



AUTOMATIC EXAM HALLMATE

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Abstract

The Automatic Exam Hallmate is designed to automate the process of exam hall seating arrangement and invigilator assignment efficiently. The increasing number of students and examinations in educational institutes makes manual exam hall and invigilator allocation time-consuming and error-prone. The system takes student data, subject details, exam schedule, and available classrooms as input and automatically allocates students to examination halls while ensuring proper spacing and avoiding conflicts.

It also assigns invigilators based on availability, workload balance, and examination rules. The proposed system reduces human effort, minimizes errors, improves transparency, and ensures fair distribution of resources.

By using a centralized database and automated algorithms, the system provides faster automatic allocation like supervisor and rooms for exam, better management, and secure handling of examination data. This solution is suitable for colleges and universities to manage examinations effectively and reliably.

Keywords: Automatic Exam Allocation System, Classroom Allocation through capacity, Automated Seating Arrangement, Conflict-Free Supervisor Allocation, Examination Scheduling, and Generate Seating arrangement in pdf.

1. INTRODUCTION

Examinations are essential when it comes to the assessment of academic performance and the regulation of standards within institutions of higher learning. This is due to the fact that the expansion of institutions of higher learning with regards to the number of students and the number of courses and the number of rules and regulations to follow has made the process of managing examinations extremely complex. Manual examination management is not effective anymore. It can be realized that the manual process of allocating examination halls and invigilators faces several issues, including inefficient use of classroom capacity, conflicts in the schedule, unbalanced invigilation tasks, and increased potential for human errors. One of the most important issues that can be realized through the evaluation of the existing system would be the allocation of staff from common departments to invigilate their own subject-related examinations, potentially raising issues with neutrality and integrity of the examination process. Secondly, the process of preparing seating arrangements and their distribution to students through printed forms would be time and error-prone. With the growth of information and communication technology and the increased usage of automation in management, there remains a need to develop intelligent examination management systems to handle these issues systematically. The automatic system for management of examinations would be able to provide features to automatically allocate classrooms on the basis of seating capacity, follow institutional rules, assign invigilators without creating conflicts in staff from common departments, and provide well-structured seating arrangement forms in standard digital formats like PDF documents. The current paper describes an Automatic Exam Management System that can be used for the automatic allocation of classrooms and invigilators while taking into account the limits of the institutions and relevant rules of the examination

process. The proposed system will ensure that there is maximum usage of existing classrooms, that no supervisors of the same department as the examined subject are allocated, and that seating arrangements free from conflicts can be directly printed or exported in PDF format. Through combining automated decision-making techniques with rule-checking mechanisms, it is planned that the proposed implementation will optimize efficiency in examining processes, reduce human interventions, and be effectively deployed at any scale within institutions of higher education. The proposed system focuses on strict adherence to rules of examination and policies of institutional governance. Through rule-checking mechanisms included in the proposed implementation, it is guaranteed that examining halls will be strictly allocated based on seating capacity requirements while maintaining appropriate spacing between candidates where necessary.

Another important aspect of the significance of this research is the automated faculty allocation system in the process of examination supervision. The factor of faculty availability, as well as their department, has been considered to prevent conflicts of interest as well as monotonous supervision of exams. The aspect of faculty members not being able to supervise exams related to their department ensures the impartiality of the exams and upholds the aspect of integrity in the examination process, which falls in line with the ethics of conducting exams in the institution.

The system further enhances this transparency of operations with the ability to generate seating arrangement and allocation reports in Portable Document Format. Automatic generation of PDFs means that seating arrangement documents are standardized, non-editable, and easily shared with examination staff and students. The system eliminates any discrepancies that would be resulting from manually generating documents and also enables institutions to keep authentic documents of examination processes for future reference.

Scalability:

The proposed solution is scalable because it is intended to support small colleges and large universities simultaneously with more than one exam at the same time. Its modular architecture facilitates easy integration with the college management system databases, exam platforms, and communication systems already available in the college. Moreover, the proposed system remains adaptive to operational changes like the unavailability of the assigned room or absence of the supervisor at the time of the last minute, ensuring continuous execution of the exam.

