Digital Notice Board Using Raspberry Pi

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***Abstract*—We working on a program to create digital notice board that uses ESP32 LED matrix for quick alert function and Raspberry Pi LED screen to display more detailed information. With the combination of these two things, we can send short messages while also being able to display more complex data. Apart from that this kind of system can be updated wirelessly through an easy-to-use web interface. I think this is the best one! ESP32 is great for short messages while Raspberry Pi screen has ability to show more detailed data like PDF files and images. This is also something we can use at schools, offices and public places where quick information is needed. With the automation we make the project more efficient and share more information. All from your desk**

***Index Terms*—Raspberry PI, ESP-32, 8x32 LED Matrix, LED Screen**

I. INTRODUCTION

Notice boards are widely used for announcements such as general or safety information for educational and other official purposes; notice boards for business and office use; notice boards for public places such as parks and/or roads; public information bulletin boards for hospitals; and public notice boards for highway signs. Digital notice boards are a more contemporary, efficient and environmentally friendly solution for distributed news material. This project proposes a Smart Digital Notice Board in which Raspberry Pi and ESP32 are used as an intelligent communication device with a user friendly and efficient system. Compared to IoT solutions that exist wholly dependent on internet access, our system operates within a localized environment without a network outside the premises. The Raspberry Pi/ESP32 is the basic control-and-loading/moderation unit of our system, whose job is to maintain and update all content uploaded to the board and for controlling the display. The function of the ESP32 is to ensure the wireless communication within the premises to an authorized user by means of a computer or mobile app. Furthermore the notice board has the ability to use text, images and videos to communicate effectively Voice announcements to make it accessible for people with disabilities The system also includes sensors that allow automation of certain functions such as controlling the brightness of the display depending on the ambient lighting level or only turning on the screen when there is motion, thus saving energy. By adopting this smart and self-contained digital notice board institutions will reduce the use of manual labor, paper waste and streamline the dissemination of information making communication more efficient and sustainable.

II. LITERATURE REVIEW

A digital notice board is a modern twist on the traditional notice board, which makes it easier to update messages using techniques such as Wi-Fi, Bluetooth and IOT. One of the main reasons Raspberry Pie has become so popular in these systems because its powerful characteristics and flexibility are due to it. In 2011, Dalwadi presented a wireless notice board using RF communication. Then, in 2015, Maryi and her team carried things a step forward by adding Wi-Fi and LCD display, making the remote update very easy. Rapid forward to 2020, and Kapula used a Wi-Fi-based system with an arduino to control it wirelessly. In 2021, Kaur and her team performed a wireless notice board built on ESP-32, making it easier to connect with other IOT devices-as you are targeting with your raspberry pie-based project. Gaikwad and colleagues, also in 2021, were used with Bluetooth for local communication, but it is limited in range compared to the wider access of Wi-Fi on the Raspberry Pie System. Patel and Patel (2017) focused on using Raspberry Pie to create an IOT-operated smart notice board, which enables real-time updates and cloud integration. Similarly, Kumar and Prasad (2018) developed a Wi-Fi-based notice board with remote updates through the web interface. All these

studies suggest how effective microcontroller-based systems can be, and they actually highlight the benefits of using Raspberry Pie to create a digital notice board that are able to scalable and real-time updates.

III. IMPLEMENTATION TECHNOLOGY

1. Raspberry Pi

The raspberry pie is a small but powerful computer that runs Linux. In this project, it acts as the brain of the system - explains everything from the management of the material to control the LED screen. It ensures smooth, high-quality performance of images, videos and announcements.

2. ESP 32

ESP32 is a smart microcontroller with an underlying Wi-Fi and great processing power. Here, it is used wirelessly to send scrolling messages or alerts to small displays, such as LED matris. It communicates locally with raspberry pie, so no internet is required.

3. 4-Cascaded MAX7219 8x8 LED Matrix

This is a compact LED display (8X32) used to show small, eye-catching messages-such as scrolling text or emergency alert. ESP32 controls this matrix for real - time updates.

4. LED Screen

It is the main display unit, which is capable of showing pictures, videos, PDF, and more. It can also be seen clearly in sunlight. Raspberry Pie updates the screen in real time.

5. Computer (Administrator Side)

An administrator uses a desktop or laptop to manage and schedule. It connects the raspberry pie directly on a local network, making the update fast and safe - no internet requires.

IV. METHODOLOGIES

1. Raspberry Pi Setup:

We started with the brain of the raspberry pie -our system. Installed Media Player Software and Blender. It was not designed to lift heavy, but it handled the performance functions properly. Smooth video playback on projector? Checked.

