ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

IOT BASED TIME TABLE POSTING, DISPLAY AND INTELLIGENT NOTIFICATION SYSTEM USING MIT APP INVENTOR AND ESP32

[1]P. Anjaneya, [2]M. Guru Swamy, [3]M. Suresh Reddy, [4]P. Ramoji, [5]S. Mallikarjuna Reddy
[1,2,3,4,5] Annamacharya Institute of Technology & Science, Kadapa, A.P, India,

ABSTRACT

The increasing complexity of academic schedules has made effective timetable communication a challenge in many educational institutions. Traditional methods such as notice boards and manual announcements lack real-time updates and timely alerts, often leading to missed classes and coordination issues. To address these limitations, this project proposes an IoT-Based Smart Timetable Display and Intelligent Notification System using ESP32 and MIT App Inventor. The system employs a centralized cloud-based architecture using Firebase Realtime Database to enable real-time synchronization of timetable data. Authorized faculty members can update schedules through an administrator mobile application, while students access real-time timetables and receive automated notifications through a dedicated user application. An ESP32 microcontroller interfaced with a 20×4 I2C LCD display continuously retrieves and displays timetable information, ensuring public visibility. Intelligent notification logic triggers alerts ten minutes before class commencement, even when the application runs in the background. By automating timetable dissemination and minimizing manual intervention, the proposed system enhances punctuality, reliability, and operational efficiency. The project demonstrates the practical application of IoT, cloud computing, and mobile application development in smart education systems.

Keywords: IoT, Smart Timetable System, ESP32, Firebase Realtime Database, MIT App Inventor, Intelligent Notification System.

1. INTRODUCTION

In today's educational institutions, effective management and dissemination of timetable information play a vital role in ensuring smooth academic operations. A timetable provides a structured schedule for lectures, laboratory sessions, and other academic activities, thereby helping in efficient utilization of resources and proper coordination among students and faculty [1]. It also assists students in organizing their daily routines and maintaining punctuality. However, in many institutions, timetable management still relies on traditional methods such as printed notice boards and manual announcements. These approaches have several limitations, including lack of real-time updates and limited accessibility [2]. Any modification in the timetable requires manual effort, and students may not receive the updated information on time, leading to confusion and missed classes. Verbal communication further adds to the problem, as it depends on student presence and memory, making it unreliable [3]. With the advancement of digital communication, some institutions have started using messaging applications and email systems to share timetable updates. Although these methods improve the speed of communication, they lack proper organization and centralized control [4]. Important messages may be overlooked or lost among other communications, and there is no provision for automated reminders or structured data management. Recent developments in mobile computing, cloud computing, and the Internet of Things (IoT) have opened new possibilities for improving

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

timetable management systems. Mobile applications enable users to access information anytime and anywhere, while cloud-based systems ensure real-time synchronization of data [5]. IoT technology further enhances this by enabling integration with physical display systems, allowing information to be presented both digitally and on hardware devices within campus environments [6]. In this context, the proposed IoT-Based Timetable Posting, Display, and Intelligent Notification System aims to overcome the limitations of existing methods. The system integrates mobile applications, cloud storage, and IoT-based display units to provide real-time updates and automated notifications. By ensuring timely communication and centralized data management, the system reduces manual effort and improves overall efficiency. Thus, the proposed system contributes to the development of a smart and reliable timetable management solution, enhancing the academic experience for both students and faculty.

2. LITERATURE SURVEY

Timetable management systems have improved with the use of technologies like IoT, cloud computing, and artificial intelligence. Earlier systems were manual and caused errors and delays. M. Smith (2018) proposed an IoT-based system that improves automation and resource usage, but it is complex and costly. A. Kumar (2019) developed a web-based system that allows easy timetable updates, but it depends on internet connectivity and lacks IoT support. S. Lee (2020) introduced an AI-based system that generates optimized timetables, but it is difficult to implement due to high complexity. R. Sharma (2021) proposed a mobile-based system that provides real-time notifications, improving communication, but it mainly focuses on information sharing. P. Johnson (2022) developed a cloud-based system that offers real-time data synchronization, but it raises security concerns. K. Gupta (2023) proposed an IoT-based smart campus system with automation features, but it increases cost and maintenance. From these studies, it is clear that existing systems do not provide a complete solution. Therefore, a system combining IoT, cloud, and mobile technologies is needed for efficient timetable management.

