iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** V **Month of publication:** May 2026

DOI: https://doi.org/10.22214/ijraset.2026.82558

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue V May 2026- Available at www.ijraset.com

"Design and Implementation of a Smart Hostel Management System Using Android Studio and MySQL"

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***Abstract:** With the rising population of students in educational institutions, there has been a demand to offer effective and automatic hostel management systems. The old manual systems of managing the room allocation, attendance, fees, complaints and leave records are lengthy and subject to mistakes. This paper is a proposal of the design and deployment of a Smart Hostel Management System with the use of Android Studio and MySQL. The offered system is an Android based application that is written in Java and MySQL as a backend database. It offers secure user authentication and also allows administrators and students to digitally manage hostel operations via. functionalities like instant room allocation, tracking attendance and handling fees and complaints. The system improves openness, precision, and interaction and decrease the amount of administrative labor. This is the one that will be cost effective and scalable. Strategic of hosting El administration.*

I. INTRODUCTION

Administrative functions are substantially changed in educational institutions due to the fast development of mobile computing and information technologies. Most of the traditional hostel management systems are based on manual record-keeping and paper-based operation, which come with issues like data consistency, transparency, delayed data processing and more administrative work. These limitations become more pronounced with the continuous rise in student enrollment and the growing demand for efficient hostel accommodation management.

In recent years, the adoption of digital solutions has improved certain aspects of hostel administration; however, many existing systems remain fragmented and lack integration of essential services. Core functionalities such as attendance monitoring, fee management, complaint handling, and leave processing are often managed through separate modules or independent systems, resulting in inefficiencies and poor coordination. Plus, the challenges of data security, scalability, and real-time access underscore the need for a more comprehensive and cohesive solution.

To address these challenges, this work proposes the design and implementation of a Smart Hostel Management System using Android Studio and MySQL. The system is based on a client–server architecture, where the Android application acts as the client interface and the MySQL database serves as the centralized backend for data storage and management. The system proposed is a combination of several modules such as room allocation, attendance tracking, fee management, complaint registration, leave application etc., in one single system.

The app is developed using the Android platform, allowing users to access it in real time, interact with it easily, and authenticate with secure mechanisms to ensure data integrity and privacy.

The centralized database architecture facilitates efficient data handling, reduces redundancy, and supports scalability for large-scale deployment. Furthermore, the system incorporates structured workflows and automated processes to minimize manual intervention and human error.

The proposed solution aims to enhance operational efficiency, improve communication between students and hostel administrators, and ensure transparency in hostel management processes. By leveraging mobile technology and centralized data management, the system contributes to the digital transformation of hostel administration and provides a scalable framework adaptable to various institutional environments.

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II. LITERATURE REVIEW

The automation of hostel management systems has gained considerable attention in recent years due to the increasing need of effective administrative solutions in educational. institutions. Some of the technological issues that researchers have investigated are numerous. strategy to eliminate the old manual systems and enhance efficiency, transparency and security of operations.

A. Conventional Hostel Management System

Earlier the administration of the hostel earlier followed the manual record-keeping, physical room registers, distribution, revenue collection and check in and complaint management. These systems were slow, subject to human errors and were also not transparent. Research also indicates that manual systems were generally associated with data duplication, long time delays to process grievances and problems of accessing previous records [1]. Lack of a centralized storage additional heightened chances of data loss and mismanagement.

B. Digital and Web-Based Solutions

With the development of the information technology, an alternative to manual operation was formed - the hostel management system operated on the web. The aim of these systems is to improve accessibility and record keeping with centralized databases and client–server architectures. Research studies have shown that the use of digital platforms can greatly decrease paperwork, increase communication, and boost data accuracy [2]. However, there is a need for a continuous Internet connection for these web-based systems and these systems may not offer the best cell phone user interface.

