

Web Controlled Digital Notice Board

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ABSTRACT: *Wireless Digital Notice Board can be used in various public utility places, it can also be used in institutes and organisations, thus reducing man power as well as the usage of papers in our day to day life and requires very less time. The main objective of this project is to develop a web controlled notice board, in which an authenticated user can send notices from the webpage to the server and that notice gets displayed on the LCD screen. In this project, ESP32 module is used which has a built-in Wi-Fi through which the user gets connected to the server and a Raspberry Pi is used as a processor to decode the notice.*

Keywords: ESP32, Web Server, Raspberry Pi, Wireless Digital Notice Board.

1. INTRODUCTION

In today's digital world, notice board plays an important role in everyone's life. Notice boards can be used in various public utility places like railway stations, hospitals, offices also in institutes and organisations etc. This project provides the ease of communication between administration and students in colleges. Whenever a notice is passed it directly gets displayed on digital notice board, without efforts like printing on a paper and then attaching it manually. In this project, ESP32 is used which has inbuilt Wi-Fi module. Arduino IDE is used to program the ESP32. Within just few lines of code we can establish a Wi-Fi connection with the ESP32 and can access the web server. The ESP32 module will read the incoming messages/notices from the web server and sends it to the Raspberry Pi which is connected to the LCD and it will then display the message/notice on digital notice board. For security purpose, we have a given authentication like username and password for connecting to the Wi-Fi of ESP32, so that the information can only be sent from an authenticated user.

2. LITERATURE SURVEY

This project briefly introduces the major properties of GSM system. It includes five parts. It is about service and features, architecture of GSM system, channel and frame structure of GSM, GSM security features, data in the GSM System [1]

This project presents an SMS based notice board incorporating the widely used GSM to facilitate the communication of displaying message on notice board via user's mobile phone. Its operation is based on microcontroller ATMEGA32 programmed in assembly language [2]

Using the IoT technology of Raspberry Pi and Android, an authenticated user can send and control the messages/notices from anywhere which will be displayed on LCD display notice board at the home location. With the proposed system, the resources like time and manpower are reduced sufficiently [3]

This project offers about an advanced hi-Tech wireless notice Board. This device is improved to display the present day facts via an Android application of smart phones or tablet. While person sends the message from the Android application tool, it is received and retrieved by using the Bluetooth device at the display unit. The Bluetooth access password will only be known to the person, it is then sent to the microcontroller that in addition displays the notice sent from the user on the electronic notice board which is equipped with a liquid crystal display. It makes use of an Arduino machine device(AVR microcontroller) to manipulate the operation [4]

The main objective of this project is to develop a wireless notice board that displays notice in the form of image, text, pdf. It uses Raspberry Pi as a processor. The Raspberry Pi is the heart of this system. In this system an android application is used to send notices. After sending the messages it gets displayed on the LCD screen [5]

3. SYSTEM REQUIREMENTS

The two major requirements of this system are hardware and software requirements. The hardware used in this project are ESP32, Raspberry Pi, LCD (Liquid Crystal Display), Speaker, Connecting Wires and a power adapter of 12V-3A is used. The software used are Arduino IDE and QT Designer application.

3.1 HARDWARE

3.1.1 ESP32



ESP32 is a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters and power-management modules, ESP32 is created and developed by Espressif Systems, a Shanghai based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor of ESP8266 microcontroller.

3.1.2 Raspberry Pi



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.

3.1.3 LCD (Liquid Crystal Display)



A liquid crystal display (LCD) monitor is a computer monitor or display that uses LCD technology to show clear images, and is found mostly in laptop computers and flat panel monitors. This technology has replaced the traditional cathode ray tube (CRT) monitors, which were the previous standard and once were considered to have better picture quality than early LCD variants. With the introduction of better LCD technology and its continuous improvement, LCD is now the clear leader over CRT. Also, LCD monitors may be made much more cheaply than CRT monitor.