To make it easier, the proposed system includes the WhatsApp Information Retrieval Bot facility, which helps the examination staff. Using the facility, the examination staff can acquire information about the examination by simply typing their name and date of the examination. The WhatsApp Information Retrieval Bot will display the legitimate details about the assigned examination hall, time of supervision, reporting time, and seating arrangement, which will minimize dependence on notifications, miscommunications, and access updates about the examination details through the widely used means of communication, which includes WhatsApp.

In general, the Automatic Examination Management System proves the applicability of intelligence automation and chat technology in dealing with critical academic processes. In fact, the Automatic Examination Management System enhances efficiency by requiring less human intervention, allowing lecturers to communicate with each other instantly, producing secure soft copies, as well as ensuring fairness and honesty during examination processes. The next segments of this document highlight the design framework, assignment algorithm, design process, and performance analysis.

2. LITERATURE REVIEW

With the expansion of the world, educational institutions are soon changing to online platforms to efficiently manage academic and administrative tasks. The traditional management of examinations involves manual processes such as dealing with student data, correcting errors in dates of examinations, seating arrangements, and delegating duties related to invigilation, which consumes a considerable amount of time and is also error-prone. To overcome these problems, automated management systems of examinations using modern technology and instant communication systems such as WhatsApp chatbots are being used [6][9].

1. Primarily deals with secure login systems and role-based access control. This paper clearly states that differentiating between user roles like administrators and faculty members leads to better data security and system integrity. The paper concludes that role-based dashboards prevent unauthorized access and make system management easy in large educational institutions [4].
2. The paper "Student Information Management System using Web Technologies" by A. Kumar and S. Verma primarily deals with student information management systems that include search, filter, and bulk data management operations. The authors clearly state that online management of student information leads to increased accuracy and faster decision-making [9].
3. As The study also explains the importance of allowing teachers to handle and update their own profiles in reducing the administrative burden on the staff of the institution. This is because managing profiles independently ensures that the faculty information is always up-to-date and readily available for academic, administrative, and reporting purposes. In addition, automation in faculty management helps to enhance coordination between departments, transparency, and effective assignment of academic and administrative responsibilities, leading to increased efficiency in institutions [6].
4. The paper "Automated Examination Scheduling and Room Allocation System" by S. Rao and K. Patel mainly

emphasizes examination scheduling and classroom management. The paper describes how automated scheduling systems assist in preventing time conflicts, ensuring optimal room usage, and effectively managing seating capacity. The authors of the paper conclude that automation helps to minimize errors and increase transparency in examination activities [3][5]. 5. The paper “Algorithm Based Seating Arrangement System for Examinations” by N. Sharma mainly emphasizes the application of algorithms to prepare seating arrangements for examinations. This paper explains that automated seating arrangements help to prevent malpractice and ensure equitable distribution of students to examination halls according to branch and semester constraints [7][8].

3. METHODOLOGY

The Auto Exam Management System tends to implement a systematic model by which the allocation process, allocation to the supervisor, as well as the dissemination of the exam details, can be conducted. Each stage is made more accurate, and institutional exam policy guidelines need not be taken into account. For different departments, the system takes the aid of the constraint satisfaction model by which various exam scenarios could be managed. To implement this system, the first phase includes data collection. Various details such as the enrolment details of students, subject details, exam dates, classroom capacities, and faculty details would be obtained from institutional repositories. Validity checks would be performed to get rid of any discrepancies, duplicates, as well as format variations.

In the second phase, the constraints and policies related to the examination, as well as some institution rules, have been formally defined and represented in the system. The constraints may include class capacity, student grouping based on the subject, exam spacing, faculty availability, faculty workload balancing, and avoidance of departmental conflict. Of specific note is the fact that no faculty member is allowed to handle the department-related exam conducted by the system. All these constraints have been represented by rule-based logic in the system.

