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Digital Notice Board Via Mobile App

Dr.P.Malini¹, P.Kavimozhi², S.Yazhini³

Assistant Professor, Department of Electronics and Communication,Engineering, Vivekanandha College of
Technology for Women Tiruchengode, Namakkal, Tamil Nadu, India¹

UG Scholar, Department of Electronics and Communication Engineering Vivekanandha College of Technology for
Women Tiruchengode, Namakkal, Tamil Nadu, India^{2,3}

ABSTRACT: In today's fast-paced academic and professional environments, effective communication plays a crucial role in ensuring that information reaches the intended audience promptly. Traditional notice boards, while widely used, present challenges such as delayed updates, limited visibility, and excessive paper usage. To overcome these limitations, this paper proposes a Digital Notice Board system that can be controlled remotely via a mobile application, offering real-time updates and improved accessibility. The system integrates a microcontroller with a display unit and leverages Wi-Fi connectivity to transmit messages from a mobile device to the board instantly. Administrators can post, edit, and schedule notices through a user-friendly mobile interface, reducing manual effort and increasing operational efficiency.

The proposed system supports dynamic content, including scrolling text, images, and multimedia elements, making it versatile for various contexts such as schools, colleges, offices, and public areas. Data security and reliability are ensured through secure authentication protocols and optimized communication algorithms. Implementation results demonstrate that the system provides seamless performance, fast response times, and high user satisfaction. Compared to traditional notice boards, this approach offers several advantages: reduced paper consumption, faster dissemination of urgent information, enhanced readability, and the ability to reach multiple display units simultaneously.

Furthermore, the system is highly scalable and can be extended to integrate IoT-enabled features, cloud storage, and automated alerts, allowing for future improvements such as personalized notifications and remote monitoring. The study concludes that mobile-controlled digital notice boards represent a significant advancement in modern communication infrastructure, combining efficiency, sustainability, and interactivity. This solution not only addresses the shortcomings of conventional methods but also aligns with the increasing demand for smart, connected, and eco-friendly information management systems.

I. INTRODUCTION

The development of the Internet of Things (IoT) has revolutionized the way information is traded and accessed, bringing intelligent, networked systems into everyday life. Of its many applications, the concept of a digital notice board based on IoT has emerged as a serious option to make communication more effective in every situation. Notice boards are a critical tool for disseminating information in schools, offices, transportation hubs, and public spaces. Usage of old-fashioned notice boards, however, necessitates manual maintenance that is often time-consuming, laborious, and bound by geography. These challenges lay the ground for having a convenient, automated means of getting the job done. The goal of this paper is to introduce a new, IoT-based electronic notice board system where information is made available to be shared by utilizing the easy-to-use mobile application for the entry of the messages. The proposed system has the capability of enabling authorized users to enter messages that are displayed on the LED matrix screen in real time. The system employs main hardware components like Arduino microcontrollers, GSM modules, and Ethernet modules for creating the strong, secure, and efficient communication channel. The employment of IoT removes some of the space-physical limitations, such that users can update notices from anywhere with an internet connection. The system aims to minimize notice management, reduce the dependence on paper, and decrease manual intervention. This would save time and resources while making it more environmentally friendly by significantly reducing paper waste. In addition, the flexibility and scalability of the system make it appropriate for various applications in schools, offices, railway stations, airports. Additionally, it integrates IoT in a notice board to overcome the obsolete communication methods versus the advanced technology. In terms of design, it uses a safe, user-

friendly interface with reliability for data transmission while at the same time being convenient to administer. This makes this solution by IoT more intelligent and environmentally friendly in communication processes. This paper delves into the design.

proposed system, outlining methodology, hardware and software needs, implementation approaches, and applications. Redressing traditional disadvantages of notice boards and venturing into IoT makes the digital notice board a cutting-edge solution to meet the growing demand for intelligent communication tools in today's digital age.