3.1.4 Speakers



We need Amplifier Board and Speaker to use this Module. Bluetooth FM USB MP3 Audio Board with LCD Display with IR Remote Control. Speakers are used for announcement purpose.

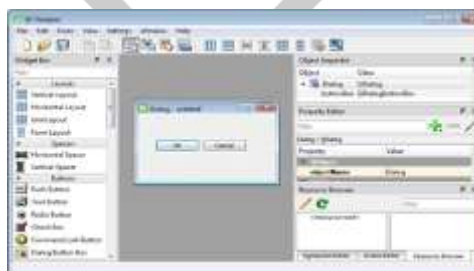
3.2 SOFTWARE

3.2.1 Arduino IDE



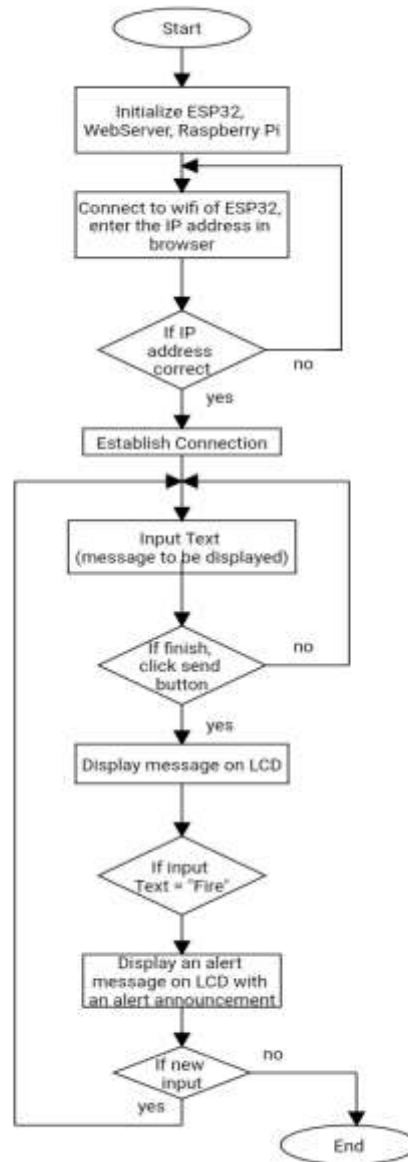
The Arduino Integrated Development Environment or Arduino Software (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. It is an open source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs – light on a sensor, a finger on a button, or a twitter message and turn it into an output-activating a motor, turning on LED, publishing something online. Embedded C was to program the ESP32 in Arduino IDE.

3.2.2 QT Designer Application



QT Designer is the QT tool for designing and building graphical user interfaces (GUIs) with QT widgets. We can compose and customize our window or dialogs in what-you-see-is-what-you-get (WYSIWYG) manner and test them using different styles and resolutions. The Py-Qt installer comes with a GUI builder tool called QT Designer, using its simple drag and drop interface.

4. FLOWCHART



5. METHODOLOGY

In the transmission section the message/notice, the user wants to display on the LCD should be entered in the web page.

The web page is created by using HTML language. The web page consists of a text box and a send button where the user can write any information he/she wants to send and after clicking the send button the data will be sent to the web server. The receiver section consists of ESP32, Raspberry Pi and LCD display. The digital notice board can be used by the authenticated person only by using the default SSID and password to connect the users wifi with the in-built wifi of ESP32. The user can enter into the webpage by searching the default IP address of the local webserver which is '192.168.4.1'. The ESP32 is programmed by using embedded C language in Arduino IDE. The Raspberry Pi is programmed using Python language and design by using the QT Designer Application.