After the allocations are done, the system is able to create the formatted seating plans and supervision assignments. The seating plans are generated taking into consideration the class sizes and rules of examinations. These seating plans are subsequently formatted into standardized PDF reports for ease of distribution. Moreover, a WhatsApp-based information extraction bot is embedded for authorized staff to receive real-time information on their allocated examination data in relation to simple inputs, for instance, their name and the date of the examination.

3.1 System Architecture

The design of the proposed Automatic Exam Hallmate System is modular and multi-layered to ensure clarity, scalability, and effective management of examinations. The system architecture is divided into four main layers, which are: Data Layer, Application Logic Layer, Allocation Engine, and Presentation & Communication Layer.

The Data Layer is a centralized repository that holds all the examination-related information. This includes student enrolment information, subject information, examination schedules, classroom capacity information, and faculty information along with their respective departments and availability. All input information is checked at this layer to prevent duplication, inconsistency, and formatting issues.

The Application Logic Layer processes the input information and applies institutional examination policies and rules. This layer is responsible for specifying constraints such as classroom capacity constraints, subject-level student allocation, examination gap constraints, and conflict-free allocation based on departments. This layer ensures that all examination policies are adhered to before moving ahead with the allocation process.

The Allocation Engine is the central part of the system design. It uses a constraint satisfaction and rule-based method for the automatic allocation of examination halls and supervisors. Students are allocated to classrooms based on seating capacity and distancing requirements, optimizing the use of infrastructure. At the same time, supervisors are allocated while taking into account faculty availability, balancing of workload, and the most important constraint that no faculty member is assigned to supervise an examination related to their own department. This design provides equity, clarity, and conflict-free supervision.

The Presentation & Communication Layer is responsible for the output and distribution of examination information. The system provides automatic generation of formatted seating arrangement reports and supervisor allocation information in PDF format, providing standardized, secure, and un-editable documentation. In addition, a WhatsApp Information Retrieval Bot is incorporated into the system, enabling authorized faculty members to obtain real-time examination information such as hall number, supervision time, and reporting instructions through simple queries such as name and date of examination.

In general, this multi-layered design enhances the reliability of the system, makes it easier to maintain, and is scalable. The distinct roles of data processing, rule checking, allocation mechanisms, and communication services make it possible for the proposed system to effectively handle the examination process in a small college as well as a large university.



