



# DIGITIZED NOTICE BOARD SYSTEM FOR EDUCATIONAL INSTITUTION

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**Abstract** - In educational institutions, traditional notice boards require manual updates, leading to inefficiencies in communication. This paper presents a Digitized Notice Board System, leveraging microcontroller-based technology and wireless communication to enable real-time updates. The system allows administrators to remotely post and modify notices, ensuring instant dissemination of information to students and faculty. The proposed model integrates a user-friendly interface, reducing paper waste and enhancing accessibility. Additionally, the system supports multimedia content, enabling the display of images, videos, and important announcements in an engaging format. Security features such as role-based access control and encrypted data transmission ensure authorized and secure communication. The system is designed to be energy-efficient, incorporating low-power components and smart scheduling for optimized power consumption. Furthermore, cloud integration enables data backup, remote access, and multi-location scalability, making it suitable for institutions with multiple campuses. The notice board also supports scheduling and automated alerts, allowing time-based announcements and emergency notifications. The system's architecture, implementation, and benefits in improving institutional communication and operational efficiency are discussed.

**Keywords:** Digitized Notice Board, Wireless Communication, Educational Institution, Microcontroller, Real-Time Updates, Smart Notice Board, Paperless Communication, Multimedia Support.

## 1. INTRODUCTION

Communication is a crucial aspect of any educational institution, ensuring the smooth flow of information among students, faculty, and administrative staff. Traditional notice boards, which have been the

primary medium for announcements, schedules, and academic updates, come with several limitations. These boards require manual updates, leading to delays, outdated information, and inefficiencies in communication. Additionally, they are location-dependent, meaning students and faculty must visit specific areas to view notices. This results in limited accessibility, especially for institutions with multiple departments and campuses. Furthermore, paper-based notices contribute to environmental waste, requiring constant reprinting and maintenance, making the process not only time-consuming but also costly.

To overcome these challenges, this paper proposes a Digitized Notice Board System that leverages microcontroller-based technology and wireless communication for real-time updates. This system provides a centralized and efficient platform for posting, modifying, and managing notices remotely, ensuring instant and widespread dissemination of information. By integrating wireless communication technologies such as Wi-Fi, Bluetooth, or GSM, the proposed system allows administrators to update notices from anywhere, reducing the dependency on manual labor and improving overall efficiency. The digital system also offers enhanced security features, including role-based access control, ensuring that only authorized personnel can post or modify content. This eliminates the risk of unauthorized modifications and misinformation, which is common in traditional notice boards. One of the key advantages of the Digitized Notice Board System is its ability to support multimedia content. Unlike conventional boards that display only textual information, the digital version can incorporate images, videos, and graphical elements, making announcements more engaging and informative. This feature is particularly useful for academic institutions where visual content can enhance understanding and retention of information. Additionally, the system enables automated scheduling of notices, allowing administrators to set specific display durations for time-sensitive announcements. Emergency alerts and notifications can also be instantly broadcasted, ensuring quick dissemination of critical information.

Another significant benefit of this system is its integration with



cloud storage, enabling data backup, retrieval, and remote access. Cloud-based storage ensures that important notices are not lost and can be accessed by students and faculty from any location. This feature makes the system scalable and suitable for institutions with multiple campuses, allowing seamless synchronization of notices across different locations. Furthermore, the system is designed to be energy-efficient, utilizing low-power components and smart scheduling mechanisms to optimize power consumption. This ensures sustainability and cost-effectiveness in the long run.