C. Cell phone-Based Hostel Management Applications

With the number of smartphones in the world, hostel management apps have been created for the mobile devices, especially for Android. Android Apps offer portability, ease of usage and user friendly interface. Mobile applications provide all the features like fee tracking, room allocation, leave application, complaint management etc., into a single platform, as stated by Mohit and Suhag (2020) [3]. These applications help facilitate real-time communication between students and administrators, as well as make the system more usable and responsive.

D. Integration of Cloud and IoT Technologies

The latest research is on the involvement of cloud computing and Internet of Things (IoT) in hostel management systems. Cloud-based solutions provide scalable infrastructure, remote data access and secure data storage and reduced maintenance costs and greater flexibility [4]. IoT-based systems make it possible to be real-time observation of such parameters as energy consumption, room. occupancy and visitor management. These high-tech systems can enhance the intelligence of systems, and may be more complex to implement, but can automate and cost.

E. External Sources

The modern process of managing hostels is user-oriented, featuring role-based access control, encrypted authentication, mess management modules, electronic attendance and real-time notification. According to the research, the secure authentication system and the formed relational databases could enhance the integrity and confidentiality of data greatly [5]. The principle behind these systems is to enhance transparency, reduce administrative burden and enhance overall user satisfaction. This has improved significantly but still there is need for an affordable, secure and scalable android based solution that takes into consideration the hostel operations as a whole and integrates them into a single system. We propose the following system to overcome the above mentioned disadvantages, called Smart Hostel Management System, which combines mobile computing, MySQL (relational database management) and a secure client-server system, to offer an efficient digital system to manage the hostels.

III. COMPARISON OF EXISTING SYSTEM

Batra et al. (2020) in their paper “Web-Based Hostel Management System” published in the LCJSTEM Journal proposed a web-based hostel management system which is a system to ease the administration activities in hostel. The system included key features like student record management, room allocation, fee tracking and authentication for login into the system. The proposed system proved useful in efficient storing of the hostel data and also helped in reducing manual works. The system faced some challenges, however,

such as limited mobile access, which limited users' ability to conveniently use the system on their mobile phones, and not alerting users to important changes or warnings real-time [1].

The work entitled “Mobile-Based Hostel Management Application” published in an international journal/conference, has been done by 2 Mohit and Suhag (2020) who have developed the hostel management application using android technology based on mobile technology for better administration in the hostel. There were a few features that the application had, including room allocation, complaint handling, tracking of fees, and maintaining a student database. The idea behind the system was to provide students with convenient access and to help its administrators with efficient management, using the smartphone. But, it had some drawbacks such as inadequate security features which can compromise data security and insufficient scalability which may hinder its ability to efficiently manage a high volume of users and data records [2].

In their research publication, “Digital Hostel Management System” using web technologies, Chaudhri and Kevat (2021) suggested a web-based hostel management system to improve the efficiency of the administration of the hostel. The system emphasized on record management automation, helping to maintain students and hostel data systematically and minimize manual efforts. It also improved communications among the students and the administration of the hostels, which helped get information to students quickly and coordinate between students and administration. However, there were some drawbacks to this system; it required the internet to operate and was not very functional if the network was down or if there were no internet connections [3].

In the study “Android Hostel Management Application” published in ISR Journals, 4 Kulashekar made an Android based application to enhance the hostel services and communication. The application also had beneficial features like a gate pass management system to track students coming and going, mess notification to notify about the hostel food, suggestion module to gather the suggestions of students, an interface providing easy access to the hostel information and services. The overall user experience was enhanced, and the management activities in hostels were made easier. It had some drawbacks, however, such as lack of financial management functionalities to manage hostel fee and payments, limited room allocation functionalities that lessened its effectiveness for complete hostel administration [4].

IJRASET published a paper titled “Smart Hostel Management App” by Mungale et al. (2025) which introduced an Android and cloud-based hostel management system that utilizes smart and connected technologies for better hostel management. The system offered essential capabilities like room booking, a grievance administration framework, financial monitoring, and notifications to maintain everyone up-to-date and communicated. The application's use of cloud technology facilitated efficient data storage and access, streamlining hostel operations and enhancing their user-friendliness. But there were some drawbacks to the system, such as the need for internet connectivity for it to work and its reliance on cloud services which could impact accessibility and performance in the event of internet or server problems [5].