The ESP32 will receive information through the web server and it will then send it to the microprocessor i.e. Raspberry Pi and later the notice will get displayed on the LCD display. In case, if there any danger happens or any place catches fire we can made an alert announcement using the speakers with an alert message which will be displayed on the digital notice board by sending the specified keyword 'fire' to the LCD display. The specified keyword 'fire' is case insensitive. We can stop the announcement or remove the alert message by refreshing the webpage and by clicking the send button. If the user switched off the LCD screen with the message shown on the LCD screen, the same message will be still there on the LCD screen when the user will switch on the LCD screen again. There will be text file in the backend where the user can see the last updated message sent to the LCD and the message in the text file will always get overridden as the user will send the next new message to display on LCD screen.

7. ALGORITHM

Step 1: Start

Step 2: Establish a connection between microcontroller (ESP32) and Wi-Fi Module.

Step 3: Enter the default IP address (192.168.4.1) in the web browser

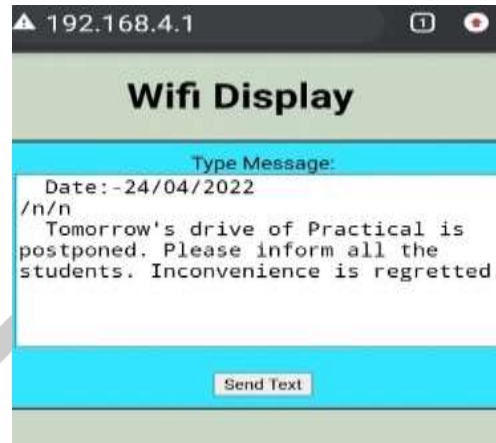
Step 4: A webpage will be displayed containing a text box and a send button. Enter the message you want to send and click the send button.

Step 5: The message sent will be displayed on the LCD display.

Step 6: Stop

8. OUTPUT

8.1 Webpage



We have created this webpage using embedded C and HTML language. To access this webpage, user needs to enter the IP Address on the browser of mobile phone and click on search. Using this webpage user can send any information or notice he/she wants to send by entering the text and clicking the sent text button. The message will be directly get displayed on the LCD screen. Here the '`\n`' used is for the new line. We can use both forward or backward slash to specify the new line in the entered text.

8.2 LCD Screen



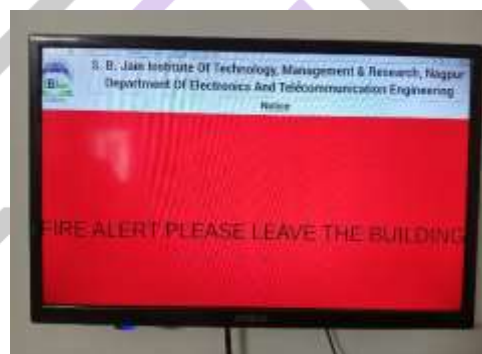
Final output after sending the message through the webpage on the LCD screen.

8.3 Fire Alarm



Fire alarm is the additional feature we have added in this project. To display the alert message on the LCD screen and to make an alert announcement if any danger happens. The user needs to type the 'fire' text and send it as shown in the above figure.

8.4 Output of Fire Alarm



The background of the LCD screen will change its color to red. With this, an announcement will be made using the speakers. We can change this alert message in the backend and the audio file also.

9. ADVANTAGES

1. Multiple users can be authorized and allowed to send notices on the digital notice board.
2. It will not allow an unauthorized user to send notices, hence it increases the security.
3. No printing, photocopying cost, and human power are required. Thus, it saves money, energy, and time.
4. Very easy to operate and consumes less power.
5. It can be used in any public utility places like educational institutes and organizations, offices, railway stations, etc.

10. CONCLUSION

As the world is getting advanced each day, digital notice boards are transferring from manual-based to digital display boards. We have evolved the version of wireless digital notice board device through ESP32 and Raspberry Pi connected to it, which display the desired message sent by the user via the mobile. Hence, ESP32 and Raspberry Pi being small but effective devices and working efficiently in digital notice boards linked with software. This proposed device has a lot of upcoming applications in educational, organization, railways, malls, advertisement, and many others. But the main parameter is the cost parameter, and this project is very cost-efficient, simple, and easy to understand.

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