2. Esp32 Programming:

Esp32 was our wireless messenger. We flash it with a simple code to draw the message from the pie. The alert pops up on LED matrix in real time. Fast. reliable. Some insects, but some are not serious.

3. LED Screen Configuration:

Connected to the main screen via HDMI or GPio. PDF and a Python script went on to show updates. Sometimes a signage app is used. The performance was bright, clear, and worked indoors and outside.

4. Administrator computer setup:

Admins used a PC to upload the material. No internet is needed - just local network. Files were pushed to PI and ESP32 via browser. Simple dashboard. Rapid upload. No duplicate.

5. System Testing:

Final Stage: Connect everything to the same network. Rain test alert. Monitor flask log and ESP32 output. Minor here and there twics. Finally, all parts worked together - just as we expected.

V. SYSTEM ARCHITECTURE

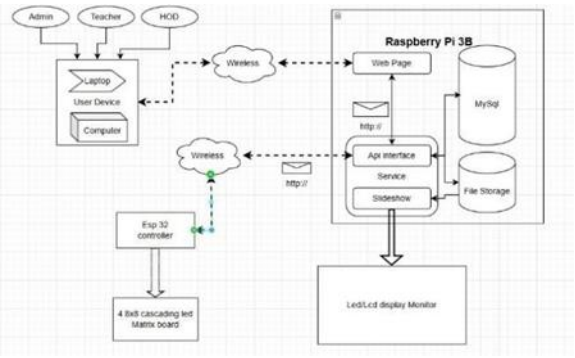

Figure 5.1 Block Diagram

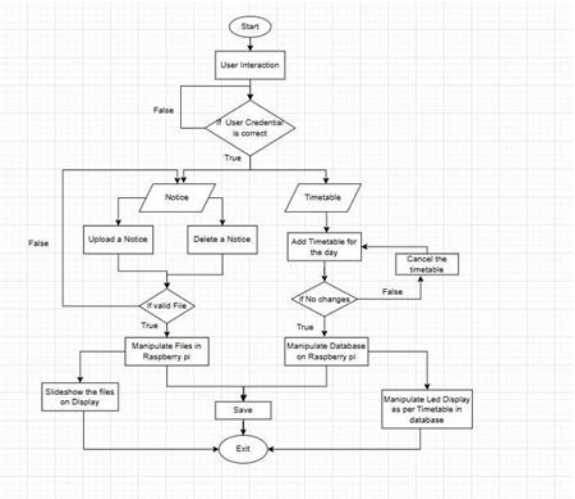

Figure 5.2 Flowchart

VI. FUTURE SCOPE

This is only the beginning. Smart digital notice boards

are becoming even smarter, nimbler, and interconnected. Imagine: automation using artificial intelligence, notices that refresh themselves, and important communications will highlight themselves. Perhaps you could even initiate the process using your voice: simply say, "Update the schedule for the meeting," and it will happen. No typing. No problems. Then think about using cloud storage—that might actually be the most game-changing aspect. You upload one thing, one time; from anywhere, you will be able to access it. There is no longer a fear of running out of storage space or completely losing the material, and let's not forget about safety; someday enhancements might offer end-to-end encryption so that only authorized users can make updates, ridding change updates from other parties.Customization features will be the second part of the equation. Think; for time of day, or even a touch-sensitive screen. These digital notice boards will no longer be a bored static. They will learn, they will engage, and they will interact. Then think about smart cities. Notice boards with built-in traffic updates, linked to transit systems, and emergency messaging will become live hubs of communication and information. Schools, businesses, train stations, anywhere notice boards bring immediate needs for updates; the software will continue to develop and become smarter and more flexible; and always connected. It is coming fast.

