WIRELESS DUAL - CONTROLLED COLLEGE BULLETIN BOARD

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Abstract:

A bulletin board is an essential communication platform used to display important announcements, updates, and information in an organized and accessible manner. While traditional boards relied on manual methods like pin-up or cork surfaces, advancements in technology have transformed them into digital systems capable of real-time updates. In fast-paced environments such as educational institutions and offices, conventional boards are often inefficient and time-consuming. To overcome these limitations, the proposed Dual-Controlled College Bulletin Board integrates GSM and Wi-Fi technologies, enabling instant, remote, and reliable message transmission. This system enhances communication efficiency, ensures timely information delivery, and provides greater flexibility in managing updates from any location.

Keywords: Microcontroller, GSM Module, Wi-Fi Module, LED Board, Android mobile, Notice Board.

1. INTRODUCTION

A bulletin board serves as a central hub for announcements within an organization. While traditional boards used physical surfaces, modern versions have evolved into electronic displays. This innovative system utilizes dual-control connectivity GSM and Wi-Fi to facilitate seamless communication between administration and users.

Authorized personnel can send messages via mobile devices, ensuring instant distribution across campus. This technology significantly enhances communication speed, reduces paper usage and ensures that vital information reaches the intended audience promptly.

Several Authors Researched on Wireless Notice Board Systems

Ankit Gupta and Rahul Sharma, this paper demonstrated a GSM-based wireless notice board that allows users to send messages through mobile phones, which are received by a GSM module and displayed on an LCD, improving communication speed and reducing manual effort [1].

Neeraj Khera, Divya Shukla, and Shambhavi Awasthi introduced a Android-based wireless notice board that uses Bluetooth and ZigBee technologies to transmit messages from a mobile application to a display unit for short and medium-range communication [2].

Pooja Patil, Sneha Patil, and Bhagyashree Patil this paper develops a GSM-based digital notice board system that receives SMS messages via a GSM module and displays them instantly on an LED screen, ensuring quick and reliable communication [3].

K. S. Reddy and M. V. Ramesh paper presents a Wi-Fi-based smart notice board system that enables real-time message updates through a web-based interface, allowing remote access within a network [4].

S. Meena and R. Karthik proposed an IoT-based notice board system using Wi-Fi technology, where messages can be sent through mobile or web applications, ensuring real-time updates and efficient information sharing [5]

R. Rajesh and V. Suresh this paper introduces a hybrid notice board system that integrates both GSM and Wi-Fi technologies, where GSM supports long-distance communication and Wi-Fi enables local updates, improving system flexibility and reliability [6].

Dharmendra Kumar Sharma et al. it explains a wireless electronic notice board system using Bluetooth and ZigBee technologies, providing a cost-effective, energy-efficient, and flexible solution for short-range communication [7].

Kamal Penmetcha et al. paper proposes a smart notice board using GSM technology that allows authorized users to update notices remotely through SMS, ensuring faster communication without manual intervention [8].

Manoj V. M., M. Tharun, Naveen S. N., and Bhaskar S. this paper describes a GSM-based wireless smart notice board system where messages are transmitted via SMS, received by a microcontroller, and displayed in real time on a screen [9].

V. V. Praveen Kumar, K. R. Ganesh, P. R. Harini, and R. Srivathsan introduced an IoT-enabled real-time digital campus notice board that integrates sensors like DHT11 and RTC to display messages along with environmental data such as temperature, humidity, and time [10].

Most existing wireless notice board systems focus on a single communication technology like GSM, Bluetooth, or Wi-Fi and lack flexibility, real-time efficiency, and dual-control features for practical use in institutions. This paper addresses these limitations by developing a dual-controlled system using both GSM and Wi-Fi, enabling instant message updates through SMS and mobile applications. It provides a simple, reliable, and efficient solution with a P10 LED display for effective real-time communication.

2. BLOCK DIAGRAM

The Dual Controlled Wireless College Bulletin Board is designed as a modular system where the ATmega328P Microcontroller acts as the central hub. The system begins with a power acquisition stage where a single-phase AC supply is stepped down and stabilized using an SMPS and a 7805-voltage regulator to provide a clean 5V DC signal. This power drives the control logic and the communication interfaces. The input layer consists of two distinct wireless pathways: the SIM900 GSM module for long-range SMS data and the Wi-Fi module for local network data. These modules are interfaced with the microcontroller via Universal Asynchronous Receiver-Transmitter (UART) protocols, allowing the processor to listen for incoming strings of text from an authorized mobile device.