3. EXISTING METHODS

In many educational institutions, timetable information is shared using traditional methods. The most common method is the printed notice board, where timetables are displayed on paper. Students have to visit the notice board to check updates, and any change requires reprinting the schedule. This method does not support real-time updates.



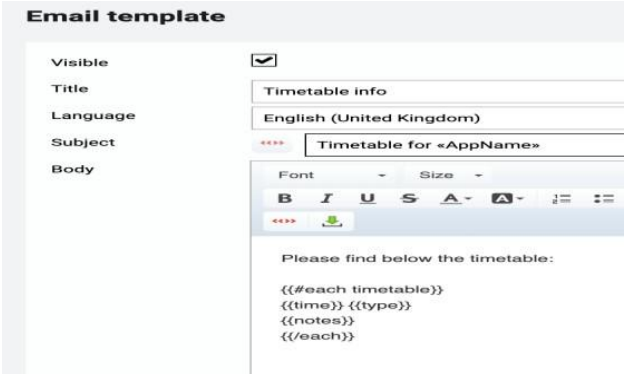
Another method is classroom announcements, where teachers inform students about schedule changes. This depends on memory and presence of students, so it is not reliable and students may miss important information.

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

Nowadays, messaging applications like WhatsApp and Telegram are also used to share timetable updates. Although they provide quick communication, messages can be missed or mixed with other chats, and there is no proper organization of data. Some institutions use digital display boards to show timetable information. These displays improve visibility but updates are usually done manually and are not synchronized in real time.



Email communication is also used to send timetable details. It provides a formal way of sharing information, but students may not check emails regularly, and there are no instant notifications.



Overall, these existing methods have several limitations such as lack of real-time updates, dependency on manual work, poor communication, and absence of an intelligent notification system.

4. PROPOSED METHOD

The proposed system is an IoT-based timetable management system that provides real-time updates and intelligent notifications to students. It is designed to overcome the limitations of traditional methods by using mobile applications, cloud technology, and embedded hardware.

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

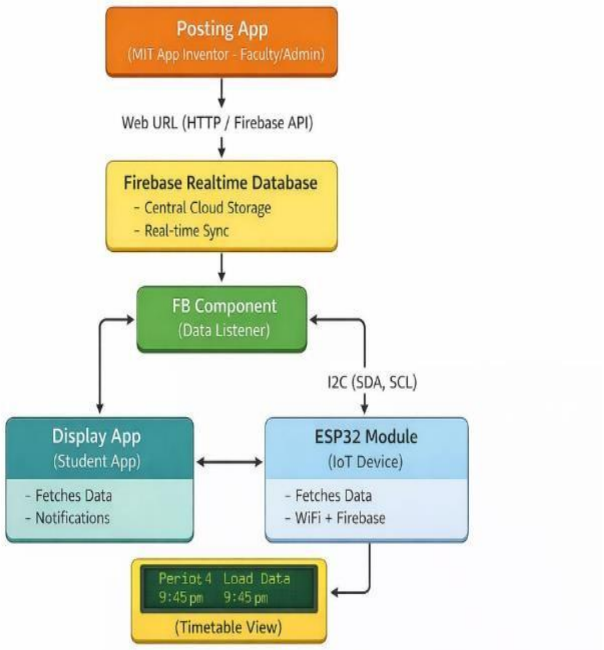


Fig 1: Proposed method block diagram

The system mainly consists of three parts. The first part is the timetable posting application, which is used by faculty or administrators to enter and update timetable details. This application is developed using MIT App Inventor and sends the data to a cloud database.

The second part is the timetable display and notification application, which is used by students. This application retrieves the timetable data from the cloud and displays it in a simple format. It also provides notifications to students before the class begins, so that they do not miss any sessions.

The third part is the hardware display unit, which is built using an ESP32 microcontroller and an LCD display. This unit connects to the internet through Wi-Fi and shows the timetable in common areas like classrooms or corridors. It ensures that timetable information is available even without mobile phones. The system uses Firebase Realtime Database as a cloud backend to store and synchronize data. Whenever the timetable is updated by the admin, the changes are immediately reflected in both the mobile application and the LCD display.