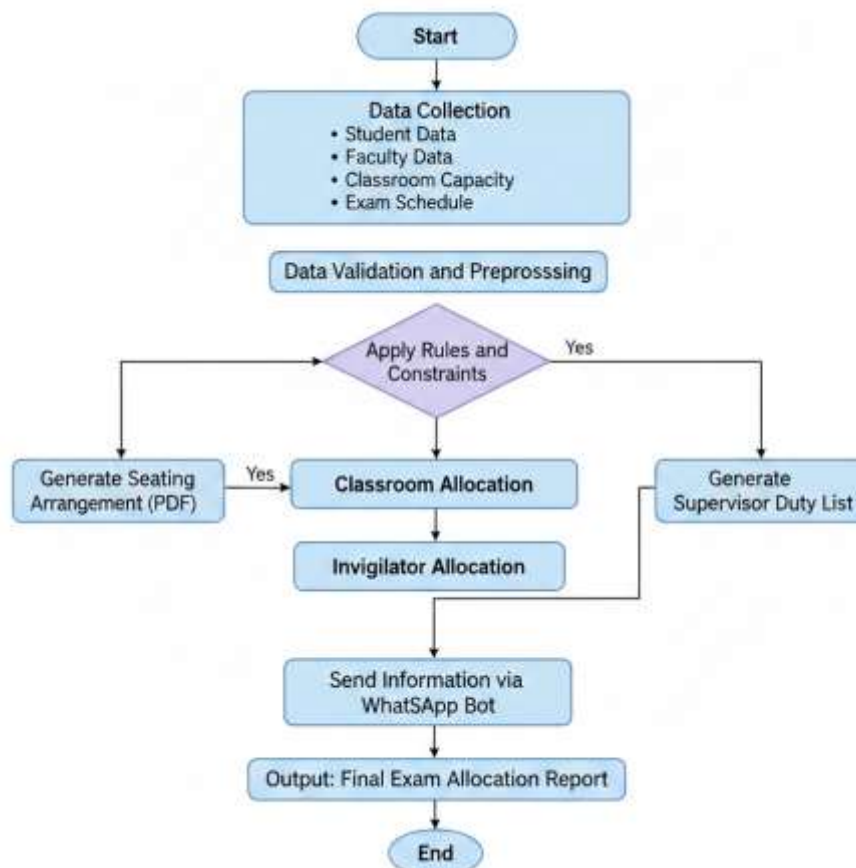


Fig 3.2 Flowchart

Fig. X depicts the flow of the proposed Automatic Exam Hallmate System. The system begins with the acquisition of data pertaining to the exam, including student information, faculty information, capacity of the classrooms, and timings of the exams. The acquired data is then validated for correctness and pre-processed to eliminate any errors prior to allocation.

Following pre-processing hallmate, the system uses institutional constraints and policies to adhere to the policies of the exam, such as the capacity of the classroom, conflict-free allocation of invigilators, and equitable allocation of resources. Based on these constraints, the system automatically allocates classrooms and then invigilators. After completion of the allocation process, the system generates seating arrangements in PDF format and generates the supervisor duty list. The generated results are then transmitted to the authorized personnel via the WhatsApp information retrieval bot, allowing real-time access to information pertaining to the exam. Lastly, the system generates the final exam allocation report, which is the final output of the proposed methodology.

4. RESULTS AND DISCUSSION

The study evaluated the proposed system, 'Automatic Exam Management System,' by designing structured data sets based on real-life exam conditions practiced in learning institutions. The data sets were developed based on several school departments, varying strengths of students in each exam subject, different classrooms capable of handling varying student numbers, and staff members allocated according to their unutilized time and school department affiliation. The Evaluation was conducted to measure the efficiency of automated class and supervisor allocation, as well as system reliability.

4.1.1 Classroom Allocation Efficiency

Analysis of the results shows that the system is capable of allocating classrooms according to the seating capacity while at the same time satisfying the constraints of the examination. Students were allocated into different free classrooms without exceeding the capacity of the classroom in such a way as to make optimal use of the infrastructure. This is opposed to the manual allocations in the previous undertaking. These allocations could lead to the underutilization and overcrowding of the examination hall.

4.1.2 Supervisor Allocation and Policy Enforcement

The result of supervisor allocation proves the efficiency of the rule-based supervisor allocation mechanism. The system ensured strict enforcement of the rule that faculty members do not conduct supervision of exams related to their department, thus increasing the fairness of the exam. Additionally, invigilation duties were distributed evenly across available staff, preventing excessive workload concentration.

4.1.3 Seating Arrangement Generation and Documentation Accuracy

The automation process in the arrangement of seating plans in PDF form contributed greatly to making the document more organized and clearer. The seating arrangement, room names, and supervision information were all included within the PDF document without any errors made from the seating arrangement documents that were manually created. Well-organized documents are helpful for the safe distribution of documents that are related to the examinations, meeting the audit process within the institution.

4.1.4 Communication Support through WhatsApp Bot

The implementation of the information retrieval bot on the WhatsApp platform improved accessibility and real-time communication for the exam operational team. The lecturers were able to access the schedules for supervision, the assigned rooms, and the times for filing by making simple inquiries such as the names and the dates for the exams. The answers were accurate and consisted of updates in the system database.

4.1.5 Overall System Performance Discussion

The experimental outcomes have confirmed that there are substantial improvements in terms of comparison with conventional practices followed for exam management. By integrating class assignment, supervisor assignment, seating arrangement generation, and smart communication into a single interface, this solution helps in reducing manual efforts for exam-related administration.