Once a message is received through the selected wireless medium, the microcontroller executes the firmware logic to parse the data and prepare it for visual rendering. Before the text appears, the controller triggers a high-frequency Buzzer to provide an acoustic notification, ensuring the audience's attention is drawn to the board. The output stage involves the P10 LED Display, which is interfaced through a series of data pins that control the multiplexing and brightness of the LED matrix. The software calculates the shift registers required to create a smooth, horizontal scrolling effect for the text. This architecture ensures that the system is redundant; if the local Wi-Fi network fails, the administrator can simply toggle to GSM mode to ensure that critical information is still delivered to the display without interruption.

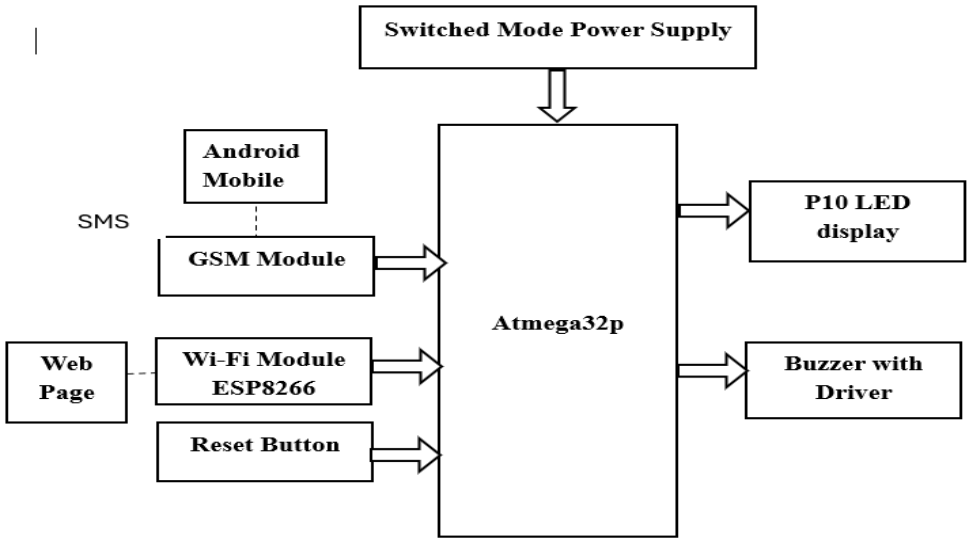


Figure 1. Block Diagram

3. HARDWARE MODULE

The hardware module build for Dual Controlled Wireless College Bulletin Board is shown in the Figure 1.

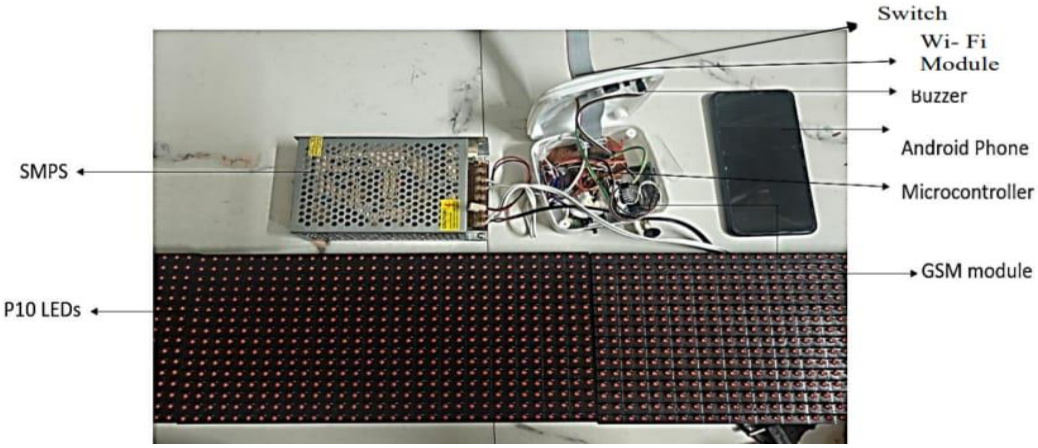


Figure 2. Hardware Module

The "Dual Controlled Wireless College Bulletin Board" lies in the integration of specialized hardware components designed for reliability and real-time data processing. At the centre of the system is the ATmega328P Microcontroller, a high-performance 8-bit AVR RISC-based processor. It acts as the "brain," managing the complex tasks of receiving wireless data, decoding text commands and controlling the visual output on the LED display. To ensure a stable power environment, a Switched Mode Power Supply (SMPS) is utilized. This unit efficiently steps down 230V AC to a lower voltage, which is then rectified and filtered. A 7805 Voltage Regulator is specifically used to maintain a consistent 5V DC supply, protecting the sensitive logic circuits of the microcontroller from voltage fluctuations.

