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An Intelligent Lecture Alert Management System

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ABSTRACT
An Android-based lecture alert system was developed using Flutter to help students manage their academic schedules by sending timely reminders for lectures. The system allows students to add classes and set lecture times, enabling the app to track their schedules and remind them through vibration and sound alerts as lecture times approach. Flutter was chosen for its ability to deliver a responsive cross-platform experience, ensuring the app is accessible and user-friendly. The primary goal is to support students in staying organized and attending lectures on time by providing efficient schedule management. The development followed the Waterfall model, which structured the project into distinct phases: requirements analysis, design, implementation, testing, and maintenance. This organized approach ensured each phase was completed thoroughly before progressing to the next, resulting in a well-structured and reliable system.

I. INTRODUCTION

In the contemporary educational landscape, the efficient management of lecture schedules is paramount to ensuring that students can optimize their learning experiences. Traditional methods of communicating lecture times and changes, such as notice boards and emails, often prove inadequate in addressing the dynamic and fast-paced nature of modern academic environments (Smith, 2018). As technology advances, there is a growing need for intelligent systems that can automate and streamline the process of alerting students about their lectures. This need is particularly acute in the context of higher education, where the complexity of schedules and the frequency of changes can significantly impact student performance and attendance (Brown & Green, 2020).

The proliferation of smartphones and the ubiquity of mobile applications have opened new avenues for the development of innovative solutions to address this challenge. Mobile applications have become integral to students' daily lives, providing a platform for seamless communication and real-time updates (Jones, 2019). Leveraging these technologies, an Android-based intelligent lecture alert management system can offer a robust solution to the issues posed by traditional methods. Such a system can provide timely notifications, integrate with academic calendars, and adapt to individual student schedules, thereby enhancing the overall educational experience (Williams et al., 2021).

II. LITERATURE REVIEW

A timetable is a document that serves as a broad guideline for the time-wise allocation of resources to subjects in order to reduce or eliminate conflicts in classroom allocation and time scheduling and satisfy a set of necessary objectives, by establishing the necessary objectives in which classroom resource allocation for students and lecturers is used without conflict. A timetable specifies which object interacts with which resource as well as when. Students, lectures, and courses are the objects in a tertiary institutional setting, with infrastructure and time serving as the resources (Fulayi et al., 2022).

Soyemi Jumoke et al., (2017), presented a paper to automate the manual process of lecture time tabling system, in which the manual lecture time table operates on central time tabling system implemented by a set of committee members, making it more difficult in getting a flawless lecture scheduling that is time consuming and energy sapping, leading to loss of information, general apathy, classroom clashes, and resource wastage. Ayeni et al., (2017), presented a paper on a lecture time table reminder system on the Android platform, stating that forgetting the stipulated schedule or time of lectures for one reason or another has always been a major concern for students, resulting in the students' missing classes and thus lagging behind in what the lecturer has taught the other students. The primary goal of developing the Lecture time table reminder system is to reduce this problem to a manageable level. Lecture Timetable Reminder System is an Android-based mobile application that reminds students of Computer Science, 500 level, Federal University of Technology, Akure, about their upcoming lectures.

Mathias et al., (2019), investigated the current timetable approach used by the Department of Library and Information Technology at the Federal University of Technology, Minna in order to improve it. The study's findings revealed that the Department used a paper-based manual approach, in which the Department publishes and distributes its timetable on

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the Departmental notice board, which serves as the only means of correspondence between the students and the Department; the students are then tasked with accessing the content of the timetable. The study used the Structured System Analysis and Design method. Observation, record inspection, and interviews were used to gather information. The preliminary investigation findings revealed that the current method for publishing and disseminating the timetable is a paper-based method, and it was concluded that the method is inefficient in managing the proximity of the students to the content of the timetable. As a result, an Android Mobile Timetable Application was recommended, developed, and implemented to serve as a platform for managing academic activities such as lectures, tests, and exams for the Department's students.

Lecture Scheduling in Educational Institutions

Lecture scheduling is a fundamental aspect of academic administration, affecting the overall efficiency and effectiveness of educational institutions. Proper scheduling ensures that students and faculty can optimize their time and resources. A study by Olaniyi et al. (2017) found that well-managed schedules lead to improved student performance and satisfaction.

