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Development Of IOT Based Smart Scheduler And Faculty Notification System

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***Abstract*— The project aims to revolutionize traditional classroom management and faculty communication through the development of a Smart Classroom Scheduler and Faculty Notification System, leveraging cutting-edge Internet of Things (IoT) technology and mobile applications. By addressing challenges such as inefficient scheduling processes and lack of seamless communication platforms, the system seeks to streamline scheduling, enhance faculty-student communication, and enrich the overall educational experience.**

Through the implementation of an IoT-based scrolling display system and dedicated mobile applications for faculty and administrators, the project intends to create a cohesive and user-friendly platform. It offers innovative scheduling algorithms, real-time updates on class schedules, and robust notification systems to ensure timely dissemination of important information. Ultimately, the Smart Classroom Scheduler and Faculty Notification System aspire to modernize educational institutions, fostering a more efficient, collaborative, and engaging learning environment for both students and educators..

***Keywords*—** Internet of things (IoT), scheduling, real-time, fog computing, cloud computing

I. INTRODUCTION

Traditional The synopsis presents a concise overview of the project, providing an insightful glimpse into its key objectives and innovative approach. This project aims to revolutionize traditional classroom management and faculty communication through the development of a Smart Classroom Scheduler and Faculty Notification System, leveraging cutting-edge Internet of Things (IoT) technology and mobile applications.

The traditional approach to scheduling classes often leads to inefficiencies, conflicts, and unnecessary complexities. Timetable adjustments, room availability issues, and faculty preferences can cause disruptions in the learning process. Moreover, the lack of a seamless communication platform between faculty and students results in missed opportunities for engagement and updates. Our project seeks to bridge these gaps by developing an intelligent system that streamlines the scheduling process, enhances faculty-student communication, and ultimately enriches the educational experience.

In educational institutions, efficient scheduling and timely communication are vital components for creating an organized and productive learning environment. However, the existing manual systems for displaying class schedules on notice boards and relying on manual reminders for faculty can lead to errors, disruptions, and missed opportunities. To address these challenges, the project proposes an IoT-based scrolling display system that will be installed outside each

classroom. This innovative display will receive real-time updates from a central server, ensuring accurate and up-to-date class schedules accessible to students at all times.

Through this project, we intend to create a cohesive and user-friendly platform that benefits all stakeholders within the educational ecosystem. The system will offer an innovative scheduling algorithm that takes into account various factors such as room availability, faculty preferences, and course requirements to generate optimal schedules. Additionally, the faculty interface will provide educators with tools to manage their availability, request changes, and effectively communicate with students. A robust notification system will ensure timely dissemination of important information, assignments, and updates, fostering a more engaged and informed learning environment.

By addressing these challenges and providing practical solutions, our project aspires to contribute to the transformation of traditional classrooms into dynamic, tech-enabled learning spaces. This introduction sets the stage for a comprehensive exploration of the architecture, functionalities, benefits, and potential impact of our “Smart Classroom

OBJECTIVE

The primary objective of the project is to develop an IoT-based Smart Scheduler and Faculty Notification System for educational institutions. This innovative system aims to revolutionize traditional classroom management and faculty communication by leveraging cutting-edge IoT technology and mobile applications. The overarching goal is to streamline scheduling processes, enhance faculty-student communication, and modernize educational institutions by providing real-time updates, efficient scheduling algorithms, and robust notification systems. Through this endeavor, the project seeks to create a dynamic, tech-enabled learning environment that fosters collaboration, engagement, and efficiency for both students and educators..

The challenges in the current system can be summarized as follows:

1. Manual Scheduling Complexities: Traditional classroom scheduling methods involve manual coordination of multiple variables, leading to errors, conflicts, and time-consuming adjustments. Faculty members often rely on manual reminders or emails to stay updated about their lecture timings, which can be unreliable and may result in delays or missed lectures

2. Resource Allocation Issues: The allocation of classrooms, labs, and other resources often lacks optimization, resulting in underutilization or clashes.
3. Faculty Preferences: Accommodating faculty preferences for specific time slots or teaching environments can be challenging, leading to dissatisfaction and potential scheduling conflicts.
4. Communication Gaps: Limited or outdated communication channels hinder effective information dissemination, such as class cancellations, rescheduled sessions, and important announcements. The lack of real-time information and efficient communication methods in the existing system can lead to disorganized classrooms, wasted time, and reduced productivity for both students and faculty.

5. Missed Engagement Opportunities: Inadequate communication tools restrict faculty-

student interaction outside the classroom, diminishing the potential for collaborative learning and engagement

6. Complex Changes Handling: Handling changes in schedules or course assignments, due to unforeseen circumstances, is cumbersome and lacks real-time updates. The absence of an automated system hampers the ability of the Head of the Department (HOD) to quickly adjust and update class schedules based on changing requirements or unforeseen events. This manual process can be time-consuming and prone to errors.

