DIG-PASS: ENHANCE AND SECURE SOLUTION FOR GATE-PASS USING QR CODE

[1]Manish P. Gangawane, [2]Omkar A. Jadhav, [3]Parag R. Shirsat, [4]Abhishek N. Soundankar, [5]Om S. Suryawanshi

[1]Asst. Professor, Department of Computer Engineering, Guru Gobind Singh College Of Engineering And Research Centre, Nashik, Maharashtra, India.

[2,3,4,5]Student, Department of Computer Engineering, Guru Gobind Singh College Of Engineering And Research Centre, Nashik, Maharashtra, India.

Abstract: Institutions often face challenges in managing gate-pass systems efficiently, often resorting to manual processes prone to errors and inefficiencies. To address this issue, we propose "DiG-Pass", an innovative Android application aimed at streamlining and securing the gate-pass process through QR code technology. The project revolutionizes traditional gate-pass systems by digitalizing the entire process, offering users a convenient and reliable solution. Through the application, users can request gate passes seamlessly, reducing the administrative burden on college staff while enhancing security measures. Each gate pass is generated with a unique QR code, ensuring authenticity and preventing unauthorized access. The project modernizes the gate-pass system and contributes to a more efficient and secure campus environment.

*Keywords***:** Gate-Pass systems, Digitalization, QR Code technology, Security, Campus environment.

I. INTRODUCTION

The security of individuals has become a top priority for businesses and organizations across all industries in recent years. The welfare of the students is the responsibility of the learning institution. Thus, authorization is needed to enter or exit a campus to maintain security. The process of obtaining permission hasn't changed much in the past few decades. The party in question drafts a letter of request, which is then submitted for processing. After manual verification, a written permit that can be used at entry and exit points is given out. The cloud database that is kept up to date for that purpose guarantees that the concerned faculty can, upon request, view any specific users records of any gate pass that has been issued to his/her. There may be multiple stages of human verification in the process. There is a lot of physical labor involved in this tiresome process. The goal of this project is to automate and put this system online. Both sides will save a variety of resources by doing this. Additionally, the project lessens disagreements and upholds openness between the warden, student, and student coordinator. Creating gate passes is a crucial part to make sure that any educational facility is secure. The manual processes used in traditional gate pass generation methods take time and are prone to error. This project utilizes a QR code to overcome these obstacles. Nothing can use a unique QR Code.

II. OBJECTIVES

1) To enhance college campus security by efficiently managing access control of gate pass process.

2) To issuing digital gate pass process for students and staff.

3) To reduce the paperwork and time required for process of traditional gate pass issuing process.

4) To enhance the user convenience through digital gate pass requests.

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III. LITERATURE SURVEY

This system offers an Intelligent Security Management for Gated Premises that digitizes manual undertakings at the primary gates. It offers a secure, efficient, and convenient alternative to traditional manual security system[1].

This paper presents a promising solution for educational institutions to streamline gate pass management, enhance security, and improve operational efficiency[2].

This paper consists a smart and secure solution for managing gate passes in hostels. The system is very user friendly and it is anticipated that functions of the system are easily accessed by administrators, faculties and students[3].

Face Recognition Based Gate Pass System provides a software-based web application based on face recognition. The face detection system and the generation of the gate pass for the authorized individual are the two aspects of the system[4].

Gate pass Generation and Management System Using QR Code helps to prevent the entry of unauthorized persons in institutes, colleges, etc. One of the main advantage of using the system is all the entry and exit record of a person is saved and can easily access it[5].

This paper describes an application which is designed for hostel students to get gate passes for going outside the hostel. The objective of this work is to make the hectic process of getting a gate pass easier and less stressful[6].