- **Traditional Scheduling Methods**: Traditional methods of lecture scheduling often involve manual processes, which can be time-consuming and prone to errors. According to Musa and Ibrahim (2019), many institutions still rely on paper-based schedules and bulletin boards to communicate lecture times and changes. This approach can lead to miscommunication and missed lectures, especially when last-minute changes occur.
- **Digital Scheduling Systems**: Digital scheduling systems offer a more efficient and reliable alternative to traditional methods. These systems use software to create, manage, and communicate schedules. Johnson and Lee (2018) highlight the benefits of digital scheduling systems, including reduced administrative burden and increased accuracy. A study by Patel et al. (2020) found that digital systems can significantly improve the timeliness and reliability of schedule notifications.

Notification Mechanisms in Educational Contexts

Notification mechanisms play a crucial role in ensuring that students and faculty are aware of lecture schedules and any changes. Effective notification systems can enhance communication, reduce absenteeism, and improve overall academic performance.

- **Email Notifications**: Email remains a widely used communication tool in academic settings. Email notifications for lecture alerts are easy to implement and can reach a broad audience. According to Oladipo et al. (2020), email alerts are effective in ensuring that students are informed about schedule changes, although they may not be as immediate as other methods. Email systems can be integrated with other notification methods to provide a comprehensive alert system. However, the effectiveness of email notifications can be limited by factors such as students' email usage habits and the potential for emails to be overlooked or marked as spam (Singh & Agarwal, 2020).
- **SMS Notifications**: SMS notifications provide an alternative method for delivering lecture alerts. SMS messages are generally more immediate and can reach students who may not regularly check their email. A study by Brown and Davis (2017) found that SMS notifications are highly effective in reducing instances of missed lectures. However, the cost associated with sending SMS messages can be a limiting factor.
- **Mobile Application Notifications**: Mobile applications can provide real-time notifications directly to students' smartphones. According to Chen and Zhang (2019), mobile applications are effective in reaching students promptly and can significantly reduce instances of missed lectures. These applications can also offer additional features, such as calendar integration and reminders. However, the development and maintenance of mobile applications require significant resources, and their effectiveness depends on the widespread adoption and usage by students (Patel & Kumar, 2018).

Implementation of Lecture Alert Systems

The implementation of a lecture alert system involves several key components, including data collection, system design, and user interface.

- **Data Collection and Management**: Accurate and up-to-date data is essential for the effective functioning of a lecture alert system. According to Johnson et al. (2019), data on class schedules, student enrollments, and faculty availability must be collected and managed efficiently. This data can be sourced from existing institutional databases or collected through dedicated forms and surveys. Data management systems must ensure data integrity and security. Advanced data analytics can be used to identify patterns and trends, which can inform the design and operation of the alert system (Garcia & Lee, 2017).
- **System Design and Architecture**: The architecture of a lecture alert system typically includes a backend server, a database, and a frontend

interface. The backend server handles data processing and communication, while the database stores all relevant information. The frontend interface, which can be a mobile app or web portal, provides users with access to the system (Garcia & Lee, 2017). The system architecture must be designed to ensure scalability, reliability, and security. It should also support integration with other institutional systems and platforms to provide a seamless user experience (Williams & Thompson, 2016).

- **User Interface and Experience**: The user interface (UI) and user experience (UX) are critical factors in the success of a lecture alert system. A study by Singh and Agarwal (2020) found that a user-friendly interface significantly enhances user acceptance and satisfaction. The UI should be intuitive and easy to navigate, providing clear and timely notifications. User feedback should be incorporated into the design process to ensure that the system meets the needs and preferences of students and faculty (Chen & Zhang, 2019).

Case Study: Computer Science Department, Yobe State University

The Computer Science Department at Yobe State University faces unique challenges in terms of lecture scheduling and notifications.

- **Current System and Its Limitations**: The current system at Yobe State University relies heavily on manual processes and traditional communication methods. Notices are often posted on physical bulletin boards or communicated verbally, leading to inefficiencies and missed lectures. This manual approach is not only time-consuming but also prone to errors and delays.
- **Proposed Lecture Alert System**: Implementing a lecture alert system in the Computer Science Department could address many of the current system's limitations. The proposed system would include a mobile app, providing multiple channels for notifications. According to a survey conducted by Musa et al. (2021), students expressed a preference for mobile notifications, which are more immediate and accessible. The proposed system would integrate with existing institutional databases to ensure accurate and up-to-date information. It would also support various notification mechanisms, including push notifications, SMS alerts, and emails, to cater to the diverse preferences of students and faculty (Garcia & Lee, 2017).