II. LITERATURE REVIEW

Effective and timely communication is crucial in educational institutions, corporate offices, and public spaces. Traditional notice boards, which have been used for decades, have several inherent limitations. These include the need for manual updates, delayed information dissemination, restricted visibility, and substantial paper usage, which is neither eco-friendly nor efficient (Kumar et al., 2018). To address these limitations, researchers have explored digital solutions that leverage microcontrollers, network connectivity, and mobile technologies to provide more interactive and real-time communication platforms.

Early approaches to digital notice boards involved PC-controlled displays with basic LED matrices or LCD screens. Li and Zhang (2016) proposed an electronic notice board system controlled via a local server connected to a computer. While the system enabled faster message updates than traditional boards, it lacked mobility and required users to access a desktop computer, limiting its usability. Additionally, these systems often did not support dynamic content, such as scrolling messages or multimedia elements, reducing engagement.

With the proliferation of mobile computing and IoT technologies, research shifted toward mobile-controlled digital notice boards. Sharma et al. (2019) developed a Wi-Fi-enabled notice board system that allowed administrators to update messages remotely through smartphones. This method improved accessibility and enabled real-time updates. However, early implementations were often limited to text-only content, which reduced the system's appeal in visually-rich environments like campuses or office lobbies.

Cloud integration has further advanced digital notice boards. Systems that combine mobile apps with cloud servers allow administrators to store, schedule, and manage notices from anywhere, while simultaneously controlling multiple display units (Patel et al., 2020). Cloud-based architectures provide secure authentication, ensuring data integrity and preventing unauthorized updates. Moreover, these systems support scalability and centralized management, which is essential for large organizations or institutions with multiple campuses.

Recent studies have emphasized user engagement through multimedia features. Rao and Gupta (2021) explored digital notice boards that display scrolling text, images, and video content, demonstrating increased attention and better information retention among viewers.

Integration with IoT devices, such as sensors and automated alerts, can further enhance functionality by providing personalized notifications, automated scheduling, and dynamic content updates.

Despite these advancements, challenges remain in latency reduction, communication reliability, and system robustness. Optimizing the interaction between mobile applications, cloud infrastructure, and display hardware is critical to ensuring seamless real-time updates.

The literature highlights a clear trend toward mobile, cloud-based, and multimedia-supported notice boards as replacements for traditional systems, setting a foundation for the proposed mobile-controlled digital notice board. In conclusion, prior research provides insights into the evolution of notice board systems from static, manually-updated platforms to dynamic, IoT-enabled, mobile-controlled solutions.

These studies inform the design of systems that are interactive, sustainable, and efficient, addressing the shortcomings of conventional methods and meeting modern communication needs.

III. METHODOLOGY

The IoT-based Digital Notice Board system proposed here would provide an end-user-friendly and effective broadcasting of live messages in real-time. The system is composed of two basic sections, namely Sender and Receiver. The sender is something like a user who inputs some message via the mobile app. This message is wirelessly sent employing communication protocols to the Receiver, in which it forms the hardware configuration that processes the message and posts it onto the digital notice board.

Remote updating is facilitated by the system; therefore, the user updates the notice board from wherever they use the internet. The hardware components that are engaged in the system are the microcontroller, Arduino (acting as central processing unit), which it gets and processes and will transmit to the LED matrix display. The LED Matrix Display offers high brightness, thus displaying the messages under very dimmed lighting conditions.

For supplying wireless communication and for the fact that messages will be received by the receiver from the application, the GSM module is of great use. All other parts such as a transformer and a voltage regulator are included so that stable power is received with 220V AC to 24V DC conversion. This supplies necessary voltages to their microcontroller along with the display.

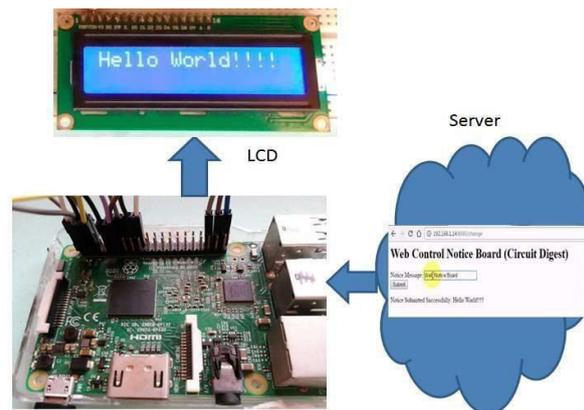


Fig1: Working of Digital notice board

In terms of software, the system utilizes an Android built mobile application whereby users are able to enter and post messages straight to the notice board.