Home Page :



Fig 4.1.home page

Login page

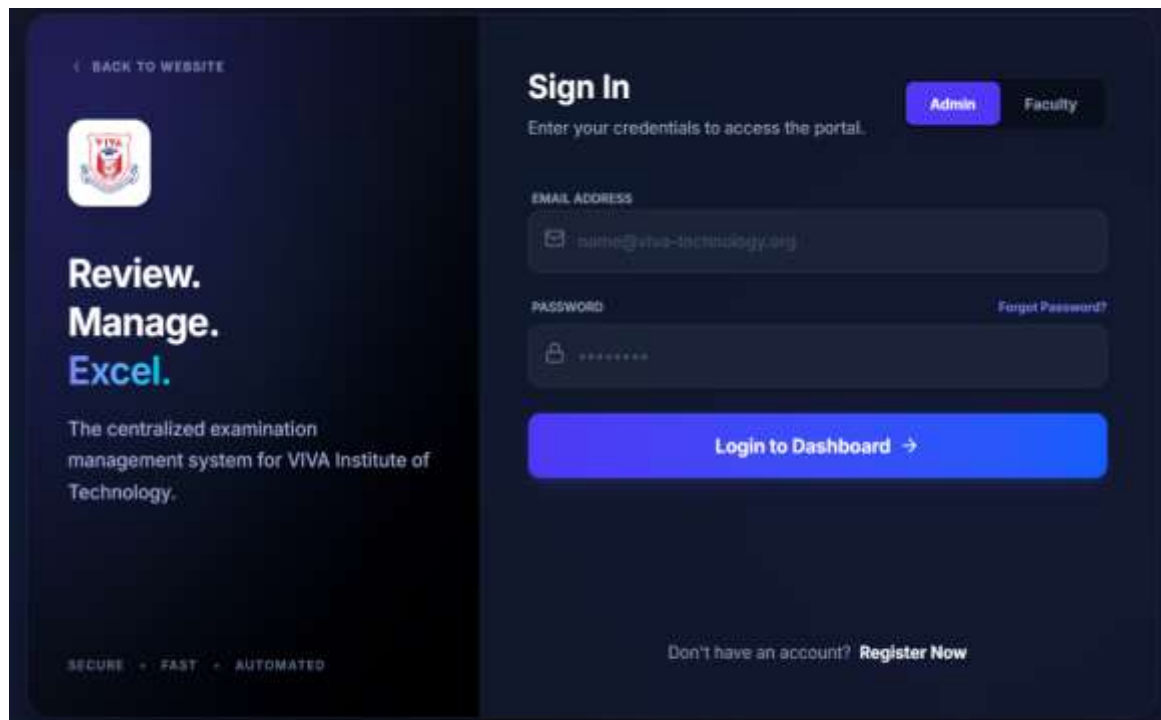


Fig 4.2.login page

Admin Dashboard