E-Gatepass System is a Client-Server application software. It uses the concept of MVC (Model View Controller) to implement the application. It overcomes the entire problem of manual paperwork and making computerized system which can be easily operated in institutions[7].
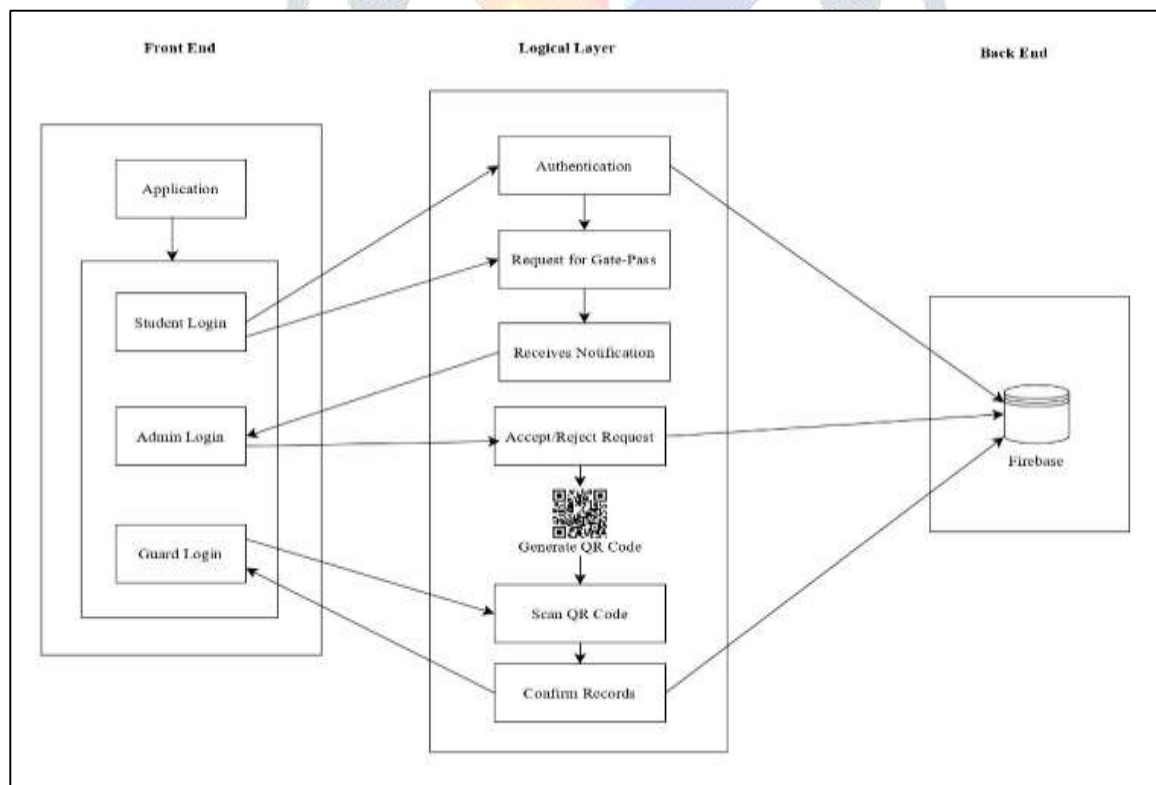
IV. SYSTEM ARCHITECTURE

Fig. 1: System Architecture

The system architecture is a three-layered architecture:

Front End layer consists of the user interfaces that users interact to request gate access. This includes the interfaces for Student, Staff, Admin, and Guard. Students/Staff can log in and request a gate pass. Admin can approve or reject gate pass requests and potentially sent notifications to the user. Guard can verify QR codes and grant or deny entry.

Logical layer is responsible for processing the gate pass requests received from the front-end layer and applying the business rules. Authentication involves verifying the identity of users logging into the system. Authorization involves determining whether a user has the necessary permissions to perform an action, such as requesting a gate pass or approve/reject a request. Generating QR codes involves creating unique QR code after approving the gate pass request from admin.

