can be displayed within seconds. Information may be in the form of text, image, pdf etc. PC is used for sending information and Raspberry pi is connected to internet at the receiving side. In addition to this an application which is installed on the admin's mobile phone can serve the same purpose. This application also contains a speech to text converter .So the admin can send text messages through his/her own voice.



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### **Introduction**

Notice board is an essential information gathering system in our life. In our day-to-day life we can see notice boards in various places like, educational institutions, railway stations, shopping malls, Bus stations, offices etc. So we can say that Notice boards are the places to leave public information such as advertise events, announce events or provide attention to the public, etc. Now days a Separate person is needed to stick those informations on the notice board. It will lead to lose of time as well as usage of manpower. In conventional analog type notice boards paper is the main medium


for information exchange. We know that informations counts are endless. So there is a usage of huge amount of paper for displaying those endless counts of informations.

The problems faced by the wooden or conventional type notice boards are resolved by the implementation of our digital notice board. It will bring an advanced means of passing notices around in the world in a much easier and efficient way. Due to the popularity of internet, we choose internet as a medium for transferring informations. The Internet of things (IoT) is the network of physical devices, vehicles,

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home appliances and other items embedded with electronics. Software, which enables these objects to connect and exchange data. Each device is uniquely identifiable through its Embedded computing system but is able to inter operate within the existing Internet infrastructure. For provide security, we add username and password type authentication system. So only respective authority can send informations. Raspberry pi which is the Heart of our system. A monitor is interfaced with Raspberry Pi. So informations in the form of text, image and pdf can display on the large screens. Our primary aim is to get more people's attention on the display. By the usage of high definition display devices people can get more attention on the notice board rather than conventional notice boards. In conventional wireless notice board can display only texted messages. But in our newly implemented system can display images and pdf documents in addition to text messages. Because in Educational institutions majority of informations given from the higher authorities in the form of images or pdf format. So displaying these types of informations make our system more user friendly. Due to the utilization of internet the sender can send message anywhere in the world. There is no range limitation for the successful exchange of information.

### Literature Survey

In early days GSM technology is used for displaying informations.<sup>1</sup> Here GSM module which is located at digital notice board is used to receive informations from the authorized user and displayed. In this work only text message is transferred. It become inefficient when we need to transfer other than text messages. By introducing the concept of Bluetooth technology<sup>2</sup> communications become faster and efficient. Here an android application is used for enabling Bluetooth for sending message. This work mainly focused on cable replacement and data can send up to the rate of 1 Mb per sec. Bluetooth has limited range (approximately 70m to 100 m). In order to increase the range of communication Zigbee based notice boards are introduced.<sup>3</sup> But here data rate is only about 250 Kb per sec. Wi-Fi based digital notice boards are currently used in many places like schools, colleges, railway stations, Airports etc. Here Raspberry pi which act as a receiver and it connected with local Wi-Fi networks. When a person wants to send information to raspberry pi, the person

first connected to corresponding Wi-Fi. So sender and receiver

must be within the Wi-Fi range. Maximum possible range of Wi-Fi is about 100 meter. Due to this range information exchange must done within the boundaries.

### Design Rationale

Achieving the following criteria is the main designing goal for the architecture of the proposed system.

- Reduction of man power: Reduction in the effort of a separate person, who has stick notices manually on the conventional notice board.
- Reduction in time: The facilities in the high speed internet, the peoples can view transmitted informations on the display board within seconds. There is less waiting time for accessing the informations.
- Ease in accessibility: Here notice informations are accessed through internet, so there will be widespread of the information over a wide region. Also internet will give access to its respective nodes connected to its server and hence accessibility becomes easy.
- Improvement over technology: The sender and receiver are connected with each other with the help of internet. Thus it will enable the communication over a wide range without any physical connections between them.
- Reduction in the size of system: Only Raspberry pi is used for achieving overall performance of the system. This single hardware makes the reduction in the system.

### Proposed System

#### Overview

Figure above shows the Block diagram for the proposed system. The main objective of the system is to develop a wireless notice board that displays notices in the form of image, text, pdf. It uses a Raspberry pi as a processor. Raspberry pi is equipped with a Portable Projector/LCD display. We can display messages and can be easily set or changed from anywhere in the world. In addition mobile application is used to convert voice into text. Here the voice is pass through the voice reorganization system and converted into text.

The system will sent this message to cloud. Then it passes to the notice board which is connected to internet by Wi-Fi. The processor, process it and displayed on the screen. We can send the message to all the screens or desired screen.