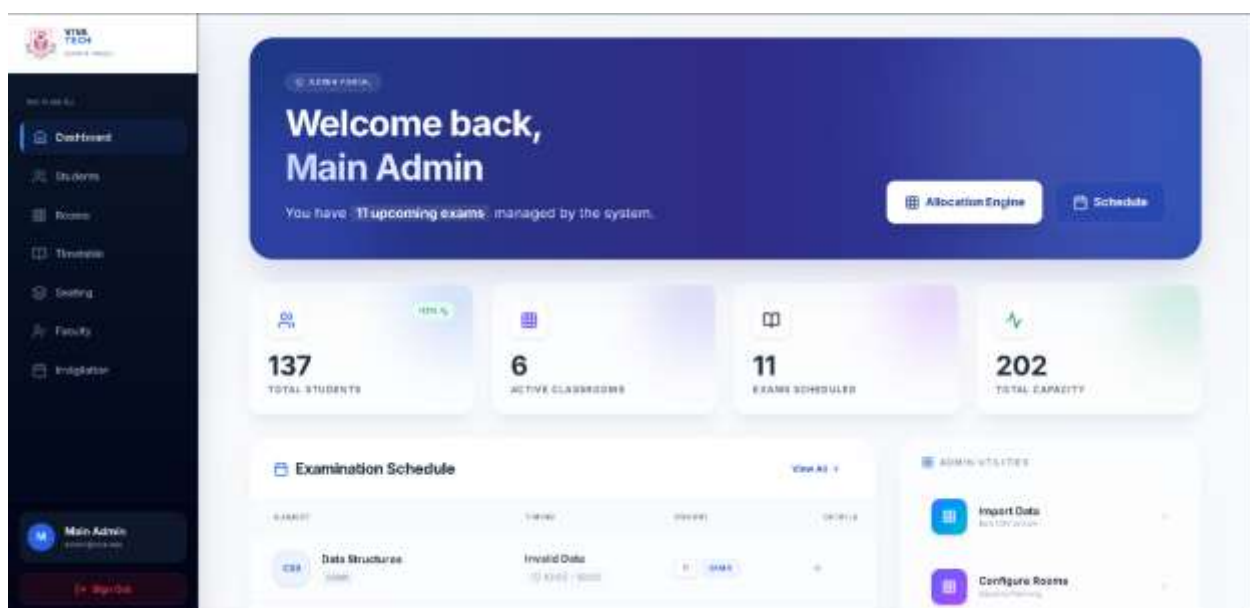


Fig 4.3 admin dashboard

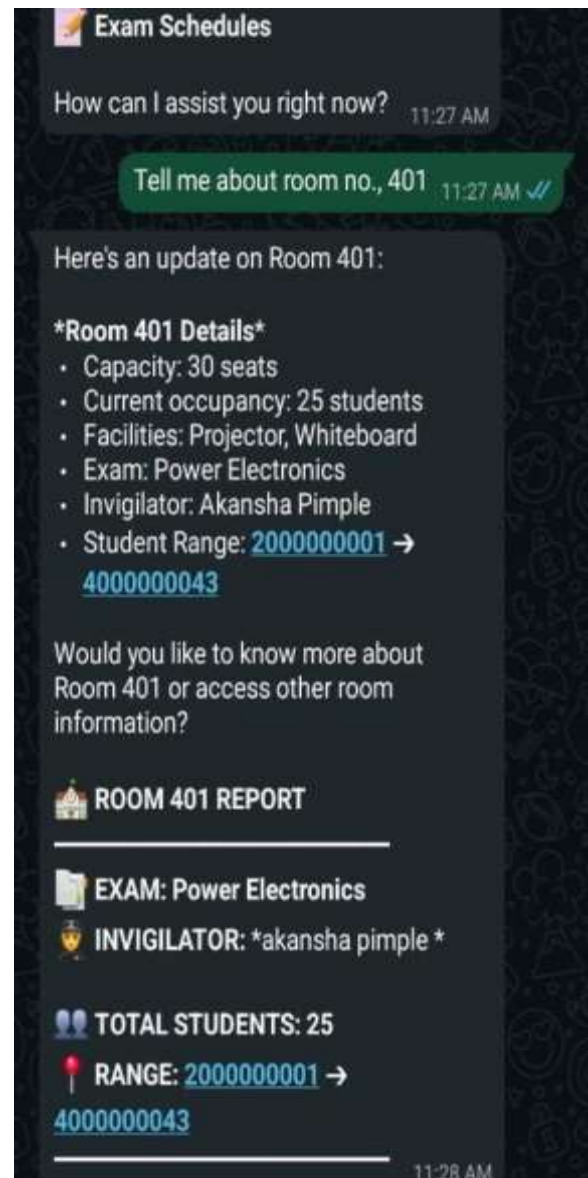
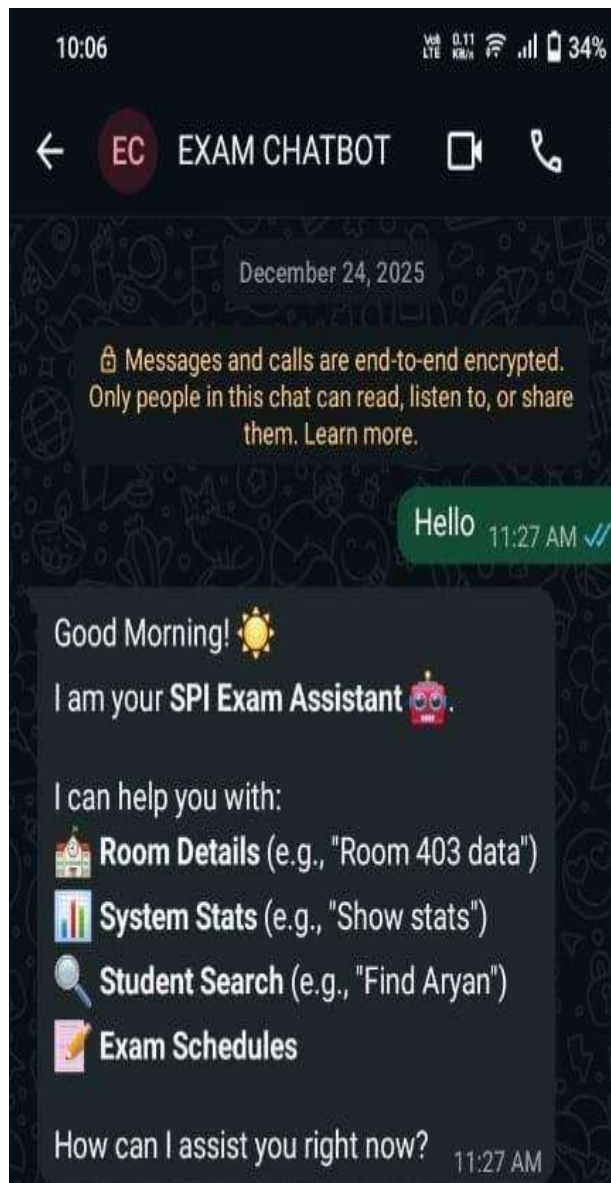