Back End layer consists of the data storage and server-side functionality that support the application. This layer is uses Google

Firebase, a cloud database. It stores Student/Staff data, gate pass requests, and potentially approval logs. The back-end also likely includes server-side functions that manage tasks such as authentication, QR code generation, and communication between the different layers.
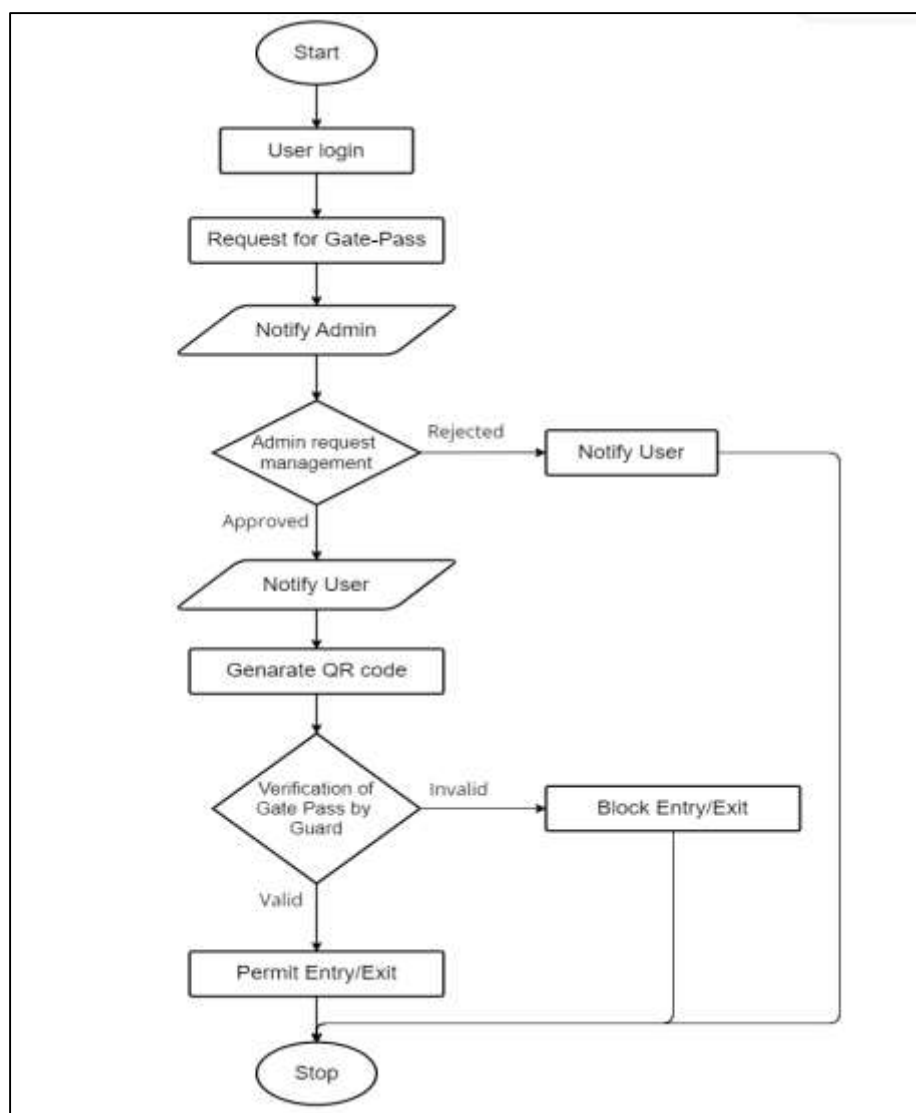
V. METHODOLOGY

Fig. 2: DiG-Pass Process Flow

Students and staff will sign up for the app by filling in details like name, roll number, department, email, etc. The details will be stored in the Firebase real-time database. After registering in the app, they will sign in using a logging email and password. After logging in, In the application, the user can send a gate-pass request by filling out the reason for the gate-pass, leaving time, and vehicle number, if applicable. The other details in the gate-pass request, like name, email, branch, year, and department will be fetched automatically in the form. Users don't need to fill in those details again.