IV. RESEARCH GAP

Comparative study of the hostel management systems available, it is evident that most of the existing systems available have limited features that include only basic features such as keeping the student database, assigning rooms etc. Normally, these systems lack the inbuilt module for Attendance, fee, complaints, leave and much more that is supported in the same mobile platform. Besides, scalability, security and real-time data synchronization issues exist, due to the decentralized or disjointed structures. Therefore the need of secure, scalable, and also Android based hostel administration system with the central system architecture, which guarantees seamless incorporation of numerous services, expands the overall performance and improves openness in hostel administration.

V. METHODOLOGY

The proposed solution is “Smart hostel management system” based on the cell phone system developed in android studio with java programming language and MySQL database as back end database which is to automate the process of hostel management by using cell phone based system. The system is built in a client–server architecture with the client being an android application, and the server being built based on server APIs to communicate with the centralized MySQL database. The approach starts with user authentication, with authorized users (administrators and students) securely logging in, to use the system. Upon authentication, the admin would be able to manage the activities of the hostel such as room allocation, student files, attendance, controlling student fees, complaints, etc. Students will have the ability to request a leave, make a complaint, check attendance and fee payments with this mobile application.

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The information in the backend is structured data, like student information, room information, attendance data, financial transactions and more. The API makes it possible to interact with the MySQL database and the Android app, and PHP ensures secure data transfer and up-to-date updates between the two.

The system is modular and can be scaled up or down according to the requirements and the system is easy to maintain. The modules (room management, attendance monitoring, fee tracking, leave management and complaint handling) are standalone modules that communicate with the central database. This would help in making it efficient in operations, minimizing the manual labour and increase in transparency in the functioning of the hostel.

VI. SYSTEM ARCHITECTURE

The suggested Smart Hostel Management System will utilize the client-server principle, which will allow the Android-based application to communicate with the centralized database. It has three key system architecture elements including Android mobile application (client-side), server-side application and MySQL database.

Android Studio is created using Java to develop the Android application at the client side. It gives the user interface, which the students and the administrators interact with the system. Some of the operations that can be undertaken by the user include; authentication of his or her log-in, management of room allocation, view attendance, fee tracking, submission of leave applications and registration of complaints.

The Android application communicates with the server side which in turn communicates with the database. It checks user requests and validates data, as well as communicates with MySQL database, using server-side scripts like PHP APIs. These APIs facilitate the exchange of data in terms of the http request and response making the data exchange secure and efficient. MySQL database is used as the backend data storage system in which all the information related to the hostels is stored and managed. This contains student records, room details, attendance records, fee records, leave requests and complaints. The database provides the management of data, reliability, and data integrity.

When a user makes an action on the Android application, the call is made to the server, with an API call. The request is processed by the server and communicates with the database where necessary and the server respond to the mobile application. This design gives real-time access to data, and enables secure communication and proactively manage the operations of the hostels.

It's modular, and easily scalable and upgradable in the future, so it can be used in today's educational facilities that are looking for digital solutions for their hostel management.