Fig 4.4 Whatsapp Bot

Parameter	Existing System (Manual / Semi-Automated)	Proposed Automatic Exam Hallmate System
Exam Hall Allocation	Done manually using registers or spreadsheets, leading to errors and inefficiency	Automatically allocates halls based on classroom capacity and exam regulations.
Seating Arrangement	Done manually and distributed manually on paper.	Automatically generated seating arrangement in standardized PDF format
Accuracy	Prone to human errors and duplication	High accuracy due to rule-based automation
Classroom Utilization	Prone to underutilization or overcrowding	Optimal utilization of available classrooms
Invigilator Allocation	Manual allocation, prone to uneven workload distribution	Automated allocation to ensure balanced workload distribution.
Department Conflict	Conflicts between faculty members and department members due to invigilation of departmental exams	Strict enforcement of rules prevents departmental conflict

Document Generation	Manual generation of reports	Automatic generation of secure, non-editable PDF reports
Communication	Notice boards, messages, or emails	Real-time information via WhatsApp Information through Retrieval Bot

4. CONCLUSION

The Automatic Exam Management System is capable of automating key activities in the examination process, such as classroom allocation, supervisor allocation, and generation of seating arrangements to optimize resource utilization and avoid any potential conflicts. The supervisor allocation system based on rules helps avoid any kind of prejudice during the examination process and ensures fairness in the allocation of invigilation duties.

The proposed Automatic Exam Hallmate System can be applied in colleges and universities for automating activities related to the management of examinations. The system can assist in alleviating the problem of workload associated with manual allocation processes and also ensure transparency in resource allocation. The automated report generation and communication system makes the system suitable for implementation in real-time environments. The WhatsApp-based information retrieval system assists users in retrieving information associated with the examination process. The system is able to provide a transparent and scalable solution that can assist in enhancing administrative efficiency, policy compliance, and effective management of the examination process in an educational institution

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