

Raspberry Pi Controlled Smart e-Notice Board using Arduino

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Abstract - Sharing information among a group of gathering is a very important and critical application in many circumstances. Even though many electronics notice board has evolved in the recent time, they are not flexible enough in serving its purpose. The aim of this project is to provide a well flexible and reliable e-Notice board which can be used in Colleges, Schools, Railway Stations, or in any group gatherings. This project is done with Raspberry Pi2 as a Server and the Arduino Boards with LCD displays as the Smart e-Notice Boards.

Keywords - IoT, Notice Board, Embedded, Networking, Raspberry Pi, Arduino.

1. Introduction

Many new communication technologies have been developed in the last couple of decades. Sharing information is the main motto of any communication technology. Apart from sharing information, technology has evolved in such a way that, the desktops and electronic appliances are accessed remotely. In our day-to-day life, we are using many appliances in home, office and public places like airport, bus stands, hospitals etc., for our comfort and convenience. Communication technology helps us to exchange information and also allows monitoring and controlling the machines from remote locations. This controlling of appliances is possible with wired or wireless communication interfaces embedded in the machines. The growth of Embedded System along with the Networking Technology has given rise to many interesting applications. One such application is the Public Addressing System (PAS) through Notice Boards. Being in the era of IoT devices, we should be able to have an e-Notice Board which can support wired and wireless data transfer. Also it will be

very much appreciable if the messages can be scheduled in the notice board well in advance.

The Smart e-Notice board is aimed at the colleges and universities for displaying day-to-day information continuously or at regular intervals or a scheduled message. Being connected to internet or intranet system, it offers flexibility to display the flash news or announcements faster than the traditional system. This type of display system can also be used in other public places like schools, hospitals, railway stations, parks etc., making the announcements easier, without disturbing the surrounding environment.

2. Related Works

Many works were done towards the development of Electronics notice boards in the recent years. The model for displaying notices in colleges on system by GSM technology is done already ^[2] and it can be suitable only for text based messages and also a good network reception is needed to receive the SMS. A method of instantaneous notice board ^[1] has been proposed and implemented but the disadvantage of that system is that it requires the student or the end user to login to the desktop to see the updated flash messages. A GSM based multiple notice boards ^[3] is also designed and in this proto type, all the notice boards will have the same display which is sent through the SMS.

The proposed system is designed in such a way that it can overcome the shortcomings of the available prototypes and also it is flexible so that it can be extended in the future with few modifications.

3. Proposed Work

The block diagram of the proposed methodology is given below. The Raspberry Pi2 system acts as the central server of the proposed system and the Notice boards are accessible only by logging in with the correct credentials in the raspberry pi server.

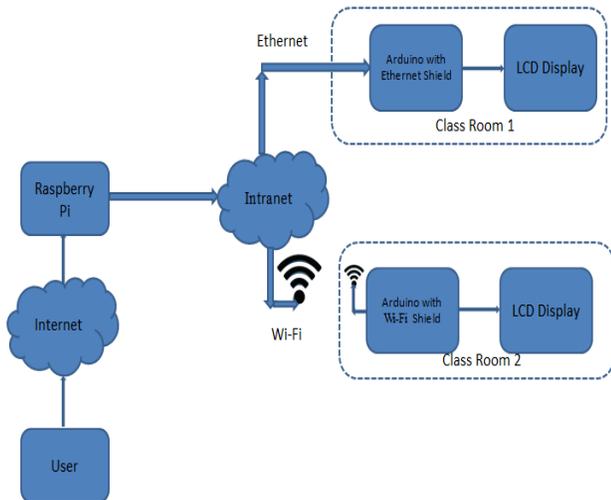


Fig. 1 Block Diagram of the Proposed Method.

Raspberry Pi2 acts as the server for this e-Notice board system. It is connected to internet using a proper IP Address, so that an authorized user of this system can login from anywhere. Raspberry Pi is connected to the intranet network also. The display system in Class room 1 will be having an Arduino board with an Ethernet Shield and a LCD Display attached with it. With the help of the Ethernet shield the display node is connected to the intranet. In class room 2, the Arduino is connected with a Wi-Fi shield and a LCD Display and this node is also connected to the intranet through Wi-Fi. These devices will also have a valid IP address assigned towards them.