Fig: System Architecture

VII. FLOW CHART

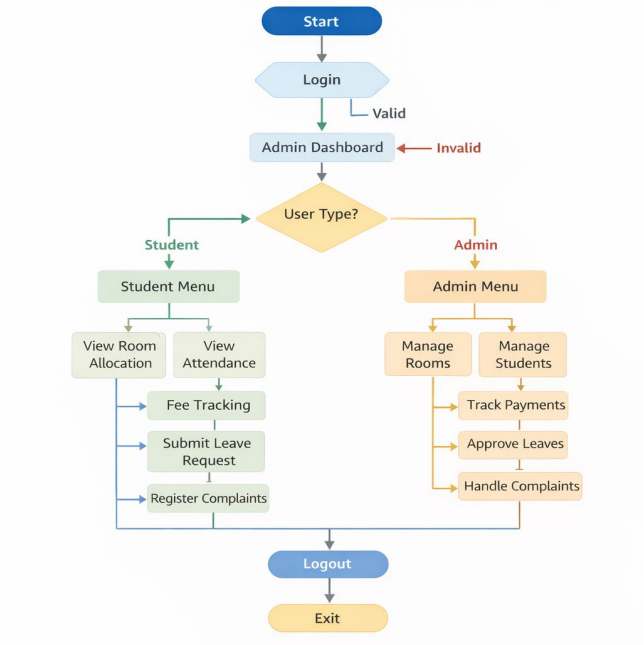


Fig: Flow Chart

VIII. RESULT

Front End has been developed in Android Studio and Back End is developed in MySQL database which is successfully implemented as Hostel Management Application is proposed. To test the functionality, efficiency and usability of the system for various activities performed inside the hostel like student records, attendance, fee collection, leave application etc. the number of users was used to test the system.

A. System Performance

The application created was tested to be efficient. The MySQL database and Android application data communication was done by use of PHP APIs in order to guarantee fast retrieval and storage of information. Even when working with a number of records, the response time of the system was low.

B. Functional Evaluation

The application has a number of modules such as student registration, student attendance, fee management, and leave application processing. These modules were tested separately and collectively to make sure that they integrate well and work well. The findings show that the system is capable of minimizing the workloads of the manual work and the accuracy of the records of the hostel.

C. User Interface and Usability

Android based interface was made easy and user friendly so that students as well as administrators can easily access the necessary functionality. Students will be able to see the attendance records, leave requests, track the student fee status and administrators will be in a position to manage the student data and track the hostel activities easily.

D. Comparative Analysis

The proposed digital solution will be more organized in terms of data, retrieving information will be faster, and more transparent than the traditional manual systems. Hostel management is made more reliable and efficient with the automated system that reduces the possibility of errors in record keeping and enables the real-time updating.

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E. Discussion

The findings reveal that there is great improvement in the process of managing the hostels when mobile technology is integrated with the database systems. The application saves administrative work as well as enhances communication both among the hostel authorities and students. Nevertheless, the system can be expanded in future by adding some additional features like cloud integration and additional security measures to make it more scalable and resilient.