The microcontroller programming is executed using the Arduino IDE in Embedded C with libraries for control of LED matrix and GSM communication. The software design also includes hosting and data management, where PHP, JSON, and SQL are employed to handle authentication and message data securely.

This hosting environment provides global accessibility to users. The system workflow starts with the user input of a message in the mobile application, which is transmitted through the GSM protocol to the receiver module. The message is received at the Arduino microcontroller, processed, and formatted into a binary compatible format for the LED matrix display.

The processed message is then directly displayed in real-time on the digital notice board. The system also provides for sequential message display, date-time tracking, and format options, making the solution very flexible. Key features of the system include remote accessibility, allowing users to send messages from any location, user-friendly interface, ensuring simplicity in operation, and cost efficiency, achieved by using readily available components and open-source software.

The proposed methodology aims to offer scalability, reliability, and ease of use, addressing the limitations of existing systems while providing an innovative and efficient solution for communication.

Future enhancements could include multimedia support, energy-efficient displays, and further integration with advanced IoT frameworks.

IV RESULT

The IoT-based Digital Notice Board was successfully implemented and tested, demonstrating superior performance in message delivery, display operation, and system dependability. The system enabled remote sending of messages by authorized users via a mobile application, and the messages appeared on the notice board without any perceivable delay. The LED matrix display panel utilized for showing messages was found to be bright and clear, and it was easy to see the messages even with varying light conditions. The user interface of the mobile application was intuitive and easy to navigate, allowing users to send messages with minimal effort, making it suitable for both technical and non-technical users. The Ethernet module provided stable internet connectivity, ensuring that the system was able to receive and display messages in real-time, with minimal latency. This was crucial for ensuring that the messages were updated promptly on the board. The system, which is microcontroller-based and has been incorporated with the Ethernet module, worked smoothly during the testing phase without any system failure or crashes. The components used, including the Arduino and the Ethernet module, were very affordable, which kept the cost of the system low compared to conventional notice boards that need greater human intervention and resources to be managed. Security functions were also integrated into the system so that sending messages was possible only by authorized people. The project, as a whole, achieved its goal of saving manpower and time consumption along with providing an affordable, efficient solution to displaying messages in real time. The system has potential to be used on a much greater scale in education, public areas, and business settings where remote communication is required.

V. DISCUSSION

The Digital Notice Board using IoT presents a number of major benefits over conventional modes of communication. One of the key advantages is that it is possible to update messages in real time anywhere using a mobile app, providing instantaneous delivery of information. The system minimizes the use of human effort, paper, and physical presence, leading to an efficient and environment-friendly solution. The ease of use in the mobile interface enables even less technical users to use the system, and the scalability and customization of the board enable it to be flexible in different settings such as schools, transport terminals, and public spaces. The long-term cost savings from decreased manpower and paper use also make this system cost-efficient. The system is not perfect, though. It is highly dependent on reliable internet connectivity, which is a problem in rural or low-network locations. Power usage is also an issue, especially for large-scale implementations with high-brightness screens. The initial hardware installation, including devices such as microcontrollers and LED screens, also comes at a higher cost than notice boards. In addition, security issues involving unauthorized access and message tampering need to be handled through encryption and authentication techniques. Future developments may include increasing connectivity options, like adding Wi-Fi, Zigbee, or LPWAN technology, and interactive components like touchscreens. The inclusion of other IoT devices, like sensors, can add contextual data to enhance the usefulness of the system. In spite of these drawbacks, the notice board based on IoT is a viable solution for contemporary communication.