Overall, the proposed system provides a smart and efficient solution for timetable management by combining IoT, cloud computing, and mobile technology. It reduces manual work, improves communication, and ensures that students receive timely information.

4. METHODOLOGY

The proposed system is developed using a step-by-step approach to ensure proper functioning and real-time performance. First, the timetable data is created and uploaded by the admin using the timetable posting application developed in MIT App Inventor. The entered data includes subject name, class timings, and day-wise schedule. The uploaded data is stored in the Firebase Realtime Database, which acts as a central cloud storage. This database ensures that all updates are saved and synchronized in real time.

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

Next, the student mobile application continuously retrieves the timetable data from Firebase. It displays the schedule in a simple format and compares the current time with the class timings. When the time is close to the class, the system automatically sends a notification to the student. At the same time, the ESP32 microcontroller connects to the Wi-Fi network and fetches the same timetable data from Firebase. The retrieved data is then displayed on the LCD screen placed in common areas like classrooms or corridors. Whenever the admin updates the timetable, the changes are immediately reflected in both the mobile application and the LCD display. This ensures that all users receive the latest information without delay.
Overall, the methodology ensures smooth data flow from admin to cloud and then to users and hardware, providing a real-time and efficient timetable management system.

5. HARDWARE IMPLEMENTATION

The hardware implementation of the proposed system is mainly based on the ESP32 microcontroller and a 20×4 LCD display. The ESP32 acts as the main control unit, which connects to the Wi-Fi network and communicates with the Firebase cloud database. The LCD display is connected to the ESP32 using the I2C interface, which reduces the number of wires and makes the connection simple. The LCD is used to display timetable information such as subject name and class timings.

A regulated 5V power supply is provided to the ESP32 and LCD to ensure stable operation. Proper connections are made using jumper wires to avoid loose connections and ensure reliable performance. After powering the system, the ESP32 connects to the Wi-Fi network using stored credentials. It then fetches timetable data from the Firebase database at regular intervals. The received data is processed and displayed on the LCD screen in a clear format. Whenever there is an update in the timetable, the ESP32 automatically retrieves the latest data and updates the display. This ensures that the information shown on the LCD is always current.

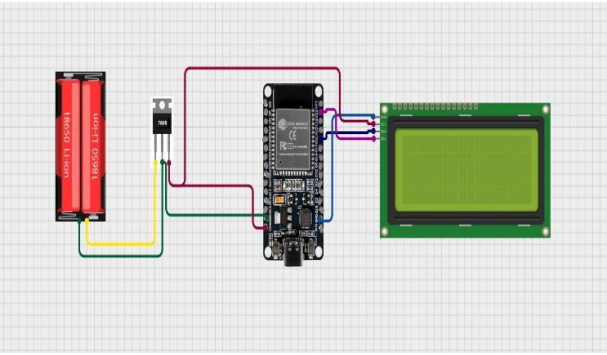


Fig 2: Circuit Diagram

Overall, the hardware implementation is simple, cost-effective, and suitable for real-time timetable display in educational institutions.

6. HARDWARE COMPONENTS

The proposed system uses a few basic hardware components to display the timetable information. The main component is the ESP32 microcontroller, which acts as the core of the system. It has built-in Wi-Fi capability, which helps it connect to the internet and fetch data from the cloud database.

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

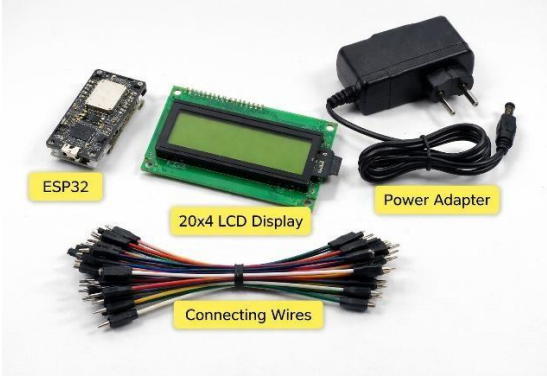


Fig 3: Components

A 20×4 LCD display is used to show the timetable information. It can display multiple lines of text, which makes it suitable for showing class timings and subject details clearly. The LCD is connected to the ESP32 using an I2C interface, which reduces the number of connecting wires. A power supply unit is used to provide a stable 5V power to the ESP32 and LCD display. Proper power supply ensures smooth and continuous working of the system without interruptions. The system also uses a Wi-Fi network to connect the ESP32 to the cloud database. This allows real-time data transfer and updates. Basic connecting wires and interfacing components are used to establish proper connections between all the hardware parts. Overall, the hardware components are simple, low-cost, and easy to use, making the system suitable for academic and practical applications.

