



# DIGITAL NOTICE BOARD WITH PERSONALIZED NOTIFICATIONS

**Kamalesh S<sup>1</sup>, Kumaran B<sup>2</sup>, Sunil N<sup>3</sup>, Sarveshwaran S V<sup>4</sup>**

<sup>1,2</sup> Department of Mechanical Engineering, Bannari Amman Institute of Technology, India

<sup>3</sup> Department of Artificial Intelligence and Machine Learning, Bannari Amman Institute of Technology, India

<sup>4</sup> Department of Computer Science and Engineering, Bannari Amman Institute of Technology, India

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**Abstract** - The swift progression of digital communication has created a need for effective notification systems that enable organizations to manage announcements smoothly. This paper outlines an in-depth study on creating a "Digital Notice Board with Personalized Notifications" utilizing the MERN (MongoDB, Express.js, React.js, Node.js) stack. The suggested system empowers administrators to issue notices that are customized and sent via both web and SMS notifications. This research emphasizes the design of a platform that is efficient, scalable, and user-friendly, incorporating role-based access control, enhanced security features, and real-time data analytics. Performance evaluations indicate that the system effectively accommodates high user volumes while maintaining seamless notification delivery.

**Key Words:** Digital Notice Board, MERN Stack, Real-Time Notifications, Role-Based Access Control, Web and SMS Alerts.

## 1. INTRODUCTION

Conventional notice boards encounter issues such as the need for manual intervention, inefficiencies in reaching the intended audience, and a lack of timely updates. With advancements in digital technology, there is a growing need for automated and intelligent notification systems. However, current solutions tend to lack customization and do not cater to personalized notifications according to user preferences.

### 1.1 Objective

This research aims to develop and implement a digital notice board that incorporates authentication features, user role management, and a user-friendly interface to enhance communication effectiveness in educational institutions and organizations.

The importance of this project lies in its capacity to deliver real-time notifications through various channels, including web and SMS, ensuring that users receive pertinent information without delays.

## 2. LITERATURE REVIEW

Various notification systems have been created, including email notifications and push alerts on smartphones. Nonetheless, many of these systems do not have a solid architecture that enables smooth integration with web applications. Services like Google Firebase provide notification capabilities, but they depend on external resources and do not offer detailed access control.

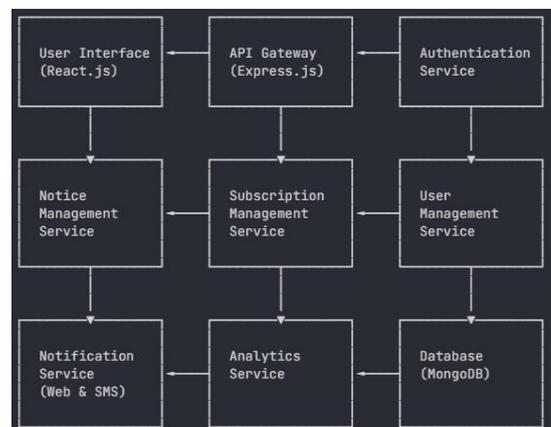
### 2.1 Comparison with Related Work

Analysis of current models reveals a deficiency in user-oriented notifications and insufficient modularity in the architecture of the system. Our suggested solution tackles these issues by incorporating a tailored notification system within a well-organized MERN-based application.

## 3. METHODOLOGY

### 3.1 System Architecture

The suggested system utilizes the MERN stack for comprehensive development. Its architecture includes an API gateway (Express.js) to handle interactions between the client and server, a MongoDB database for effective data storage, and React.js for a user-friendly front-end interface. The diagram below depicts the overall system architecture:





**Fig -1:** System Architecture

### 3.2 Technologies Used

The MERN stack was selected due to its flexibility and ability to scale. MongoDB provides a NoSQL database that effectively manages unstructured data. Express.js enables rapid server-side processing, while React.js delivers a responsive front-end experience. Node.js guarantees effective backend operations. Supplementary technologies like Tailwind CSS for user interface design, JWT for secure authentication, and Redux for managing state further improve the system's capabilities.

### 3.3 System Design

The suggested approach adheres to a systematic development cycle that begins with research and analysis, continues with requirement collection, then moves on to database design, and concludes with frontend and backend development, along with REST API creation. The flow of this process is illustrated in the figure below:



**Fig -2:** Proposed Methodology Flow

### 3.4 Implementation Details

The system utilizes JWT-based authentication to provide secure access to resources. Role-based access control (RBAC) distinguishes between users (Admin and General User) by granting specific permissions. The notification module incorporates a message queue to manage bulk notifications effectively, while the UI guarantees a smooth experience with elements like Material UI and interactive features.

## 4. RESULTS AND DISCUSSION

The developed system was evaluated in various scenarios, including managing simultaneous notifications, maintaining performance under heavy loads, and addressing security threats. The findings demonstrate that the system effectively processes notifications with minimal delay. Furthermore, the use of JWT-based authentication enhances security by preventing unauthorized access. In comparison to current solutions, our method provides improved user-specific notifications, superior UI/UX, and enhanced backend performance.

During implementation, we encountered challenges such as optimizing real-time notifications, ensuring consistency in message delivery, and strengthening role-based access management. These issues were resolved through the integration of a reliable message queue and real-time updates to the database.

## 5. TESTING AND EVALUATION

Unit and integration tests were carried out utilizing Jest and Mocha to guarantee seamless interactions among system components. Performance assessments indicated that the system proficiently processes multiple notification requests simultaneously without notable delays. Security tests validated the robustness of authentication methods in thwarting unauthorized access. Preliminary user feedback from a limited deployment indicates excellent usability and effectiveness in handling notices efficiently.

## 6. CONCLUSIONS

This document outlines a digital notice board built on the MERN stack that provides secure, real-time, and customized notifications. The suggested system effectively addresses the shortcomings of current notification services by incorporating role-based access control, a scalable framework, and notifications delivered through multiple channels. Planned improvements involve the integration of AI-driven recommendation systems for



tailored notifications, enhancing backend performance with microservices, and increasing support for mobile application push notifications.

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