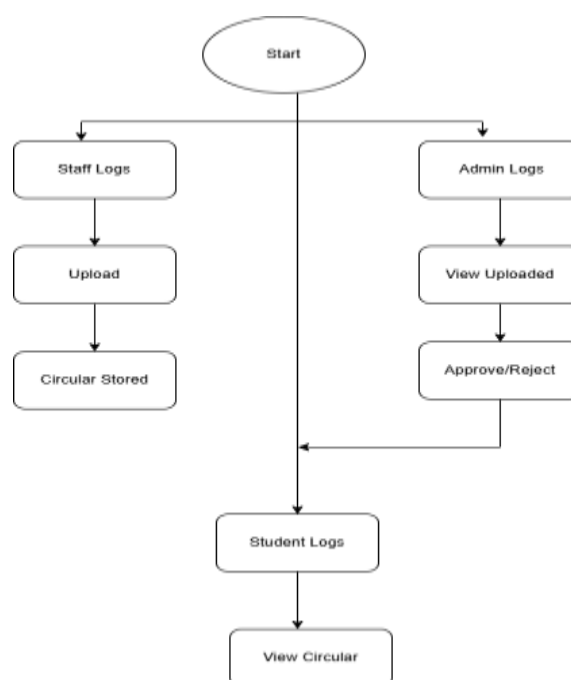
By eliminating the need for printed materials, the Digitized Notice Board System contributes to environmental sustainability by reducing paper waste and promoting a more eco-friendly communication approach. Moreover, the automation of notice updates reduces administrative workload, allowing faculty and staff to focus on more productive tasks. This digital transformation not only enhances efficiency but also aligns with the increasing adoption of smart technology in educational institutions.

## 2. PROPOSED SOLUTION

To overcome the limitations of traditional notice boards, we propose a Digitized Notice Board System using the MERN (MongoDB, Express.js, React.js, Node.js) stack. This system enables real-time updates, remote access, and seamless communication within educational institutions. By leveraging modern web technologies and cloud storage, the proposed solution ensures a scalable, secure, and user-friendly platform for administrators, faculty, and students. The system architecture consists of three primary components: the frontend (React.js), the backend (Node.js & Express.js), and the database (MongoDB). The frontend provides an interactive interface for users to post, view, and manage notices, ensuring accessibility across various devices. The backend handles authentication, authorization, and database operations, ensuring secure communication between the client and server. The MongoDB database efficiently stores notices, user credentials, and access permissions, allowing seamless retrieval and management of notices in real time.

The Digitized Notice Board System incorporates several key features to enhance institutional communication. Real-time updates ensure that notices can be posted, modified, or deleted instantly, eliminating delays associated with manual updates. Role-based access control restricts notice management to authorized personnel, preventing unauthorized modifications. The system also supports multimedia content, allowing users to upload images, videos, and PDFs for better engagement. With cloud integration, notices are stored in a centralized MongoDB database, enabling seamless synchronization across multiple campuses. Additionally, automated scheduling and alerts allow administrators to schedule notices in advance and trigger real-time notifications for urgent announcements. The responsive design of the React-based interface ensures accessibility on desktops, tablets, and mobile devices. Furthermore, the system is designed to be energy-efficient, reducing the need for printed materials and promoting sustainability.

The workflow of the system begins with an administrator logging in, authenticated by the backend using secure credentials. Once logged in, the administrator can create, edit, or delete notices through the React.js frontend. The notices are then stored in MongoDB and retrieved dynamically via API calls for display on digital boards and user dashboards. Students and faculty can access the notices from any internet-enabled device, ensuring widespread accessibility. Additionally, automated notifications inform users about important updates without requiring manual intervention. By integrating modern web technologies, cloud storage, and real-time processing, the MERN-based Digitized Notice Board System offers a cost-effective, efficient, and scalable solution for improving communication in educational institutions. The following sections will discuss the detailed implementation, testing, and performance evaluation of the system. The work flow diagram is given below .



## 3. PROBLEM OVERVIEW AND MOTIVATION

Effective communication is essential in educational institutions to keep students, faculty, and administrators informed about academic updates, events, and important announcements. However, traditional notice boards present several challenges that hinder efficient information dissemination. The most significant issue is manual updates, which require physical effort to post, modify, or remove notices. This process is time-consuming, prone to human errors, and often leads to outdated or misplaced information. Additionally, traditional notice boards are location-dependent, meaning students and faculty must visit specific places to check for updates, making it inconvenient, especially in large institutions with multiple departments and campuses.

Another critical drawback of conventional notice boards is their negative environmental impact and high maintenance



costs. The frequent printing of paper notices leads to excessive paper consumption, contributing to waste and increased operational expenses. Furthermore, security and authenticity concerns arise since unauthorized individuals can alter or remove notices, resulting in misinformation. Traditional notice boards also lack remote accessibility, meaning administrators must be physically present to update notices, limiting their efficiency during emergencies or sudden announcements. The absence of multimedia support further reduces engagement, as static text-based information may not effectively capture attention or convey messages as clearly as images and videos can.