7. RESULTS AND DISCUSSION

The proposed IoT-based timetable system was successfully implemented and tested. The admin application allows users to enter and upload timetable data to the Firebase database. The uploaded data is stored in the cloud and is instantly available to all connected devices. The student application retrieves the timetable information in real time and displays it clearly. Whenever any changes are made by the admin, the updated timetable is immediately reflected in the application without delay. The notification feature works effectively by alerting students before the class begins, which helps in improving punctuality and reducing missed classes.

The ESP32 hardware unit also performs efficiently by connecting to the Wi-Fi network and fetching data from the cloud. The timetable is displayed on the LCD screen, and it updates automatically whenever there is a change in the database. This ensures that timetable information is always available in common areas. From the results, it is observed that the system reduces manual work and improves communication between students and faculty. Compared to traditional methods, the proposed system provides faster updates, better accuracy, and real-time notifications. However, the system depends on internet connectivity, and any network issue may cause temporary delay in updates. Overall, the system is reliable, efficient, and suitable for modern academic environments.

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

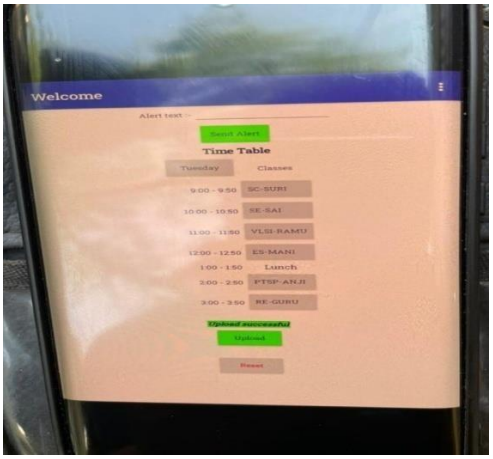


Fig 5: Time table selecting

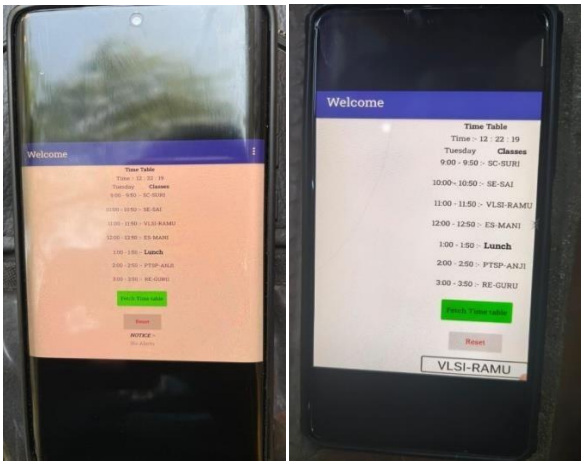


Fig 6: SMS displayed on LCD send by the mobile and remaind notification

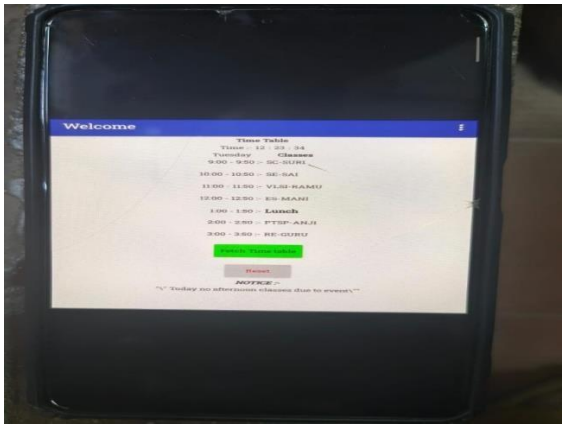


Fig 7: Alert Notification

Table 1: Performance Comparison of Existing and Proposed system

Aspect	Existing Method	Proposed Method
Updates	Manual, not real-time	Automatic, real-time