II. LITERATURE SURVEY

A. Venkateswara rao, Y. Naveen, B. Sai Upendra, U.Rajesh Gupta and P.Hemanth "kumar"“College Time Table and Notice Board Display With Auto SMS to Faculty” The Journal of Engineering sciences Vol 12, Issue 9, Sep/2021 ISSN NO:0377-9254.

This paper aims to present a technology based notice board using COLLEGE TIME TABLE AND NOTICE BOARD DISPLAY WITH AUTO SMS TO FACULTY. We are using the GSM module for sending and receiving the message, once the period is set, GSM module sends message to that faculty, when class begins; It additionally changes the information in the notice board through straightforward SMS. This projectconsist of, LCD module, GSM module and RTC module, which all are interfaced with Arduino (ATMEGA328). It also consist of BUZZER which also interfaced with Arduino (ATMEGA328) for indication of period completion like college bell. The wireless network is designed with idea of a SMS, as the SMS send by the GSM module based on the period setting by using RTC and Switches; For changing the information in the notification board, any user can send SMS to mobile number which is present on the GSM module.

2] Dhanasekar Subramaniyam, “Gsm Based Wireless Notice Board Using Graphical Lcd “, Sri

Eshwar College of Engineering, May 2021 , https://www.researchgate.net/publication/351662319

This paper gives the possibility of remote electronic notification board utilizing GSMinnovation. Electronic notice boards are the essential thing in any organizations or public spots like transport stand, railroad station or in the business places like universities, schools, banks and so forth presently the notification board is overseen or controlled physically. It diminishes various

Development of IOT based smart scheduler and faculty notification system assets like paper printer ink, labor and most significant the time, as this framework straight forwardly shows any data on the notification load up so that no abuses can be possible here.

3] Pavel Younus Abdullah, Dr. Bazar Khidr Hussan -” Class Schedule System “, 2019

This project aims to enhance the Scheduling Class System and simplify the explanation of database accessibility. Using the web, this database was implemented. PHP is an application programming language, and MySQL is a database management system. This project was developed to give administrators and instructors a framework within which to nominate coursework, including teacher course timetable, classroom, and day's tables, as well as to provide feedback on each coursework. In case of changes, it enables the end-user to add, edit, delete, save, and update records or information. Reports such as class schedules, class lists, teacher lists, hall lists, department lists, and school years with multiple semesters can be generated using it. The best feature of this system is that it may be expanded upon in the future because to its flexibility and scalability, both of which are crucial. The Class Schedule System will require additional development and linkages. A Smartphone application's development and execution are still unresolved issues.

[4] Freddie Rick E. Labuanam, Sheena-Jean E.Tapaoan, Richards Q. Camungao - “ Application Of Representation And Fitness Method Of Genetic Algorithm For Class Scheduling System” - International journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-2, July 2019. 10.35940/ijrte.B1026.078219

The Application of Representation and Fitness Methods of Genetic Algorithm in Class Scheduling (ARFMGACS) developed by the college of CCSICT was given in this study. Class

Development of IOT based smart scheduler and faculty notification systemscheduling is made more organized by using the representation technique; it functioned as a holding area for automatically generated schedules, and the fitness method is the formula used to layout the newly constructed course class into a schedule. The system offers functionality for creating pre-scheduling templates using the genetic algorithm's representation approach and for creating class, faculty, room, and lab schedule

[5] Ayeni Olaniyi Abiodun, Dada Olabisi, and Talabi Olanrewaju, " Lecture Time Table Reminder System on Android Platform," 2017 Published Online January 2017 in

MECS(http://www.mecs-press.net) DOI: 10.5815/ijwmt.2017.01.02

The paper outlines the issue of students forgetting lecture schedules and missing classes. It iis a common concern in educational institutions, leading to potential academic setbacks and knowledge gaps. To address this problem, a Lecture Timetable Reminder System has beenproposed and developed as a mobile application on the Android platform, specifically designed for Computer Science students at the 500 level of the Federal University of Technology, Akure.

The primary objective of this system is to minimize the occurrence of missed lectures by providing timely reminders to students about their scheduled classes. By doing so, the application aims to ensure that students stay informed and attend their lectures promptly, reducing the risk of falling behind in their studies.

