

IOT based Digital Notice Board using Raspberry Pi

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Abstract: Notice board is a common device that is used to display information. Many universities and other public sectors relay on wooden notice board for displaying the announcements. However, reliance on such traditional boards is not efficient to convey relevant information around the organization. This paper emphasizes on basic idea of IOT based digital display using raspberry pi.

The primary aim of the proposed system is to ensure that information send from remote place is displayed on digital screens. At transmitter, authorized user sends the notice using an android application as well as website. At receiving end, Wi-Fi is connected to raspberry pi.

When the administrator sends the notice it is broadcasted to multiple digital screens. Data transmission is done through wireless technology. All users would be notified about the notice being displayed with a sound alert. This project deals with the use of IOT and raspberry pi.

Keywords: Wireless notice board, raspberry pi, authorized user, IoT, digital information distribution, digital information broadcast, internet.

I. INTRODUCTION

As technology changes the way we live our day to day lives, it is fascinating to imagine what the future will bring. People want to be informed and up to date with latest events happening around the world. Nowadays, people prefer wireless connection because they can interact with people easily and it requires less time. Wireless is a popular technology that allows an electronic device to communicate with other devices without any linking of physical media between them.

The main objective of the project is to present a notice on a digital display using the widely used technology IOT, to facilitate the displaying of the notice on digital unit through an administrator's mobile application. Its operation is based on raspberry pi programmed in python programming language.

II. INTERNET OF THINGS (IOT)

The Internet of Things (IoT's) can be described as connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the Internet. The devices are intelligently linked together which enables new forms of communication between things and people, and between things themselves. Building IoTs has advanced significantly in the last couple of years since it has added a new dimension to the world of information and communication technologies.

The Internet of Things is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment. The confluence of efficient wireless protocols, improved sensors, cheaper processors, and a bevy of start-ups and established companies developing the necessary management and application software has finally made the concept of the Internet of Things mainstream.

The development of the Internet of Things will revolutionize a number of sectors, from automation, transportation, energy, healthcare, financial services to nanotechnology. IoTs technology can also be applied to create a new concept and wide development space for smart homes to provide intelligence, comfort and to improve the quality of life.

III. RASPBERRY PI

The Raspberry Pi is a credit-card sized computer which can be used for many of the things that your desktop PC does, like word processing and games.

However one key aspect that makes the Raspberry Pi so brilliant for schools is its ability to execute “Python” coded programmes. It is a single nanocomputer card ARM processor designed by designer David Braben video games, as part of its foundation “Raspberry pi”.

IV. LITERATURE SURVEY

To put notice on notice board is a very long process, a lot of resources such as paper, printer ink, man power are wasted due to this and leading to loss of time. Therefore, in order to avoid such things we have developed an idea which gives rise to a system that overcomes all of these problems.

The following table gives the comparison of Bluetooth and Wi-Fi:

| Standards | Bluetooth | Wi-Fi |
|-------------------|---------------|-------------------|
| Power Consumption | Less Powerful | High Powerful |
| Bandwidth | Low(800 kbps) | High(11 mbps) |
| Device Connected | Upto 7 | More than 7 |
| Frequency | 2.4GHz | 2.4,3.6 and 5 GHz |
| DataTransfer Rate | 25mbps | 250mbps |
| Range | 30m | 100m |
| Security | Less | High |
| Latency | 200ms | 150ms |
| Bit Rate | 2.1mbps | 600mbps |

Table 1: Comparison of Bluetooth and Wi-Fi

V. SYSTEM ARCHITECTURE

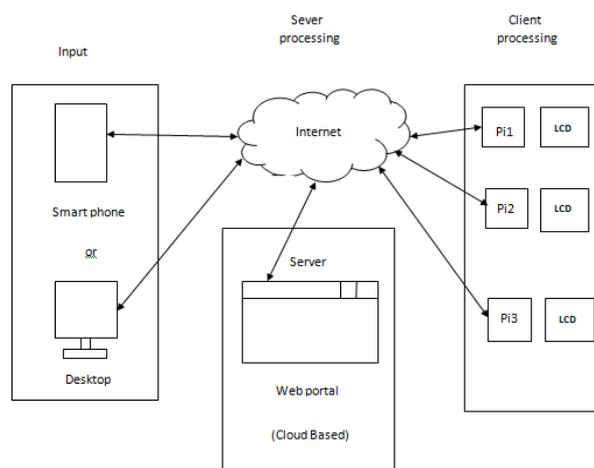


Figure 1: System Block Diagram

The basic structure of the system consists of four major blocks and its working is explained below:

Input:

The data to be inputted is in the form of pdf format. The user can send multiple notices one after another to one or more display screens.