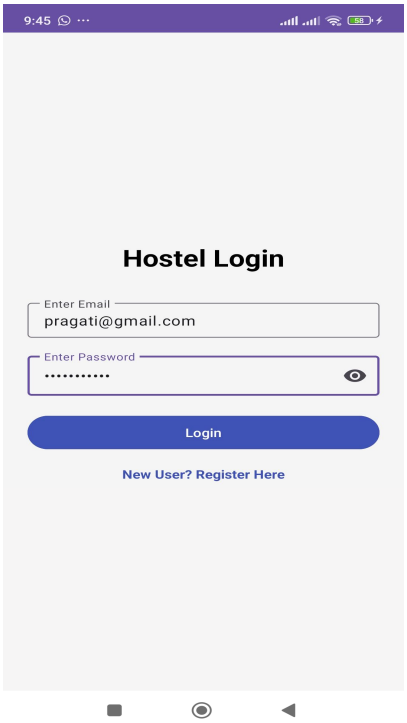


Fig: Log In Page

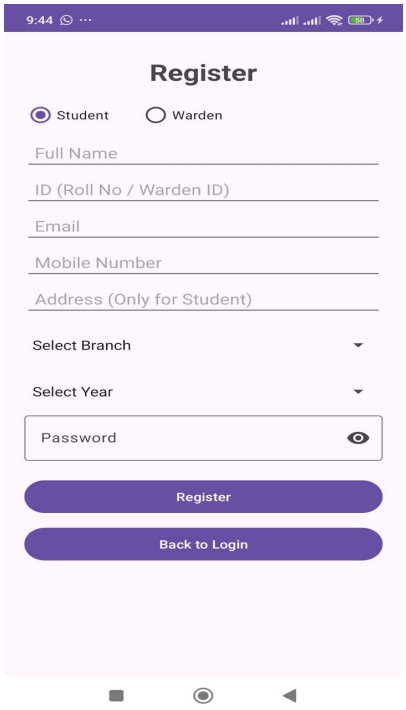


Fig: New Register Page

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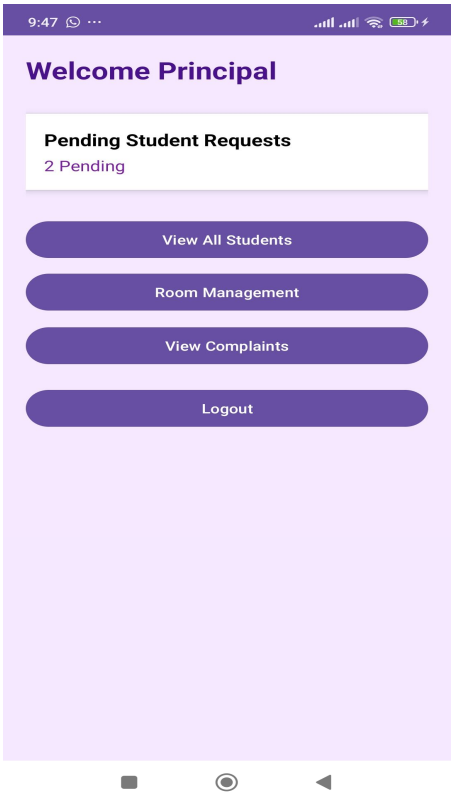


Fig: Warden Dashboard Page

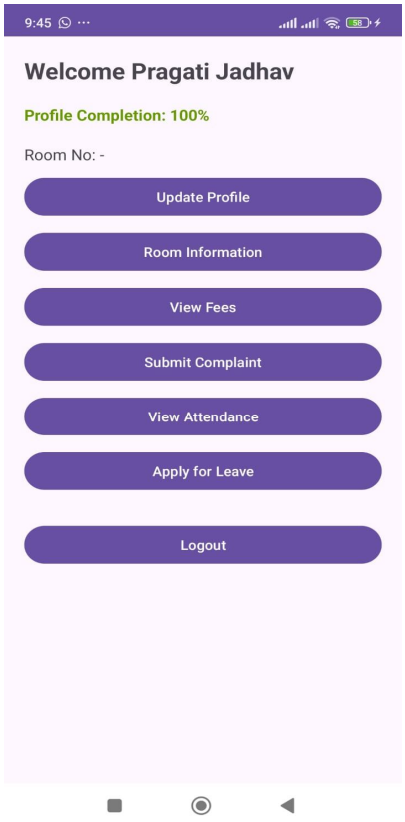


Fig: Student Dashboard

IX. CONCLUSION

The offered Hostel Management Application will be a highly effective and credible tool of organizing the hostel-related process with the help of the newest digital technologies. The system has been successful in unifying an android based user interface and a MySQL database as a back-end to allow effective student record, student attendance, fee tracking and leave applications. This system promotes the minimization of manual paperwork, human mistakes as well as enhances transparency of the hostel administration. The results of the experiment have shown that the system is relatively efficient and fast in presenting the students and administrators with the necessary information. On the whole, the created application will allow improving the operation of the hostel and streamline the procedures of its management.