[6] Chao Wang, Member , IEEE, Aili Wang , Xi Li , Member , IEEE, Xuehai Zhou Member , IEEE-"A Classroom Scheduling Services For Smart Classes", January 2015 10.1109/TSC.2015.2444849

A descriptive summary of the classroom scheduling service for smart classrooms is provided in the study that is related to this publication. Many formulations and algorithms are used, it was proposed to solve the problem of traditional classroom planning. Since the authors use MATLAB for simulation, computational complexity can have a dramatic impact on performance.

Development of IOT based smart scheduler and faculty notification system

Recently, an integer linear programming (ILP) approach has been proposed to solve the scheduling problem. ILP models are developed and solved using three advanced ILP solvers based on generic algorithms and SAT (Boolean Satisfiability) techniques. The Smart Class architecture provides a set of backstage control web pages that allow administrators to interact with database management. The lesson planning process can be driven by a planning algorithm or manually by an administrator

[7] Cut Fiarni, Arief Samuel Gunawan, Ricky, Herastia Maharani, Heri Kurniawan- " AutomatedScheduling System For Thesis And Project Presentation Using Forward Chaining Method WithDynamic Allocation Resources " , December 2015 10.1016/j.procs.2015.12.133

In order to handle the collaborative function of this system, Project and Thesis Presentation Automatic Scheduling System is a web-based system. As a result, it can be accessed anywhere and whenever it is needed, either through a variety of devices that have a web browser (such as mobile phones, tablets, laptops, computers (PCs), and so on).According to tests of alternative schedules run on the system (either manually or automatically), the system's schedule matches expert users' schedules 100% of the time. It also offers higher adaptability and better data handling than the previous system for scheduling theses and projects. As long as it has the same characteristics, complexity, rules, and limitations as the proposed system, the concept can be used to various types of dynamic resource allocation, automatic scheduling systems.

[8] Ammar Ihsan Nasution, " Developing Smart Appointment and Scheduling System for Innovation in Smart Universities" 2015 International Journal of Computer Science and Information Technology Research, Vol. 3, Issue 4, pp: (112-118), Month: October - December 2015, Available at: www.researchpublish.com.

Development of IOT based smart scheduler and faculty notification systemThis paper proposes a conceptual solution for appointment and scheduling management system among university's student and lecturer. Smart appointment and scheduling system designed to help the university to build the system for consultation service management amonglecturers and students. The main objective of this project is to process appointment and scheduling system effectively and efficiently through an online system and replace the current manual process that will contribute in developing smart and future universities. With this project, the lecturers and the students can manage their time to meet and do the consultation.

This conceptual paper introduces to improve the quality of the service in smart/future universities through innovative system that lead to the prosperity. This paper offers nine blocksof Business Model Canvas (BMC) framework and Literature Review (LR) as the methodology ofthis research. The finding of this paper shows that the new innovative appointment andscheduling system can help the university to build the characteristic and personalization of the student as well as the innovation system in the smart/future universities

III. METHODOLOGY

Intelligent Scheduling Algorithm :The heart of the system lies in an intelligent scheduling algorithm. This algorithm considers various factors, including faculty preferences, room availability, course requirements, and potential conflicts. By optimizing these variables, the algorithm generates efficient and conflict-free schedules that enhance resource utilization and satisfaction for all stakeholders.

2. Faculty Interface::The faculty interface provides educators with a user-friendly platform to manage their schedules, availability, and preferences. Faculty members can input their teaching preferences, mark unavailable time slots, and request changes when necessary. This interface allows for greater customization, ensuring that faculty members' needs are considered during the scheduling process.

3. Student-Friendly Communication:The system includes a robust communication platform that fosters interaction between faculty and students. Through this platform, faculty members can send real-time notifications, announcements, and assignments to their students. Students, in turn, can ask questions, seek clarifications, and engage in discussions, all within the same system. This two-way communication enhances

engagement and the overall learning experience.

4. Personalized Notifications::To cater to individual preferences, the system offers personalized notification settings. Users can choose their preferred mode of communication (e.g., email, push notifications) and set the frequency and timing of notifications. This customization ensures that users receive information in the manner that best suits their needs.

5. Real-Time Updates: Changes to schedules or course assignments are communicated instantly through the notification system. Whether a class is canceled, rescheduled, or moved to a different room, all relevant parties are promptly informed, reducing confusion and disruptions.

6. Security and Data Protection: The proposed system places a strong emphasis on security and data protection. User authentication mechanisms ensure authorized access, and data encryption safeguards sensitive nformation. Compliance with privacy regulations guarantees that user data remains confidential.

7. Cross-Platform Compatibility: Recognizing the diversity of devices used by faculty and students, the system is designed for cross-platform compatibility. Users can access the system through web browsers on desktops, laptops, or mobile devices, ensuring convenient access regardless of the device used.