The input consist of two sub components:

Mobile Device:

This device can be a smart phone or a tablet which has an android application in it. With the help of this application, the authorised user is able to post the notice from any remote location via his mobile phone or a tablet. Information from this device that is to be outputted on the digital display screen is further sent as an input to the web server via internet i.e. Wifi.

Desktop:

The input information that is being posted and displayed on the digital display screen (LCD) can be sent from a laptop or any computer device. The notice is sent from a desktop computer or a laptop just with the help of url access in web browser.

Server Processing:

In order to access the notice board and distribute the notice to various other display units, it is necessary to have web platform. Thus to achieve this, creation of the web server is essential and the notice is hosted on the 3rd party cloud service. Server Processing consists of 2 major sub components:

Internet/Wi-Fi:

The notice sent from the input unit is hosted on the web server via internet or Wi-Fi. Distribution of notice which is in the pdf format to multiple display screens is done over the internet from any remote location.

Web Server:

This is also called as web portal based on cloud service. The notice is hosted on a web page using the cloud service with the help of accessing the web browser. Therefore at server side, web platform enables the notice which is posted on the web server to be broadcasted to multiple various digital display screen (LCD) through the internet.

The notice is further sent to the digital display unit after selecting the post notice button on the web page. At a time, the notice is broadcasted to multiple different digital screens.

Client Processing:

The client side consists of multiple digital display screens or units called as LCD. Each display unit has a raspberry Pi associated with it. The final output is displayed on the digital display unit which can be a TFT, VGA, HDMI all these belonging to the LCD display unit. Display unit used for displaying the notices to multiple screens can also make the use of a normal television.

Raspberry Pi:

Here, the data is received from the incoming source and checks for the format of the incoming notice. If the format of the message is appropriate then only it forwards the data to the display device and if not it keeps displaying the older message discarding the new incoming message. This mechanism is done by the operating system of raspberry pi called as raspbian using the programming language python.

Each digital display unit is associated with different raspberry Pi to output the notice received from the web server. Pi 1, Pi2, Pi3 are the 3 raspberry Pi's linked to the desktop located at different places over a certain geographical area.

This System makes use of Raspberry Pi3 which is the third generation Raspberry Pi. Pi3 is being replaced by Raspberry Pi2 which has built-in Wi-Fi and also consists of four USB ports, Bluetooth connectivity, 900 MHz RAM and many other advanced features.

VI. IMPLEMENTATION

The actual working of this system can be explained with the help of the screenshots uploaded below:

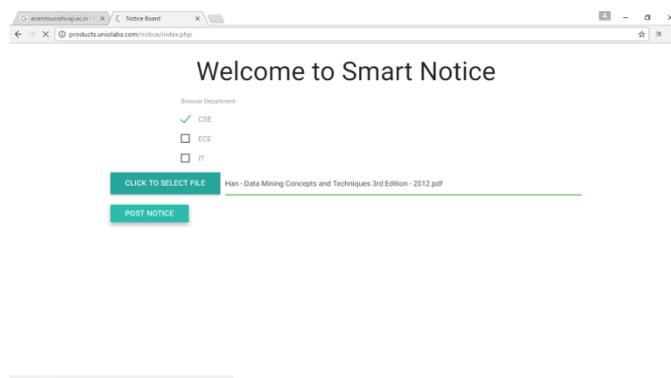


Figure 2 : Welcome page with 1 selected department

The figure 2 shows the welcome page of the website which consists of list of departments-ECE, CSE, IT where the notice has to be displayed and 2 buttons. The administrator is allowed to select any of the department of its choice where the notice will be distributed accordingly to either multiple or a single department. The web page also consists of two buttons. One button is used to choose the format of the file to be displayed, it can be a pdf file, or a jpg file or a normal text document which has to be posted and the other button is labelled as the post notice button which is used to confirm that selected notice is to be posted.

In figure 2, only one department is selected that is CSE, so the notice will be uploaded only on a single department's display unit. Therefore, the administrator has the right to access to any number of departments in order to post the notice. Corresponding department will receive the notice which has been selected in turn to get displayed on the display screen of particular department.

System can send the notice either to one or to multiple notice boards of corresponding departments simultaneously from remote location through the use of internet.