VII. RESULT

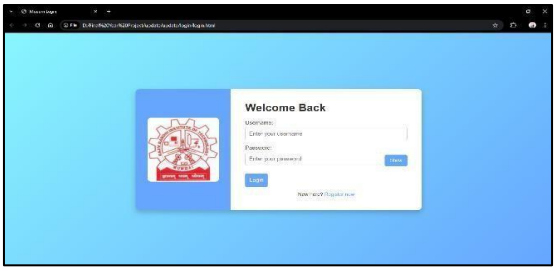

Figure 7.1 Login Page

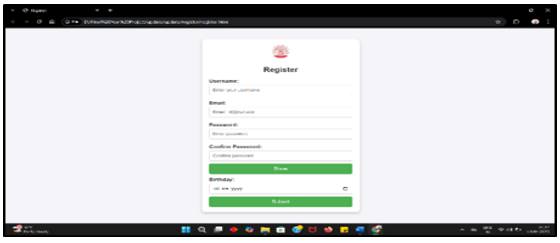

Figure 7.2 Registration From

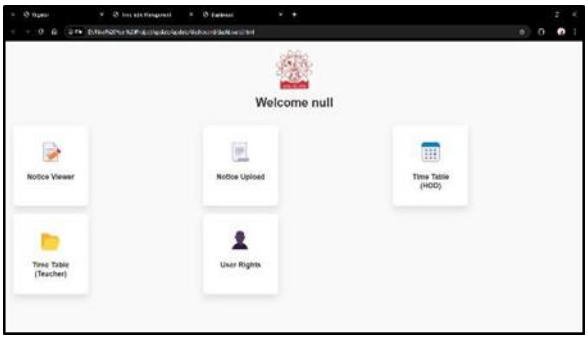

Figure 7.3 Dashboard

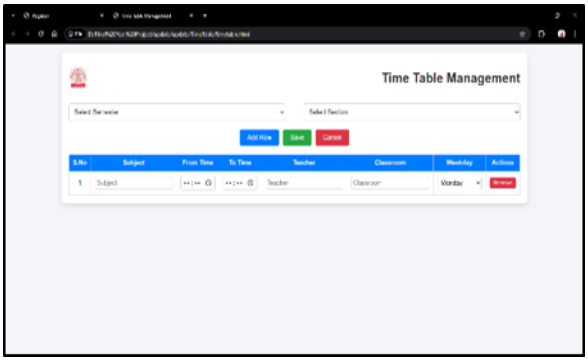

Figure 7.4 Time Table Management

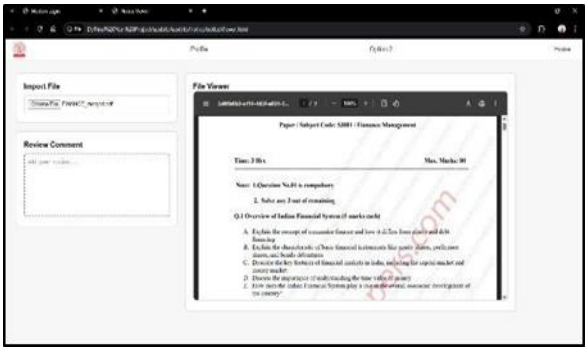

Figure 7.5 Notice Viewer

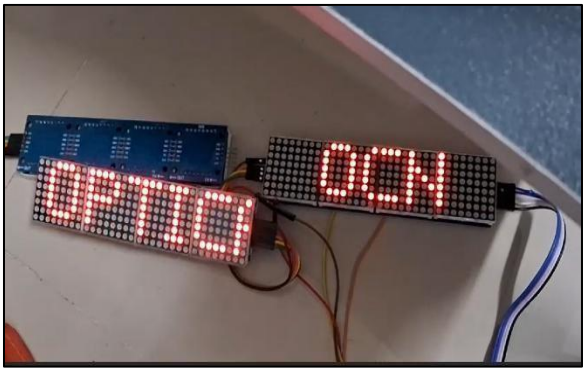

Figure 7.6 Display Output

Figure7.7 Raspberry Pi Setup

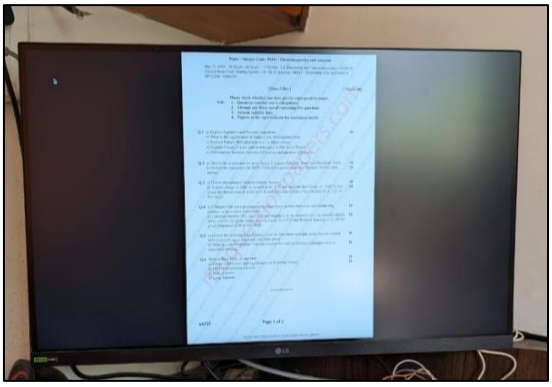

Figure 7.8 Output

VIII. CONCLUSION

Notice boards have come a long way! This digital system makes it super easy to update announcements—say goodbye to messy papers and old notices. The ESP32 takes care of the display, while a Raspberry Pi serves as the system's brain, letting administrators manage everything from afar. Need to make a correction, post an update, or share an important message, It's all quick and hassle-free. But it's not just about convenience. This setup is budget-friendly, scalable, and energy-efficient, making it an ideal choice for schools, offices, and public spaces. Real- world testing has shown it to be reliable, proving that digital notice boards are truly the future of effective communication.

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