### Methodology

The main function of the proposed system is to develop a Digital notice board that display message sent from the user through internet and to design a simple, user friendly system, which can receive and display notice in a particular manner with respect to date and time which will help the user to easily keep the track of notice board every day and each time he uses the system. System consist of two section called as sender and receiver, which shown in the figure 1. Sender is responsible for sending valuable informations through the wireless network. In order to access Digital notice board the sender must enter into the corresponding web address. For preventing unauthorized access web address we provide security authentications like username and password. If the username and password entered are invalid then the user can't access the digital notice board. When the user enter correct password and user name web address will opened and get space for the information transmission. User can access this web address either using personal computer or mobile phone. To make the proposed system more user friendly we make an android application. By using this application sender can directly enter into the web address. In addition to this android

application contain voice to speech converter. So the sender can send text message through his own voice without typing messages. These messages including text file, image file and pdf file will send to the cloud. In the simplest terms, cloud means storing and accessing data and programs over the Internet instead of our computer's hard drive. The cloud is just a metaphor for the Internet.

In receiver section, Raspberry pi is connected on Wi-Fi for accessing internet. 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. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. 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 spreadsheets, word-processing. Raspberry pi is activated by supply power around 5v. After switch on Raspberry pi, it will collect data from the cloud. The web address for collecting data from the cloud is already specified through program written in the processor. Upon receiving messages it will displayed on the monitor. Raspberry pi has no VGA port. So in order to interface LCD monitor with Raspberry pi, HDMI interface is used. The received text messages are displayed on the screen like scrolling manner. Similarly received images will display on the screen. For displaying Pdf files, first it converted into image file by the program written in the Raspberry pi. After

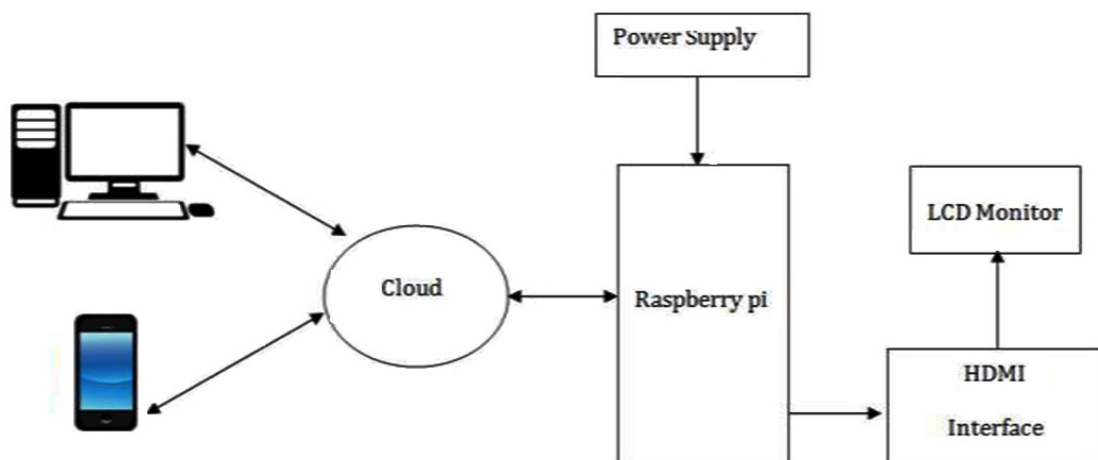


Fig. 1: Proposed Methodology of IOT and Raspberry System

converting all the pdf pages in to images then it will display. Each two pages in the received pdf file will displayed at a time. To achieve this monitor screen is spitted into two sections. Each section displays each page. After a certain delay the next pages will displayed. All these messages are displayed sequentially after short delay.

In addition to this we provide Deleting and modification option at the web link. If sender wants to delete some image or pdf file, he can simply delete it by clicking the corresponding link in the web page. Also we delete or modify text messages whenever we want. After deleting the messages from the cloud it will automatically deleted on the display after a short delay. We can change the scrolling text color, text size, display graphics, delay between the messages by simply made changes on the program.