The motivation behind developing a Digitized Notice Board System is to address these challenges through technology-driven solutions. A web-based digital notice board allows for real-time, remote updates, ensuring that announcements are posted instantly and accessible from anywhere. This approach enhances institutional efficiency, reduces administrative workload, and eliminates paper waste, promoting an eco-friendly alternative. By integrating role-based access control, cloud storage, and multimedia support, the system ensures secure, scalable, and engaging communication. The transition to a MERN-based digital notice board aligns with the growing adoption of smart campus technologies, making educational institutions more efficient, sustainable, and digitally advanced.

#### 4. SAFETY AND COMPLIANCE

Ensuring the security and regulatory compliance of the Digitized Notice Board System is crucial for maintaining data integrity and protecting sensitive institutional information. The system implements role-based access control (RBAC) to restrict notice creation and modification to authorized personnel, preventing unauthorized tampering. Additionally, user authentication mechanisms, such as encrypted login credentials and multi-factor authentication (MFA), enhance security by ensuring only verified users can access the system. To protect stored data, the system utilizes secure cloud storage with encryption and regular backups, ensuring data availability and resilience against cyber threats. Compliance with data protection regulations, such as the General Data Protection Regulation (GDPR) or institutional IT policies, is upheld by implementing privacy-focused measures, including restricted data sharing, secure API communication, and activity logging.

#### 5. USER EXPERIENCE DESIGN

The Digitized Notice Board System is designed with a user-centric approach, ensuring a seamless, intuitive, and engaging experience for students, faculty, and administrators. The React.js-based frontend provides a clean, responsive, and accessible interface, making it easy to navigate across desktops, tablets, and mobile devices. A well-structured dashboard allows administrators to post, edit, and schedule notices effortlessly, while students can quickly access categorized announcements with a search and filter functionality. The system supports multimedia

content, including images, videos, and PDFs, enhancing engagement and comprehension. Real-time notifications and alerts ensure users never miss important updates, improving overall accessibility. Dark mode, customizable themes, and multilingual support further enhance the inclusivity and adaptability of the system. By focusing on ease of use, efficiency, and accessibility, the MERN-based Digitized Notice Board System offers a modern and interactive communication platform that enhances the overall user experience within educational institutions.

#### 6. SCALABILITY AND EFFICIENCY

The digitized notice board system is designed to be highly scalable and efficient, ensuring smooth communication across educational institutions of varying sizes. Built using the MERN stack, the system leverages cloud-based storage and distributed architecture, allowing multiple campuses to access synchronized updates without performance bottlenecks. The backend efficiently handles concurrent requests, ensuring real-time updates without lag, while optimized database queries in MongoDB enable quick retrieval of notices even as data volume increases. The use of a component-based frontend in React ensures a responsive and adaptable interface, allowing the system to scale effortlessly as new features or user demands evolve. By minimizing server load through caching mechanisms and efficient API calls, the system reduces latency and enhances performance. Additionally, automated scheduling and asynchronous processing improve operational efficiency by reducing manual intervention. With its ability to handle growing user traffic and expanding institutional needs, the system provides a reliable and future-proof solution for digital communication in educational environments.

#### 7. CONCLUSION

The Digitized Notice Board System presents an innovative and efficient solution to the limitations of traditional notice boards in educational institutions. By leveraging the MERN stack, the system enables real-time updates, remote access, and multimedia integration, significantly improving communication and engagement among students, faculty, and administrators. The use of role-based access control, cloud storage, and secure authentication mechanisms ensures data integrity and security while promoting a paperless and eco-friendly alternative. With its scalable architecture, the system can seamlessly adapt to the growing needs of institutions, offering high performance, accessibility, and automation. By eliminating manual processes and enhancing user experience through an intuitive interface, the proposed solution streamlines institutional communication, reduces administrative workload, and fosters a more connected and digitally advanced academic environment.

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