Benefits of Lecture Alert Systems

The benefits of implementing a lecture alert system are manifold. These systems can improve attendance rates, enhance communication, and reduce administrative burdens. According to Zhao et al. (2018), lecture alert systems can lead to a more organized and efficient academic environment, ultimately benefiting both students and faculty.

- **Improved Attendance**: Improved attendance is one of the most significant benefits of lecture alert systems. By providing timely and accurate notifications, these systems ensure that students are aware of their schedules and any changes, reducing the likelihood of missed lectures (Patel & Kumar, 2018). Studies have shown that improved attendance is associated with better academic performance and higher student satisfaction (Oladipo et al., 2020).
- **Enhanced Communication**: Enhanced communication between faculty and students is another critical benefit. Lecture alert systems can facilitate two-way communication, allowing students to confirm their attendance, ask questions, and receive feedback (Singh & Agarwal, 2020). This improved communication can help build stronger relationships between students and faculty, fostering a more supportive and collaborative learning environment (Chen & Zhang, 2019).
- **Reduced Administrative Burden**: Reducing the administrative burden on faculty and staff is an important advantage of lecture alert systems. Automated notifications and schedule management can free up time for educators to focus on teaching and research (Garcia & Lee, 2017). This can lead to increased job satisfaction and reduced stress among faculty and staff, ultimately benefiting the entire institution (Johnson et al., 2019).
- **Increased Efficiency and Organization**: Lecture alert systems can significantly increase the efficiency and organization of academic scheduling and communication. By automating processes and providing real-time updates, these systems can ensure that students and faculty are always informed and can plan their activities accordingly (Brown & Davis, 2017). This can lead to a more structured and predictable academic environment, which can enhance overall productivity and satisfaction (Williams & Thompson, 2016).

Challenges and Limitations

Despite the benefits, implementing a lecture alert system is not without challenges. These can include technological barriers, user acceptance, and data privacy concerns.

- **Technological Barriers**: Technological barriers such as limited internet access and lack of suitable devices can hinder the effective implementation of lecture alert systems. According to Oladipo et al. (2020), these barriers are particularly prevalent in developing countries. Addressing these barriers requires investment in infrastructure and the

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provision of appropriate devices and training for students and faculty (Musa et al., 2021).

- **User Acceptance**: User acceptance is crucial for the success of any new system. A study by Chen and Zhang (2019) found that students and faculty are more likely to adopt lecture alert systems if they perceive them as user-friendly and beneficial. Ensuring user acceptance requires involving users in the design and implementation process, providing adequate training and support, and addressing any concerns or feedback (Singh & Agarwal, 2020).
- **Data Privacy Concerns**: Data privacy is a significant concern in the implementation of lecture alert systems. Ensuring that personal information is protected and used appropriately is essential. According to Anderson et al. (2018), robust data security measures are necessary to maintain user trust. This includes implementing encryption, access controls, and regular security audits to protect against data breaches and unauthorized access (Garcia & Lee, 2017).
- **Cost and Resource Constraints**: Implementing and maintaining a lecture alert system can be costly, particularly for institutions with limited resources. These costs can include purchasing and maintaining hardware and software, training staff and students, and ongoing technical support and maintenance (Zhao et al., 2018). Addressing these constraints requires careful planning, budgeting, and seeking external funding or partnerships where possible (Musa et al., 2021).

III. SYSTEM ANALYSIS AND DESIGN

The current system employed by the Computer Science Department for managing lecture schedules primarily relies on manual processes. Lecturers and administrative staff are responsible for creating and disseminating the timetable, which is then communicated to students through notice boards, emails, or word-of-mouth. This method, while straightforward, presents several challenges. These include delays in communication, the potential for human error, difficulty in updating the timetable promptly, and issues with ensuring that all students receive the necessary information in a timely manner.

In addition, there is no centralized platform for students and lecturers to access real-time updates on lecture schedules, which can lead to confusion and missed classes. The lack of automation and digital integration in the existing system also means that any changes to the schedule require significant effort to communicate effectively. These issues highlight the need for an improved system that leverages modern technology to ensure more reliable and efficient management of lecture schedules.