### Algorithm

Following step by step procedure will explain the actual working of the system

1. Start
2. Login for access notice board.
3. If the user is valid then go to step 4 otherwise go to step 2.
4. Select Informations in the form of image, pdf and text files
5. Upload files.
6. Store the message.
7. Set the duration of displayed messages.
8. Set maximum limit for the size of image to be displayed.
9. If the received image is less than the limit it will directly displayed. Otherwise image will resized.
10. When pdf is received it will converted to image.
11. Received image and text files
12. Display stored messages in First in first out order(FIFO)
13. Check for new notice. If it occur go to step 8.else go to step 9
14. Repeat above steps when power supply maintained.
15. Stop

### Results and Discussions

The proposed system was successfully tested to demonstrate its effectiveness and feasibility. In

this paper PC and android application is used as a transmitter and Raspberry is used as a receiver. Sender and receiver is interfaced through a wireless network Display is connected a. the receiver side. Raspberry pi is connected to Wi-Fi network to access data on the cloud. After establishing connection data stored on the cloud will be displays.

For sending information sender must enter in to the login page. Figure 2 shows the login page of our IOT based digital system. Username and Password

**Fig. 2: Login page**

is predetermined. If we enter wrong username and password an error will displayed on the login page, which shown in figure 3. So after typing correct username and password in the respective columns, next page will displayed in the web server

**Fig. 3: Invalid password detection**

Upload page contain icons for sending text messages, pdf files, image files. In addition to this there is a separate icon for deleting previously send data. Figure 4 shows the uploading page on web server.

Fig. 4: Upload page

For deleting previously send data simply click on the delete page icon. A new window will contain facilities to delete documents.

Fig. 5: Digital Notice Board

In delete page which contain separate list of our previously send data. In order to delete data by simply select the corresponding data in the list and press delete icon. After a short delay deleted data will be erased in receiver section.

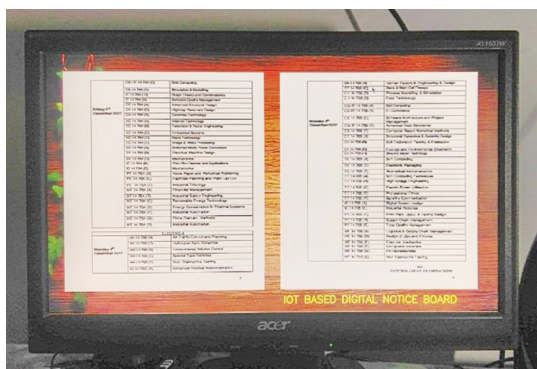


Fig. 6: Displaying pdf files

Received pdf files are first converted to image format. After the conversion of pdf into image it will be displayed. For making dual display on a monitor, we paste each converted page in pdf on background image at a predetermined position.

Figure 6 shows the illustration of displaying pdf files on our digital notice board. Here two pdf pages are simultaneously displayed on monitor.

When the received image size exceeds our predetermined values then it will resized to our predetermined set of values and displayed. Received text messages will display like breaking news in TV channels. Text messages can also be sending from the android application through voice. After each 10 seconds displayed messages will changes to next message. Newly send pdf, image file has high preference. So when we send a message in the form of image or pdf it will displayed first then after 10 seconds delay previously received messages will display. But in the case of texted messages newly received message is displayed followed by the previously send text message. So text message is displayed one after one in the serial manner. This process will continue as long as the power supply is maintained.

### Advantages

Because of the usage of internet for the transmission of messages have lot of advantages. It includes high data transmission rate, better message quality, less waiting time etc. Username and password authentication system make the system more secure. Here raspberry pi can act as a central processing unit. So we can send not only texted messages but also can send image files in the form of Jpg, jpeg, png and pdf files with better quality. By providing deleting option it makes the newly proposed system become user friendly. This facilitates deleting any previously send data at any time. This system provide first step to achieve paperless community. Due to the reduced usage of paper in a community which make the community environmental friendly. By utilizing the advantages of Raspberry pi we can add graphics on displays. When add graphics it will get more attention from peoples. Main aims of all type of notice boards are to pass information on peoples as much as possible. So this system can pass informations on more peoples than conventional wooden type notice

boards. Due to the inbuilt memory in Raspberry pi data from the cloud is stored. This will make the system non volatile. Any failure in the power supply does not effect on the stored data. Due to these advantages the proposed system can extended to live telecasting of informations around the world.

### Conclusion

Now our world is moving towards digitalization, so if we want to do some changes in the previously used system we have to use the new techniques. Wireless technology provides fast transmission over long range data transmission. It saves time, cost of cables, and size of the system. Data can be

sent from anywhere in the world. Username and password type authentication system is provided for adding securities. Previously the notice board using Wi-Fi was used. In that there was the limit of coverage area, but in our system internet is used as communication medium. So there is no problem with coverage area. Multimedia data can be stored on chip or on SD card. Text messages and multimedia data can be seen fast as possible with better quality.

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