8. Analytics and Reporting:The system collects usage data and generates analytical reports. This feature helps administrators and educators gain insights into system utilization, user engagement, and scheduling patterns, enabling informed decision-making and continuous improvement.

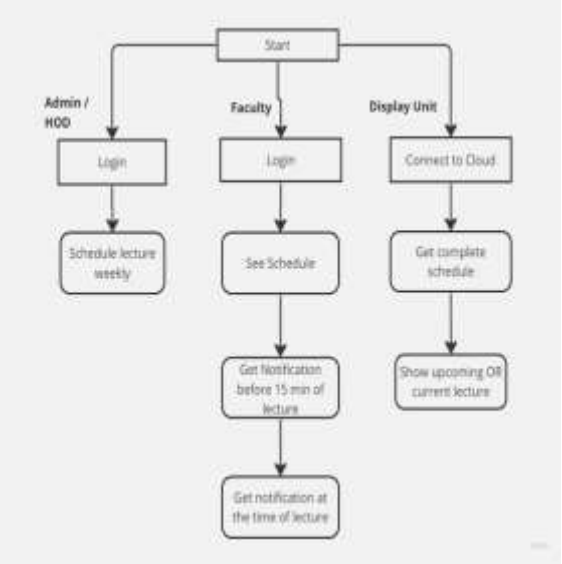

Fig 1: Flow Chart

Creating a Smart Classroom Schedule and Faculty Notification System with IoT involves integrating various technologies and components to streamline classroom scheduling and improve communication between faculty members and the system. Here's a general methodology you can follow to develop such a system:

Requirement Analysis: Identify the specific requirements of the smart classroom system. Understand what features are needed for scheduling, notification, and IoT integration. Define user roles and permissions, such as administrators, faculty members, and students.

System Design:Design the architecture of the system, including the components and their interactions.Decide on the hardware components required for IoT integration, such as IoT devices, sensors, and communication protocols.

Choose a suitable IoT platform for device management, data collection, and communication.

Database Design: Design a database to store information about classrooms, faculty members, students, schedules, and notifications.Define relationships between different entities for efficient data retrieval.

IoT Integration:Select IoT devices and sensors to monitor classroom occupancy, temperature, lighting, etc.

Implement protocols like MQTT or HTTP for communication between IoT devices and the central system.Set up IoT device management to handle device registration, authentication, and data transmission.

Classroom Scheduling:Develop a scheduling module that allows administrators to create, update, and manage class schedules.Consider integration with calendar systems to facilitate easy scheduling for faculty members.

Notification System: Implement a notification system that alerts faculty members about class changes, cancellations, or room changes via various communication channels (email, SMS, mobile app notifications).Provide options for faculty to customize their notification preferences.

User Interfaces:Create user interfaces for administrators, faculty members, and students.Admin interface: Manage schedules, view classroom occupancy, and handle notifications.Faculty interface: View personal schedules, receive notifications, and request room changes if needed.Student interface: Access class schedules, view classroom details, and receive notifications.

Data Analytics and InsightsImplement data analytics to gather insights about classroom usage, occupancy patterns, and resource utilization. Generate reports for administrators and faculty to make informed decisions for optimizing classroom allocation.

Security and Privacy:Implement robust security measures to protect sensitive data and ensure secure communication between devices and the system.Incorporate user authentication and authorization mechanisms to control access to the system's features.

Testing and Deployment:Conduct thorough testing of the entire system, including IoT device functionality, scheduling accuracy, and notification delivery.Deploy the system in a controlled environment, gather feedback, and make necessary adjustments.

Maintenance and Updates:Provide ongoing maintenance and support for the system, addressing any issues or updates that arise.Continuously gather feedback from users to improve the system's usability and effectiveness.

IV. CONCLUSION

All In conclusion, the development of the IoT-based Smart Scheduler and Faculty Notification System represents a significant step forward in enhancing the efficiency and effectiveness of classroom management and communication within educational institutions. By leveraging IoT technology and mobile applications, the project has successfully addressed challenges such as inefficient scheduling processes and lack of seamless communication platforms.

The system's innovative features, including real-time updates on class schedules, robust notification systems, and intuitive interfaces for faculty and administrators, have paved the way for a more organized, dynamic, and engaging learning environment. Through the implementation of cutting-edge scheduling algorithms and seamless communication channels, the project has modernized educational institutions, fostering collaboration, engagement, and efficiency among students and educators alike.

Moving forward, the Smart Scheduler and Faculty Notification System will continue to play a crucial role in reshaping the educational landscape, paving the way for a more efficient, collaborative, and tech-enabled learning experience. As technology continues to evolve, the system will adapt and innovate, ensuring that educational institutions remain at the forefront of educational excellence in the digital age.files.

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