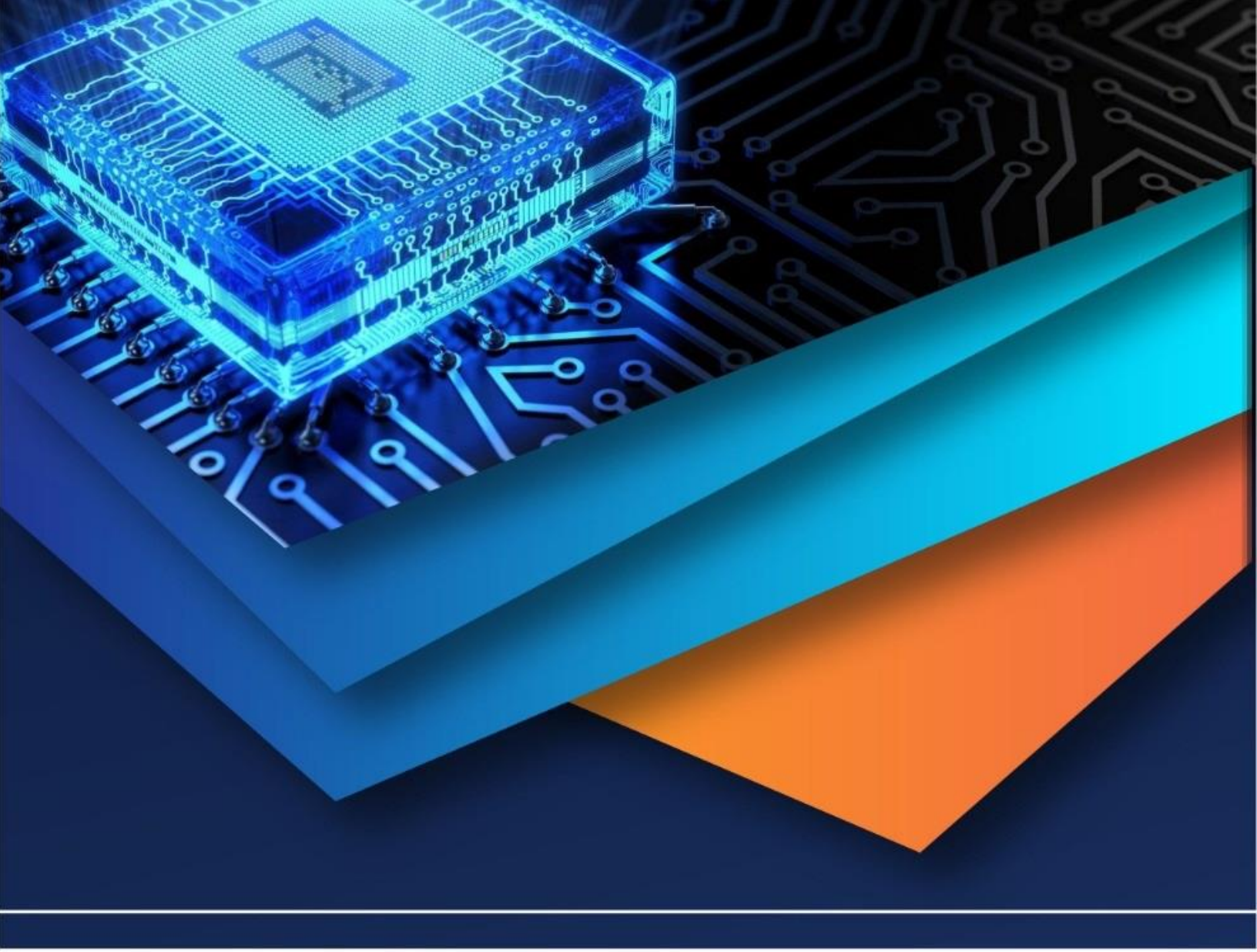
X. FUTURE SCOPE

Despite the good performance of the proposed system, it is possible to make some improvements to increase its functionality and scalability. Cloud integration can be realized in the future to facilitate secure access of data remotely and backup. IoT-based energy management and room occupancy monitoring systems are also possible improvements to the system. Also, student tracking can be further automated by including biometric or RFID-based attendance systems to enhance security. The real-time notification services, as well as analytics dashboard, will also assist the hostel administrators to make better management decisions.

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