

Smart Security Using QR-Code System

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Abstract: In today's world, security has become very important and it is must in any field like organization, educational institutes, hospitals and so on. In recent studies, it is found that QR code system has been arising to make payments, to access Wi-fi, to get course's information and so on. QR code is 2D type of barcode that stores data and can be retrieved by scanning device or scanning application. Overall, this paper aims to provide a secure and convenient way to check when an individual will enter or leave the premises in an organization, educational institutes, hospital and so on.

Keywords: QR-Code, Smart Security, Scanning device, Image Acquisition, Python, QR-Code Generation, Security

I. INTRODUCTION

In today's digital world, security is the first priority and smart security in practical terms means combination of digital as well as technical parts into traditional security of human force. Recently, QR-Code System has become very vast and important when it comes to security as it can't be hacked and can be easily used. QR-Code is two-dimensional barcode matrix with black and white patterns that stores information and we can retrieve that information or data using scanner device or application. In other words, QR-Code system works through encoding as well as decoding the information and data.

Quick Response (QR) codes was firstly invented in Japan by the Japanese company Denso Wave in 1994. It is initially created to track automotive parts and it acquired acclaim recently due to their fast and easy readability and has the ability to accumulate more data information than traditional barcodes. Quick Response (QR) codes include some important features, they are follows:

- High Capacity of Encoding Data.
- Small Printout Size.
- Easily Readable.
- Structured Appending.

This paper primarily aims on the implementation of QR Code technology and it provides secure and convenient way to check when an individual will enter or leave the premises in an educational institute. QR code technology works through some steps and that step include:

- Encode the Data.
- Generate the QR code.
- Scan the QR code.
- Decode the Data.
- Retrieval of Data.

QR code attain several needs in multiple fields like enabling quick and efficient transfer of data, lessen the time and effort need for entering data or manual input. In factors of payments and transaction, QR codes make it easier to contactless methods, increase convenience and decrease the dependency on physical cash or cards. In Advertising and Marketing, QR code work as a flyover between physical and digital media, allowing user's to easily access the websites, promotions or further information by scanning codes of posters, products, or advertisements.

In the field of Health and Safety, it works as contact tracing, digital entries and access health related data and it also contribute in public safety measures. It is also used for authentication purposes and providing extra layer of security.

For example, they're used in two factor authentication or to check of rightness of products. It also simplifies the setup of smart devices by encoding composition details.

II. BACKGROUND AND RELATED WORKS

A metro QR code ticket system is modern method to ticketing and access control for metro as well as subway system. Instead of using traditional paper ticket system using QR code can be very convenient and easy to use. Passengers uses QR code for multiple purposes like purchasing tickets, obtaining entry through turnstiles, or accessing any appropriate information.

Following are the overview of how QR code system works in metro or subway system:

- Firstly, the passengers need to download metro's official application and register an account for themselves.
- Then the passengers can directly buy the ticket from their official application then that application will normally integrate with various mean of payments that include credit card, debit card, digital wallets or any other payment options.
- After the successful payment, the metro's official application will generate unique QR code for each passenger that will represent the purchased ticket.
- Then the QR code will be stored in digital wallet for easy access. In some instances, these QR code will be available offline, lessening up the reliance on an Internet connection.
- At turnstiles gates the passengers can access their unique QR codes that is validated by the scanner and if the QR code is valid then turnstile open allowing access to the passengers.

The turnstile gate is a type of access control system, that are mechanical or electronic gates with a horizontal arm that rotate automatically manages the entry of authorized passengers in metro or subway system. In turnstiles gates, entries are approved to a single passenger at a time, which means this gate will help in preventing tailgating.

Most turnstiles gates required low power to function and it can be easily installed at entry and exit end with safe operating voltage. QR technology is actively used in many spheres of human life. You can notice QR codes in shopping centres, restaurants, clinics, administrative institutions, etc. Their common purpose is to improve customer service and user experience. Each ticket contains a QR code that users scan before boarding the train. This code helps automate subway services. As soon as the point of departure and destination are verified, the passenger is allowed to enter/exit the metro. To implement this system, you need a QR code API generator. This technology is used in the Delhi Metro app, which sells QR code tickets. To avoid queues at the ticket office, the metro administration should generate a QR code for quick payments and place it at the ticket office or subway entrance. Passengers will scan the interactive code and pay the fare directly from their smartphones. You can also create a unique metro QR for topping up the travel card balance. Passengers will put money into their account on their own, bypassing the queues at the ticket office. Make a QR code from the link to the metro website page with payment instructions. After scanning, the code will take users to the payment page, where they will choose the appropriate payment option.