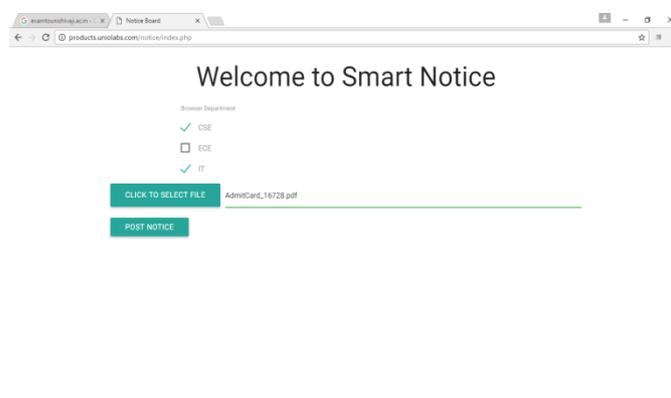


Figure 3 : Welcome page with 2 selected departments.

The figure 3 shows that web page of welcome to smart notice where the administrator has selected two departments that are CSE and IT. Here, the notice will be sent to 2 departments at the same time containing the same file format. If the user has selected a pdf file then both the departments (CSE, IT) will receive the pdf file itself.

In figure 3, the notice will be posted on two different departments within the same interval of time. Both the departments will receive the notice on its respective display unit.

Whenever the notice is delivered successfully it shows “Notice sent successfully” message as shown in the below figure 4

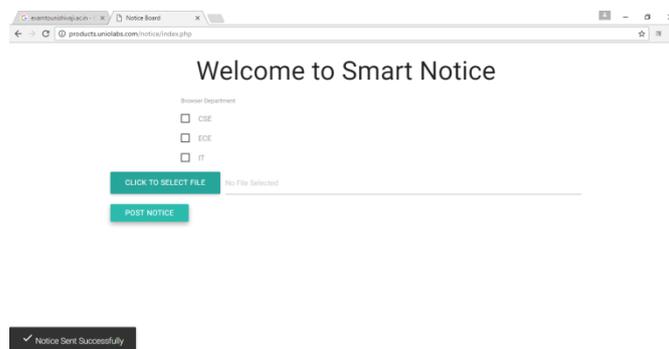


Figure 4: Message popped up as Notice Sent Successfully

In figure 4, the message gets popped once after the post notice button has been selected. This message of successfully sent is only displayed if the notice has been posted and the receiver at the web server successfully receives that particular notice.

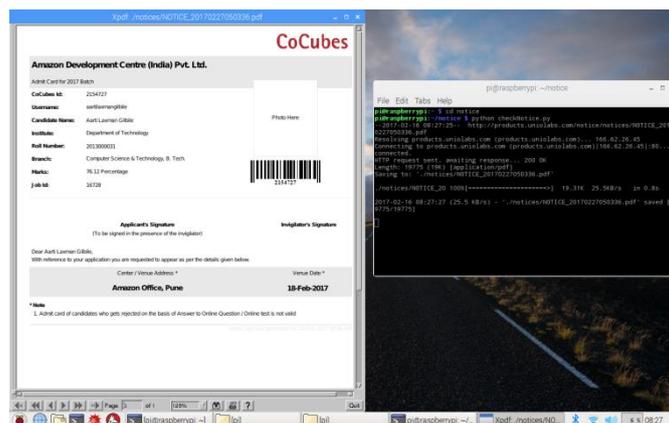


Figure 5: Notice displayed on screen

The Figure 5 describes how the notice is being displayed on the particular digital screen of the corresponding departments. The command prompt window which shows the progress of the notice that is being receiving on the digital screen.

In figure 5, it shows the notice which is displayed on screen the department's display unit such as the LCD screen. This is the notice which has been selected by the administrator that has to be posted on the display screen of corresponding department. The window beside the notice displayed is the command prompt window from where the progress of the notice is showed also termed as the terminal from where the program gets run. The notice is sent to the web server and when the web server receives it successfully, the command prompt window shows connection with the global web server is done and the http request from the client to server has been sent. After, this the web server sends the notice to the operating system of raspberrypi where the raspberrypi checks by verifying and validating the format of the notice is correct and if yes then only posts the notice to particular display unit of various departments.

VII. CONCLUSION

The aim of system is have easy access to students and announcement convenience for the administrator. It provides a user-friendly interface and fast data transmission between user device and LCD screens using raspberrypi. The data can be sent from remote location.

The display boards are one of the major communication medium for mass media. The system can be extended by adding new features like local languages and this can be achieved by using a graphics and other decoding techniques. It can be observed that the system saves time, energy and hence environment.

Cost of printing and photocopying is also reduced as information can be given to a large number of people from our fingertips. Thus we can conclude that this project is just a start, an idea to make use of IOT in communications to a next level.

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