When the user sends the gate-pass request, the admin will receive notification of every new gate-pass request. For students, the notification of a gate-pass request will be sent to the class teacher. They can review the gate-pass request. According to the details, the class teacher will accept or reject the request. The request will be sent to the HOD for review. They can accept or reject the request, and then it goes to the principal for review. If it is accepted, then a QR code will be generated and a notification will be sent to the students.

When the staff sends the gate pass, the notification will be sent to the HOD. They can review the gate-pass request. According to the details, the HOD will accept or reject the request. If the request is accepted by HOD, then it goes to the principal for review. If it is accepted, then a QR code will be generated and a notification will be sent to the staff.

The security guard will secure the QR code that is received by the user. After scanning the QR code, details like leaving time, reason, and other details will be fetched and displayed. If the QR code is valid, then it allows you to exit from the campus; otherwise, block the exit.

VI. RESULTS AND DISCUSSION

In the context of the tasks and time durations provided for the Android app "DiG-Pass," the results highlight the efficiency and effectiveness of the app's functionalities in gate-pass management using QR codes. The Sign-Up process takes a relatively short amount of time, allowing users to quickly register and use its features. User Authentication, make a gate-pass request, and Accept/Reject the request by admin processes are all completed within reasonable time, ensuring smooth user interaction and administrative control. The generation of QR codes and the QR validation process are fast, further it helps to enhance the user experience. The fast generation of unique QR code upon request approval ensures that users can access their gate-passes, while the fast QR code validation during exit from campus by guard. Discussion around these results may focus on the app's effectiveness in streamlining gate-pass management processes, reducing waiting time, and helps to enhance security. The quick execution of tasks such as notification sending and QR code generation reflects the app's optimization for efficient operation. Additionally, the short duration of user authentication and QR code validation underscores the app's commitment to user convenience without compromising security. Overall, the results of the "DiG-Pass" system is to successfully delivers on its promise of providing an enhanced and secure solution for gate-pass management using QR codes, offering users and administrators a seamless experience within less amount of time and efficiently.

SR.NO	TASK	TIME TAKEN IN SECONDS
1	Sign-Up	20
2	User Authentication	5
3	Make a Gate-Pass Request	10
4	Send Notification to Admin	5
5	Accept/Reject the Request	20
6	Generate the QR code	5
7	Send Notification to User	5
8	QR code Validation	10

Fig. 3: Performance Matrix

Fig. 4: Speed Visualization

VII.   FUTURE SCOPE

The future scope of the project entails several avenues for expansion and enhancement. Firstly, integrating advanced encryption methods to further secure the QR code data could be explored, ensuring the utmost protection of sensitive information. Additionally, incorporating machine learning algorithms for predictive analytics could optimize gate-pass management by anticipating and mitigating potential bottlenecks or security breaches. Furthermore, extending the application beyond gate-pass management to encompass broader access control systems in various sectors like transportation, healthcare, and education could significantly broaden its utility and impact. Finally, continuous updates and improvements to the user interface and user experience based on feedback and technological advancements would ensure the project remains cutting-edge and user-friendly.

VIII.   CONCLUSION

DiG-Pass will provide a faster and more efficient gate pass issuance system through the app, reducing the manual paperwork and administrative burden. This system will replace the lengthy traditional gate-pass process. This system will ensure that only authorized persons can exit the college campus. DiG-Pass will provide the solution for validating the gate pass by generating a single-use QR code. By using a QR code, students can't make a duplicate gate pass. A separate gate pass will be generated for each student. No one can add the name to the gate pass, unlike in the traditional gate pass process. Students and staff can easily request the gate pass from their smartphone devices. The app provides real-time data on exits and monitors access points. It stores the record of gate passes student-wise in the database, and admins can easily analyze the history of gate passes.

IX.   REFERENCES

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