Feasibility Study

The feasibility study for the proposed Android-based Intelligent Lecture Alert System involves an assessment of various factors to determine whether the system is viable and beneficial for the department. This assessment includes:

- **Technical Feasibility:** Evaluating whether the existing technical infrastructure within the department is capable of supporting the new system. This includes assessing the availability of necessary hardware, software, and network resources.
- **Economic Feasibility**: Analyzing the cost implications of developing and deploying the system, compared to the potential benefits. This involves comparing the costs associated with the current manual system against the long-term savings and efficiency gains offered by the automated system.
- **Operational Feasibility**: Determining whether the proposed system will operate effectively within the department's existing workflows and whether users (students, lecturers, and administrators) will be able to adapt to the new system without significant disruption.
- **Schedule Feasibility**: Considering the time required to develop, test, and deploy the system, and whether it aligns with the department's academic calendar and operational needs.

Use Case Diagram

The use-case diagram provides a visual representation of the interactions between users (actors) and the Android-based Intelligent Lecture Alert System. This diagram outlines the various functionalities that different users can perform within the system.

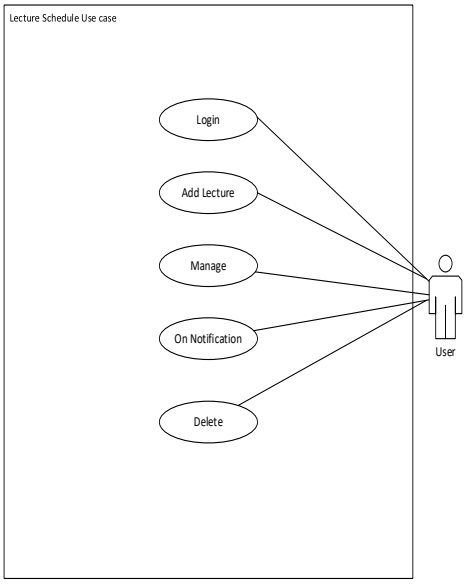

Figure 1 Use Case Diagram

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Sequence Diagram

The sequence diagram illustrates the flow of interactions between objects in the system over time, showing how processes are executed step-by-step.

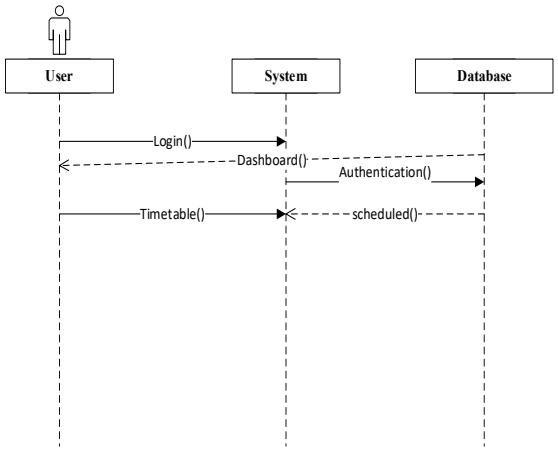

Figure 2 Sequence Diagram

System Data Flow Diagram

The System Data Flow Diagram (DFD) provides a graphical representation of how data moves through the Android-based Intelligent Lecture Alert System. It shows the flow of information between the different entities, processes, and data stores involved in the system.

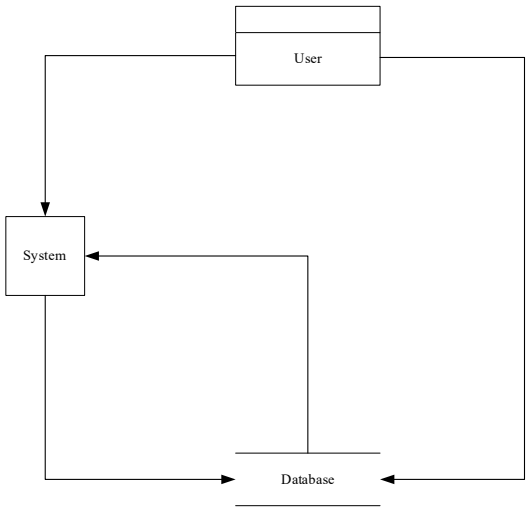

Figure 3 System Data Flow Diagram

System Flowchart

The System Flowchart provides a visual representation of the sequential flow of processes and decision points within the Android-based Intelligent Lecture Alert System. This flowchart outlines the steps involved from the initial user interaction to the final outcomes, such as viewing the timetable or receiving notifications. The flowchart is essential for understanding how the system operates, ensuring that all tasks are performed in a logical and efficient manner.