FIG(1)

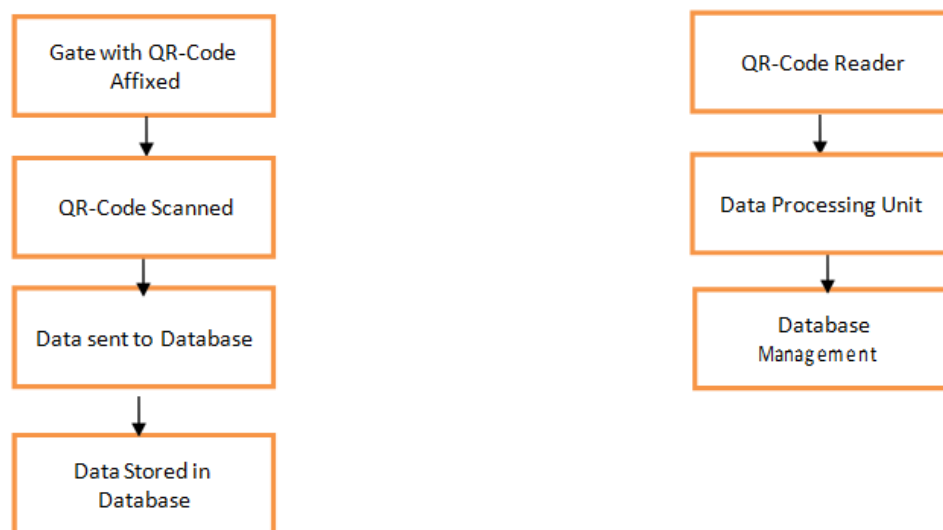
Traditional subway advertising is changing: you can notice a QR code banner next to ads for goods or services. Its task is to attract attention and help passengers with specific actions. A dynamic QR code on a local pizzeria flyer can contain the website link with the list of dishes and drinks available for ordering. By scanning such a code, users will see the menu and make their order. It will also give advertisers access to scans statistics to analyse future advertising campaign success. Following are the pictorial representation of how turnstile gates are: -

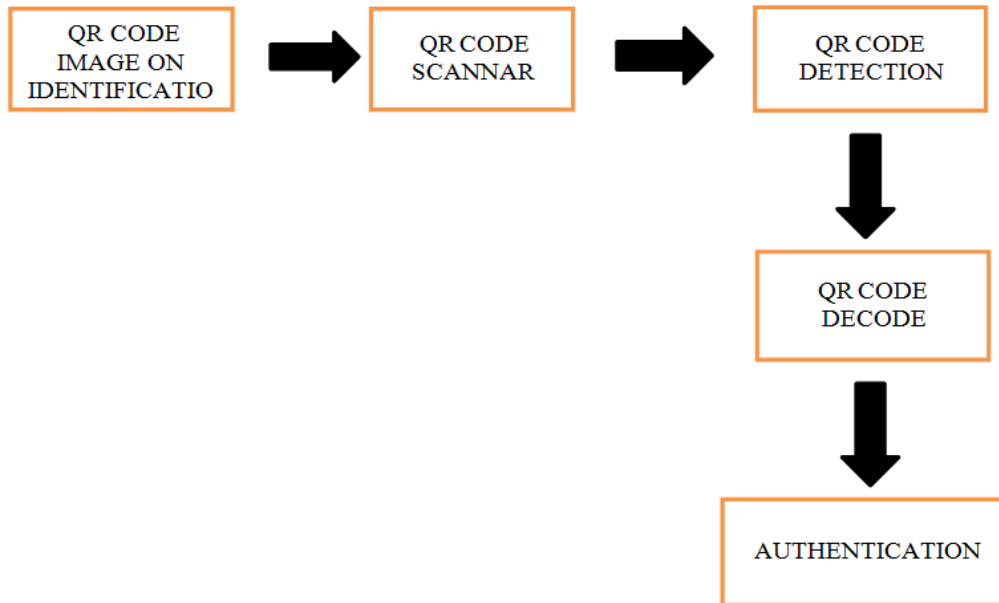
III. PROPOSED SYSTEM

In our project, firstly we'll make an unique QR-Code for students and faculties and that QR-Code will be presented on their Identification Card. The QR-Code will be scanned at the entry gate and if it is matched with the fixed QR-Code in the gate, then the gate will open. The data of the particular student and faculty will be stored in the database along with the time they entered or will leave the campus. By using our project, it is easy to check each and every student's identification card and we can easily monitor when and how many students will enter or leave the campus. Here's a brief overview of how the project might work:

- **User Registration:** Users register in a system, providing necessary information. Each user is associated with a unique QR code.
- **QR Code Generation:** The system generates a QR code for each registered user.
- **Gate Access:** To unlock the gate, a user presents their QR code to a scanner or camera near the door.
- **QR Code Recognition:** The system scans and recognizes the QR code.
- **Authentication:** The system verifies the QR code against the stored database of registered users.
- **Gate Unlock:** If the QR code is valid, the gate unlocks, granting access to the user.

It's important to implement security measures to prevent unauthorized access or QR code duplication. Additionally, regular updates and monitoring should be conducted to address potential vulnerabilities. The project involves integrating technology to enhance access control, authentication, and user convenience. There is a database created in which will store the real time data by the students. QR code generation algorithm will generate QR codes that encode student information, including the student's and faculty's name and branch name. It ensures that the generated QR codes are unique, secure, and easily scannable by QR code readers at premises. Image Acquisition include the scanner that captures an image of the QR code using a camera or an image sensor. Data Extraction and Decoding algorithm will extract the encoded data from the QR code's modules and decodes it into the original information, such as text, URLs, or other data types. With the help of python, the application will be developed that stores the information of an individual that includes students, faculty and so on. The benefits of using this project are it can be very secure, convenient, reliable and efficient. In order to develop a complete monitoring system for smart entries implementation, the data stored in MySQL database are displayed in a webpage developed entirely for the laboratory attendance system by using Hypertext Preprocessor (PHP) *Figures:*





Fig(3)

IV. CONCLUSION

In Conclusion, QR code door locks offer a convenient and secure way to control access to spaces, making them increasingly popular in various settings, including residential, commercial, and hospitality environments. Their ease of use, customizable access permissions, and potential for integration with digital systems make them an appealing option for modern security needs. As the technology continues to advance, QR code door locks are expected to play a significant role in the evolution of access control systems. This study has enabled the student to figure out how to develop the software and hardware input/output interfaces using several equipment such as QR system.

Besides, the security of the system needs to be checked in order to ensure the information stored in the database will be protected. When the user wanted to access in the premises, he/she would scan the QR code and their information would be checked from the database. This study has shown that the utilization of database server is more convenient and user friendly as data loss can be monitored through the server compared to the conventional method which was done by taking the information manually on log book.

Implementing a smart security system utilizing QR code technology offers a robust and efficient means of access control and authentication. This innovative approach enhances security measures, streamlines user interactions, and provides a convenient yet effective solution for safeguarding sensitive areas. The simplicity and versatility of QR codes make them an ideal choice for modern security systems, ensuring a balance between user-friendly experiences and heightened protection against unauthorized access.

In summary, the adoption of a smart security system based on QR code technology signifies a transformative leap in contemporary security measures. The use of QR codes ensures a multifaceted approach to authentication and access control, leveraging the ubiquity of smartphones for a seamless user experience. By integrating QR codes into security protocols, organizations can establish a robust defence against unauthorized access, identity theft, and other security threats.

V. ACKNOWLEDGMENT

The authors would like to thank the Ministry of Higher Education for providing the BESTARI PERDANA grant, 600-IRMI/PERDANA 5/3 BESTARI (085/2018) Research Management Institute (RMI) UiTM, and also Faculty of Computer and Science Engineering Gramin Technical and Management Campus support of this research work. We extend our sincere gratitude to all those who contributed to the successful implementation of our smart security system.

using QR code technology. Special thanks to the dedicated team members whose expertise and tireless efforts played a pivotal role in the development and deployment of this innovative security solution.

We also express our appreciation to the stakeholders and collaborators who provided valuable insights and support throughout the project. Their commitment and involvement were instrumental in shaping the system to meet the highest standards of efficiency and reliability.

Furthermore, we acknowledge the users and stakeholders who actively participated in the testing and feedback processes, helping us refine and optimize the QR code security system to ensure seamless integration and user satisfaction.

This project wouldn't have been possible without the collective efforts and collaboration of everyone involved, and we are grateful for the shared commitment to advancing smart security solutions.

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