VI. FUTURE SCOPE

The future application of the IoT-based Digital Notice Board is its capability for expansion and integration across diverse industries. Its development to greater functionality by harnessing machine learning and artificial intelligence (AI) is a viable path. By integrating AI, the system would be able to identify trends in the notices displayed and tailor the content according to user activity or time of day, providing a more personalized and smart experience. Further, voice recognition and natural language processing (NLP) integration could enable hands-free access to the board, making it more convenient and user-friendly.

Another direction of development is broadening the scope of devices that can communicate with the notice board. Today, the system is compatible with mobile apps, but subsequent versions may be integrated with smart home appliances, voice assistants such as Amazon Alexa or Google Assistant, or even wearable devices. This would further enhance the accessibility and convenience of the system.

Moreover, Furthermore, making the system's security stronger will become vital with an increasing level of usage. Making strong encryption, multi-factor verification, and constant observation part of the system can protect the system from incoming danger. Low-power communication systems like LoRa (Long Range) and NB- IoT(Narrowband IoT) should be researched further, too, since it would contribute to energy saving and more effectiveness in cases with less high-speed internet access or power sources available.

Finally, the inclusion of real-time data analytics and feedback mechanisms may enable administrators to monitor usage patterns, streamline content delivery, and enhance overall user engagement. As IoT infrastructure develops further, the Digital Notice Board can potentially become a part of smart cities, educational institutions, and commercial organizations, facilitating innovation and enhancing communication across domains.

VII. PROPOSED SYSTEM

The proposed system introduces a Digital Notice Board controlled through a mobile application to provide fast, reliable, and paperless communication. The system replaces conventional notice boards with an electronic display that can be updated remotely in real time using a smartphone.

The system consists of two main units: the sender unit and the receiver unit. The sender unit is a mobile application that allows authorized users to create, edit, and send notices. The receiver unit includes a microcontroller, communication module (Wi-Fi/GSM), and a digital display such as an LED or LCD panel.

When a user enters a message in the mobile app, the data is transmitted through the internet or GSM network to the microcontroller. The microcontroller processes the received message and displays it instantly on the digital notice board. This enables administrators to update information from any location without physical access to the board.

The proposed system supports real-time updates, scrolling text, and scheduled message display. Security is ensured through user authentication, allowing only authorized users to post notices. The system reduces manual effort, saves time, minimizes paper usage, and improves communication efficiency.

This solution is cost-effective, scalable, and suitable for use in educational institutions, offices, hospitals, railway stations, and other public places. Future enhancements can include multimedia display, cloud storage, and integration with IoT sensors for smart notification services.

ADVANTAGES

The digital notice board using a mobile application provides fast and efficient communication by allowing administrators to post notices instantly and users to receive them in real time. It eliminates the need for paper, making the system eco-friendly and cost-effective. Users can access notices anytime and anywhere, which increases convenience and ensures that no important information is missed. The system also improves organization by categorizing notices such as academic updates, events, and announcements. Additionally, it reduces manual work, saves time, and enhances overall productivity. Features like notifications and alerts ensure immediate attention, while secure login systems protect data and maintain privacy. Overall, it is a modern, reliable, and scalable solution for communication in institutions and organizations.

DISADVANTAGES

The digital notice board system, while efficient, has certain limitations. It requires a stable internet connection, and without it, users may not receive updates on time. The initial development and setup cost can be high, including expenses for servers, application development, and maintenance. The system is also dependent on mobile devices, which means users without smartphones or compatible devices may not be able to access the notices. Technical issues such as app crashes, server downtime, or software bugs can interrupt communication. Additionally, continuous use of mobile notifications may sometimes cause distraction or be ignored by users. Regular maintenance and updates are necessary to ensure smooth functioning, which can require technical expertise and resources.