3.1 Working of the Proposed Method

RaspberryPi2 is configured as the login server for this e-Notice board system. The authorized user will launch the internet browser from anywhere and he will type the URL of the Raspberry Pi2 Server. A login page will be displayed to the user. The user id and the password are validated by the raspberry pi server and if it matches the user is given permission to the next page.

In the next page, user will have an option to send the message to any one of the display nodes and also will

have an option to send the same message to all the nodes simultaneously. User has to select the proper selection and he will be redirected to a page where he will be asked to enter the actual message. Using HTTP GET and POST methods the data from the webpage are transferred to the display nodes. The display node receives the data and it shows the message immediately on the LCD screen. In case if the user selects the choice to send to all the nodes, the data is transmitted to all the display nodes and immediately the messages are flashed in the LCD display.

3.2 Hardware and Software Used

The Raspberry Pi2 is a credit card sized general purpose Linux computer which is running Raspbian OS on it. It is used as the login server of our project. It has a 900MHz quad-core ARM Cortex-A7 CPU and 1GB RAM. Raspberry Pi2 acts as a Web Server in this project, apache Web server is installed in the system and the login page is designed with HTML, Javascript and CSS. The authentication is done by PHP.

Arduino is an open-source computer. It is a microcontroller board based on the Atmega328. This Arduino system is used in the display nodes and it is connected to a 16x2 LCD display. In classroom 1 we used an Ethernet shield along with the Arduino for the connectivity. In classroom 2 ESP8266 Wi-Fi modem is attached with Arduino and so the connectivity is achieved in room 2. The software IDE Arduino 1.7.9 is used and the C & C++ program is written to make the Arduino to work on a client mode to receive the data from HTTP protocol and to display the data in the LCD display.

4. Results and Discussion

The results and the snapshots obtained in the execution of the proposed method are listed below. The Figure (2) is the snapshot of prompting for the user id and the password from the user. The Figure (3) is the snapshot that prompts the user for the flash message to be sent. The Figure (4) is the image which shows the display in the LCD which has been transmitted through the HTTP protocol.



Fig. 2 Login Page.

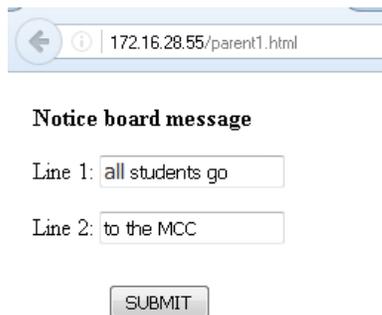


Fig.3 Send Message Page

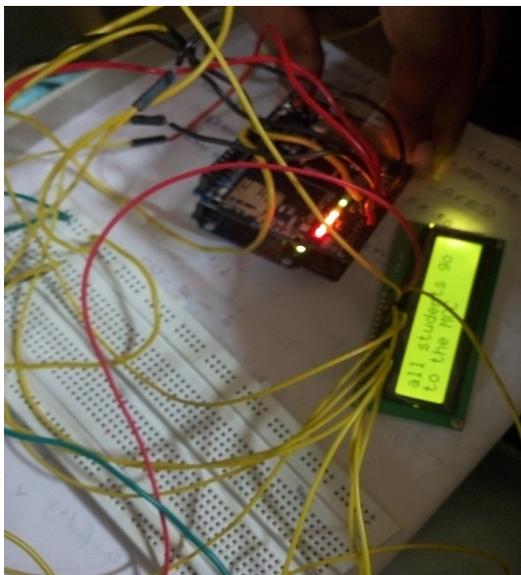


Fig.4 Display Node Output

5. Conclusion and Future Work

In this paper we have presented a smart e-Notice board which can display the message instantly without any delay. It is so much flexible and the messages can be customized

for each display. Also we have a facility to send the same message to all the display nodes. It is very much reliable because the intranet connections can be much better than a GSM based system. Also, as the raspberry Pi2 server is connected to the internet, the authorized user can send the data from anywhere. This system eliminates the purpose of manual display of notice boards and it can be used as a replacement for the normal display boards.

In future, a database can be developed to store the displayed messages, so that we can keep track of the old messages. It is possible to flash an image instead of text if a graphics LCD screen is attached to the display node. It will be a nice feature if the messages are stored in the database and it can be flashed at predefined time duration. By making use of an e-Notice board instead of the traditional notice board we can move towards a greener planet.

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