For external communication, the hardware employs two primary modules: the SIM900/800 GSM Module and an integrated Wi-Fi Module. The GSM module allows the board to receive SMS-based updates via a cellular network, while the Wi-Fi module facilitates high-speed data transfer through the college's local intranet. These modules communicate with the microcontroller using UART serial protocols. To notify the surrounding environment of an incoming update, a Buzzer is integrated to provide an audible alert before the message appears. Finally, the information is rendered on a P10 LED Display Module. Three panels of P10 LED board are chosen for their high brightness and modularity, allowing for clear, scrolling text that remains legible even from a distance, making them ideal for high-traffic campus areas.

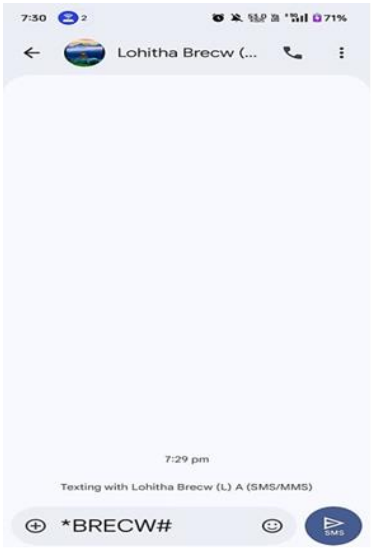
4. TESTING AND RESULTS

4.1 Testing with GSM

The hardware was tested to display various messages of different lengths controlled through a mobile device. While sending messages via SMS from an Android mobile, a specific syntax must be followed, such as *message to be sent#, to ensure proper transmission and display on the notice board before this check for sim readiness.

4.1.1 Case (1): SMS to LED Visualization ≤ 6 CHAR

The Notice board was tested to display ≤ 6 characters. The message "BRECW" was sent through sms as indicated in Fig. 3(a) Fig. 3(b) shows the notice board displaying sms sent.



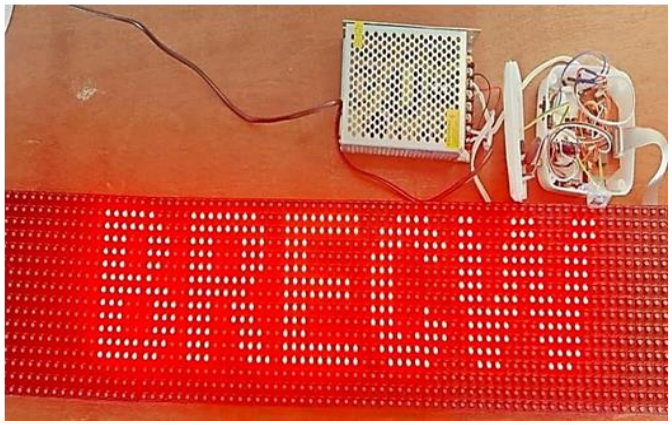


Fig. 3(a) Input with < 6 characters **Fig. 3(b) Displayed on LED board**

4.1.2 Case (2): Input with > 6 CHAR

The Notice board was tested to display > 6 characters. The message “Electrical and Electronics Engineering” was sent through sms as indicated in Fig. 4(a). Fig. 4(b) shows the notice board displaying the sms sent.

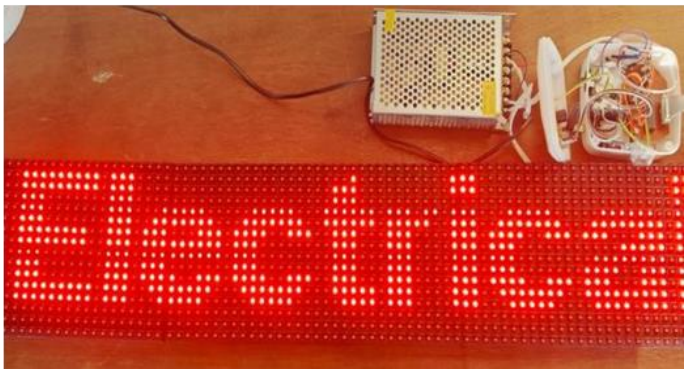


Fig. 4(a) Input with > 6 characters **Fig. 4(b) Displayed on LED board**

4.1.3 Case (3): Maximum Character Limit Message

The Notice board was tested to display the maximum number of characters. The sms “EEE is a core branch of engineering that deals with power generation, transmission, distribution, electrical machines, control systems, and electronics.” (100 characters) was sent through SMS as indicated in Fig. 5(a), Fig. 5(b) shows the bulletin board displaying the sms sent up to 63 characters.