ISSN: 2582 - 6379
IJISEA Publications
International Journal for Interdisciplinary Sciences and Engineering Applications
IJISEA - An International Peer- Reviewed Journal
2026, Volume 7 Issue 1
www.ijisea.org

Notification	No alerts	Sends notification before class
Accessibility	Limited	Easy access via app & updated
Accuracy	Limited	Always updated
Technology	Traditional methods	IOT and cloud-based
User effort	High manual effort required	Minimal human effort

8. CONCLUSION

The proposed IoT-based timetable posting, display, and notification system provides an effective solution to the problems of traditional timetable management. It replaces manual methods with an automated system that offers real-time updates and better communication between faculty and students. By using mobile applications, cloud database, and ESP32 hardware, the system ensures that timetable information is always accurate and easily accessible. The notification feature helps students to attend classes on time and reduces confusion. Overall, the system is simple, cost-effective, and suitable for modern educational institutions. It improves efficiency, saves time, and provides a smart way of managing timetables.

REFERENCES

[1] MIT App Inventor, *MIT App Inventor Documentation*, MassachusettsInstitute of Technology. Available: https://appinventor.mit.edu
[2] Google Firebase, *Firebase Realtime Database Documentation.* Available: https://firebase.google.com/docs/database
[3] Espressif Systems, *ESP32 Series Datasheet*, Espressif Systems, 2023.
[4] Espressif Systems, *ESP32 Wi-Fi Programming Guide*,Espressif Systems Official Documentation.
[5] K. Ashton, "That 'Internet of Things' Thing," *RFID Journal*, 2009.
[6] S. Madakam, R. Ramaswamy, and S. Tripathi, "Internet of Things (IoT): A Literature Review," *Journal of Computer and Communications*, vol. 3, no. 5, pp. 164–173, 2015.
[7] P. P. Ray, "A Survey on Internet of Things Architectures," *Journal of King Saud University – Computer and Information Sciences*, vol. 30, no. 3, pp. 291–319, 2018.
[8] A. Zanella et al., "Internet of Things for Smart Cities," *IEEE Internet of Things Journal*, vol. 1, no. 1, pp. 22–32, 2014.
[9] R. Buyya et al., "Cloud Computing and Emerging IT Platforms: Vision, Hype, and Reality," *Future Generation Computer Systems*, vol. 25, no. 6, pp. 599–616, 2009.
[10] M. Botta et al., "Integration of Cloud Computing and Internet of Things: A Survey," *Future Generation Computer Systems*, vol. 56, pp. 684–700, 2016.
[11] A. Al-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications," *IEEE Communications Surveys & Tutorials*, vol. 17, no. 4, pp. 2347–2376, 2015.
[12] S. R. Kodali and L. Boppana, "IoT Based Smart Campus Solutions," *International Journal of Engineering Research & Technology*, vol. 6, no. 5, 2017.
[13] A. K. Sharma and R. Kumar, "Smart Education System Using IoT," *International Journal of Advanced Research in Computer Science*, vol. 9, no. 1, pp. 234–238, 2018.
[14] Android Developers, *Android Notification System Documentation.* Available: https://developer.android.com

[15] M. Chen et al., "Smart Campus: A Review of Internet of Things Applications," *IEEE Access*, vol. 8, pp. 119–135, 2020.
[12] Z. Ebrahimi et al., "RAPID: Approximate Pipelined Soft Multipliers and Dividers for High Throughput and Energy Efficiency," arXiv preprint arXiv:2206.13970, 2022.
[13] Jyothi, Grande Naga, et al. "Design of FINFET based DRAM cell for low power applications." Computer-Aided Developments: Electronics and Communication (2019): 35-43.
[14] "FPGA-Based Improved Sobel Operator Edge Detection," ResearchGate, 2023.
[15] "Survey on FPGA Edge Detection Operators: Comparative Analysis of Sobel Implementations," SBC Journal of Embedded Systems, 2025.