VIII. PROBLEM STATEMENT

In many educational institutions and organizations, communication still relies on traditional notice boards, which are inefficient and outdated. Important announcements are printed on paper and displayed in specific locations, requiring individuals to be physically present to view them. This often leads to delays in information delivery, missed updates, and lack of awareness among students or employees. Additionally, manual handling of notices increases workload, consumes time, and results in excessive paper usage, contributing to environmental concerns. There is also no guarantee that the information reaches all intended users at the right time. Therefore, there is a need for a reliable, real-time, and accessible communication system that can deliver notices instantly to users regardless of their location. The Digital Notice Board via Mobile Application aims to address these challenges by providing a fast, efficient, and paperless solution for information sharing. In today's fast-paced digital world, effective communication is a fundamental requirement for the smooth functioning of educational institutions, corporate organizations, and public service systems. Despite significant technological advancements, many institutions still rely on traditional notice boards for sharing important information such as announcements, schedules, events, examination details, and emergency alerts. These conventional notice boards involve printing notices on paper and displaying them in fixed physical locations. While this method has been in use for decades, it suffers from multiple limitations that reduce its effectiveness in the modern era.

One of the major problems associated with traditional notice boards is the lack of real-time communication. Information dissemination through physical notice boards is inherently slow, as it requires manual preparation, printing, and posting of notices. This delay can result in outdated information being displayed or important updates not reaching the intended audience on time. In situations where immediate communication is critical, such as sudden schedule changes, emergency announcements, or event updates, the traditional system fails to deliver timely information, thereby affecting decision-making and responsiveness.

Another significant issue is limited accessibility. Traditional notice boards are usually installed in specific locations such as college corridors, office entrances, or common areas. Users must be physically present at these locations to view the notices. This creates inconvenience for individuals who are absent, off-campus, or unable to visit the notice board frequently. As a result, many users miss important announcements, leading to confusion, lack of awareness, and poor participation in activities. This limitation becomes more pronounced in large institutions where students or employees are spread across multiple departments or buildings.

Furthermore, the manual nature of traditional notice boards increases administrative workload. Staff members are responsible for preparing, printing, and updating notices regularly. This process consumes valuable time and resources, which could otherwise be utilized for more productive tasks. Replacing old notices with new ones, ensuring proper arrangement, and maintaining the board's cleanliness also add to the workload. In addition, the cost of paper, printing materials, and maintenance contributes to the overall operational expenses of the institution.

Environmental concerns also arise due to the excessive use of paper in traditional notice systems. With frequent updates and announcements, a large amount of paper is consumed, leading to wastage and negative environmental impact. In an era where sustainability and eco-friendly practices are highly emphasized, the continued use of paper-based communication methods contradicts the goal of reducing carbon footprint and conserving natural resources.

Another problem is the lack of personalization and targeting in traditional notice boards. Notices are displayed publicly, and there is no mechanism to ensure that specific information reaches a particular group of users. For example, a notice intended only for a specific department or class is visible to everyone, leading to information overload and reduced relevance. Users may ignore important notices due to the presence of too many unrelated announcements, thereby decreasing the overall effectiveness of communication.

In addition, traditional notice boards do not provide any feedback or interaction mechanism. Users cannot acknowledge receipt of information, ask questions, or provide responses directly through the notice board. This one-way communication model limits engagement and prevents administrators from ensuring that the information has been understood or acted upon. It also makes it difficult to track whether users have seen or responded to important notices.

IX. CONCLUSION

In summary, the Digital Notice Board based on the Internet of Things is a marked improvement in how information is displayed and disseminated across different environments. Through Internet of Things (IoT) technology, this system provides an interactive, real-time solution to sending crucial information easily and with ease. Having the capacity to update notices remotely through a mobile app guarantees information remains up-to-date, cutting the dependence on hand effort, paper, and physical presence, whilst also fostering sustainability. Additionally, its flexibility renders it appropriate for a broad variety of use, ranging from schools and transport centers to public areas and companies. While having many benefits, the system also has challenges, mainly in the areas of internet connectivity and power usage. These are essential in maintaining the reliability and scalability of the solution, especially in regions with poor network infrastructure. In addition, protection of the system from unauthorized access and possible tampering with messages is still an area of focus for future improvement. In total, the IoT-based Digital Notice Board is an economical, user-friendly, and expandable replacement for conventional notice boards, with major advantages in terms of efficiency, real-time communication, and sustainability. With additional development in connectivity, power management, and security, this system has great potential for universal application, making the world more connected and informed management.

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