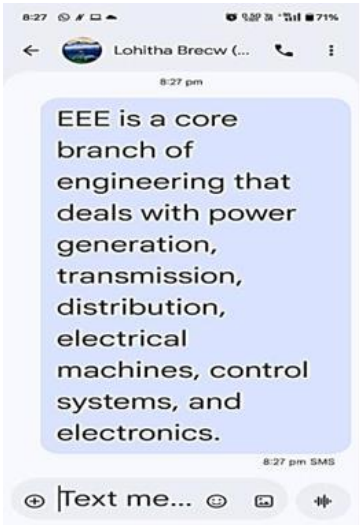


Fig. 5(a) Input with Maximum **Fig. 5(b) Displayed with Max number of character**

4.2 TESTING WITH WI-FI (with Net Analyzer App)

To test the system using Wi-Fi, first enable the mobile hotspot with the username set as project7564 and password as 123456789.

Then, open the Net Analyzer app and go to the LAN Scan option. Once the LED board (kit) is connected to the hotspot, two IP addresses will be visible one for the mobile device and another for the kit. Select the board IP address and open it in a browser, which will direct you to a web page where messages can be entered and displayed on the board.

4.2.1 Case (1): Message with ≤ 6 CHAR

The notice board was tested to display ≤ 6 characters. The text message "BRECW" was sent through the Net Analyzer using Wi-Fi communication as indicated in Fig. 6(a). Fig. 6(b) shows the notice board displaying the message sent. The system is able to visualize the message on the screen at a time, ensuring proper reception and display of short text commands.

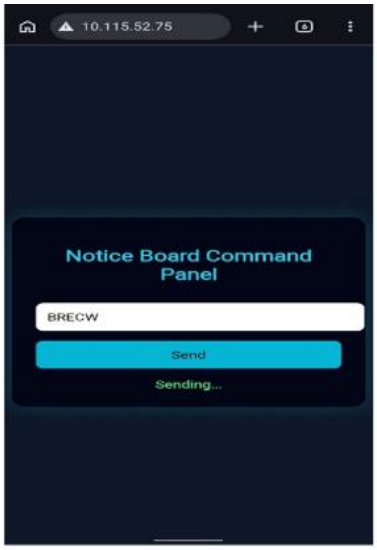


Fig. 6(a) Input with < 6 characters

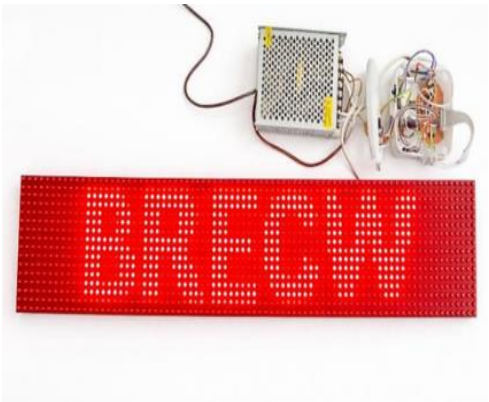


Fig. 6(b) Displayed on LED board

4.2.2 Case (2): Message with > 6 CHAR

The notice board was tested to display characters greater than 6. The text message "Electrical