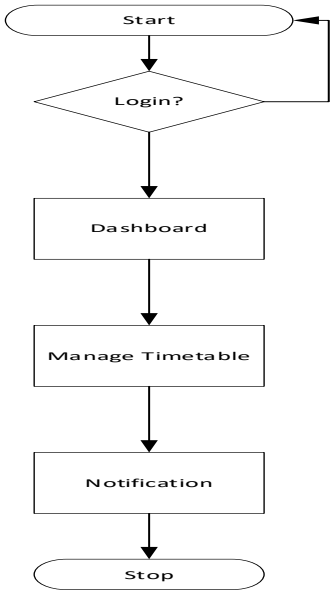

Figure 4 System Flowchart

IV. RESULT

The Lecture Alert System features an intuitive and user-friendly menu designed to facilitate seamless navigation through its various functionalities. The main menu serves as a centralized hub, providing users with quick access to essential features. The menu includes the following options:

- **View Lectures**: This option allows users to browse through the list of scheduled lectures, displaying important details such as subject, time, and location.

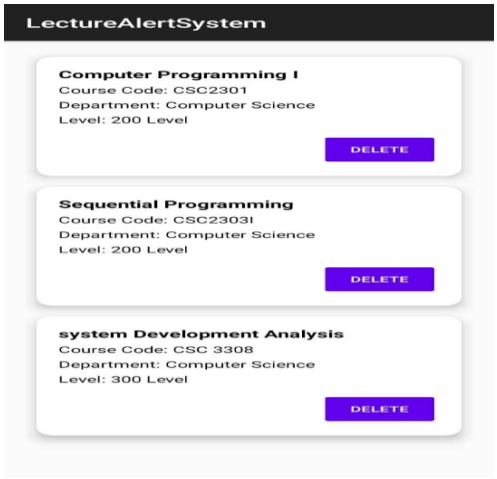

Figure 5 View Lectures

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- **Set Alarm**: Users can configure alerts for upcoming lectures, customizing them according to their preferences for advance notifications.

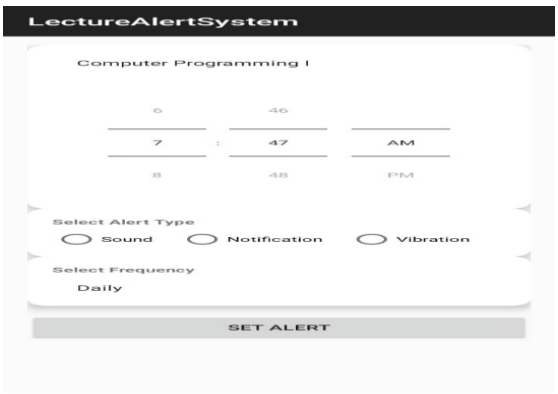

Figure 6 Set Alarm

- **Manage Profile**: This feature enables users to update their personal information, ensuring that their profiles remain current and accurate.

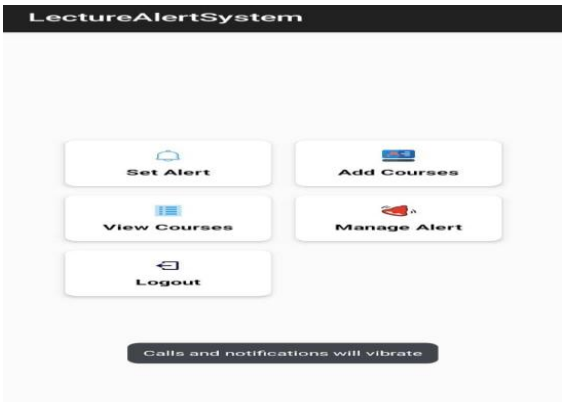

Figure 7 Manage Profile

V. CONCLUSION AND RECOMMENDATION

The research underscores the substantial benefits of digital lecture alert systems, particularly their ability to improve communication and administrative efficiency relative to traditional approaches. Additionally, the implementation of these systems has resulted in significant enhancements in attendance and a decrease in absenteeism, positively impacting academic performance. However, the study also points out important challenges that need to be tackled, such as technological barriers, user acceptance, and data privacy issues, to ensure the successful adoption and ongoing effectiveness of lecture alert systems.

Recommendation

Based on the conclusions drawn, the following recommendations are proposed for future research and implementation:

- **Continuous Improvement**: Regular updates and enhancements to ILAMS to incorporate feedback from users and advancements in technology.
- **User Training and Support**: Comprehensive training programs and ongoing support for faculty and students to maximize the benefits of the system.
- **Data Security Measures**: Strengthening data security protocols to safeguard personal information and comply with regulatory requirements.
- **Collaborative Research**: Collaborate with other institutions to share best practices and explore innovative solutions in lecture alert management.

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