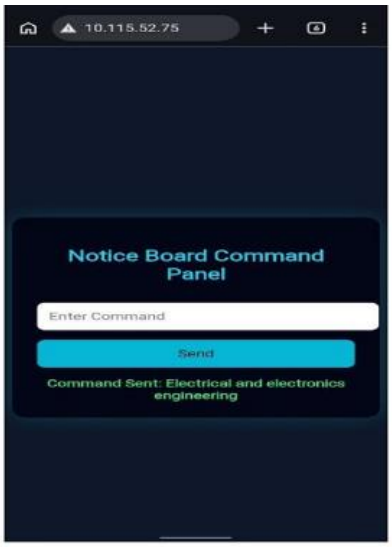


Fig. 7(a) Input with > 6 characters

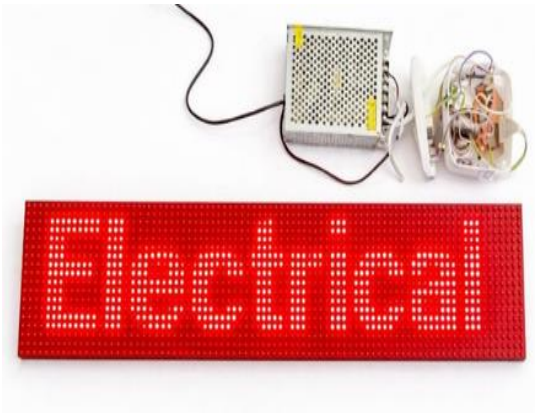
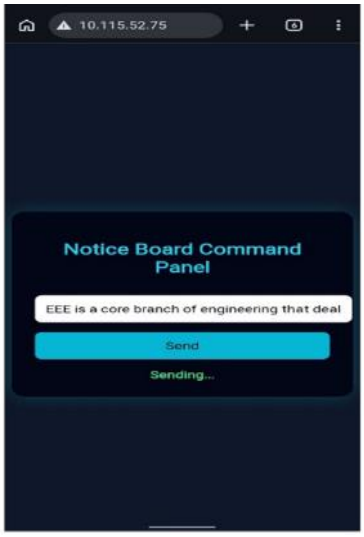


Fig. 7(b) Displayed on LED board

and Electronics Engineering" was sent through the Net Analyzer using Wi-Fi communication as shown in Fig. 7a), Fig. 7(b) shows the notice board displaying the message in scrolling format. Since the number of characters exceeds the display limit, the message is scrolled across the P10 LED board, allowing the complete text to be visualized sequentially on the screen.

4.2.3 Case 3: Maximum Character Limit Message

The notice board was tested with a maximum character limit message. The text message "EEE is a core branch of engineering that deals with power generation, transmission, distribution, electrical machines, control systems, and electronics" was sent through the Net Analyzer using Wi-Fi communication as shown in Fig. 8(a). Fig. 8(b) shows the notice board displaying the message in continuous scrolling format. Since the message length exceeds the display capacity, the P10 LED board scrolls the text smoothly, allowing the entire content to be visualized sequentially without data loss. This test confirms the system's ability to handle long messages efficiently.



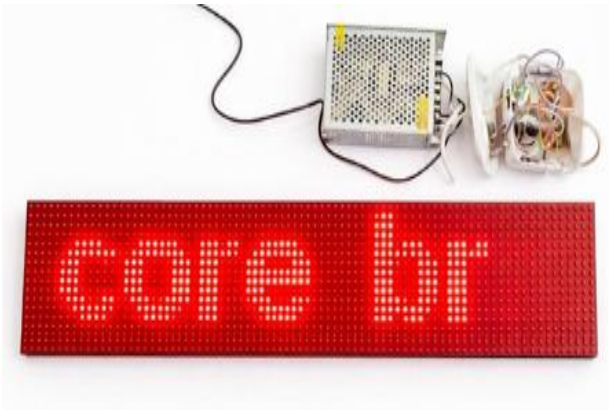


Fig. 8(a) Input with Maximum **Fig. 8(b) Displayed with Max number of character**

4.3 RESULTS

Table 1: Messages Displayed on Notice Board

Cases	Message Sent	Sent Characters Count	Message Displayed	Displayed Characters Count
1	BRECW	5	BRECW	5
2	Electrical and Electronics Engineering	37	Electrical and Electronics Engineering	37
3	EEE is a core branch of engineering that deals with power generation, transmission, distribution, electrical machines, control systems, and electronics.	150	EEE is a core branch of engineering that deals with power genera	63

The table 1 shows the message sent and displayed on Notice Board. In case-1 (≤6 CHAR) and case-2 (>6 CHAR) the entire sms sent was displayed. However, In case3 due to GSM limited storage, the Notice board displayed only a maximum of 63 characters.

Table 2: Message Displayed on Bulletin Board using Wi-Fi

Cases	Message Sent	Sent Characters Count	Message Displayed	Displayed Characters Count
1	BRECW	5	BRECW	5
2	Electrical and Electronics Engineering	37	Electrical and Electronics Engineering	37
3	EEE is a core branch of engineering that deals with power generation, transmission, distribution, electrical machines, control systems, and electronics.	150	EEE is a core branch of engineering that deals with power genera	63

The table 2 shows the message sent and displayed on the Notice Board. In case-1 (≤6 CHAR) and case-2 (>6 CHAR), the entire message sent was displayed. However, in case-3, the notice board displayed a maximum of 63 characters when using Wi-Fi communication.

7. CONCLUSION

The implementation of the dual-controlled system effectively solves the challenges of sharing information across the campus by offering greater flexibility and convenience. With the help of a user-friendly mobile interface, faculty and staff can instantly update messages on the P10 LED display without the need for physical effort or delay, unlike traditional notice boards. This shift to a digital and wireless system simplifies administrative work and ensures that students receive important academic and extracurricular information quickly, making communication more efficient and interactive.

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