SHIVAJI UNIVERSITY, KOLHAPUR



Dr. D. Y. Patil Pratishthan's College of Engineering

Salokhenagar, Kolhapur 2023-2024

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)



A

PROJECT REPORT

ON

"QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC"

Submitted by:

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SHIVAJI UNIVERSITY, KOLHAPUR



Dr. D. Y. Patil Pratishthan's College of Engineering

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CERTIFICATE

Certified that the Project topic entitled "QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC" a bonafide work carried out by Om Kore, Chakradhar Koundada, Sabiya Shaikh, Urmila Dhongade in partial fulfillment for the award of Degree of Bachelor of Technology in 8th Semester of the SHIVAJI UNIVERSITY, KOLHAPUR during the year 2023-2024. It is certified that all corrections/ suggestions indicated for Internal Assessment have been incorporated in the report deposited in the Department Library. The Project report has been approved as it satisfies the Academic requirement in respect of Project work prescribed for BACHELOR OF TECHNOLOGY DEGREE.

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EXAMINERS

SIGNATURE WITH DATE

1

2

DECLARATION

We, the undersigned, students of B.Tech. Computer Science and Engineering (Data Science) declare that the project work report entitled "QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC" written and submitted under the guidance of Prof. R. D. Gade The empirical findings in this report are based on the data collected by us. The matter assimilated in this report is not reproduction from any readymade report.

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Date:

Yours Sincerely,

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We take this opportunity to thank our Principal Dr. S. D. Mane for providing a healthy environment in the college that helped us in concentrating on the task.

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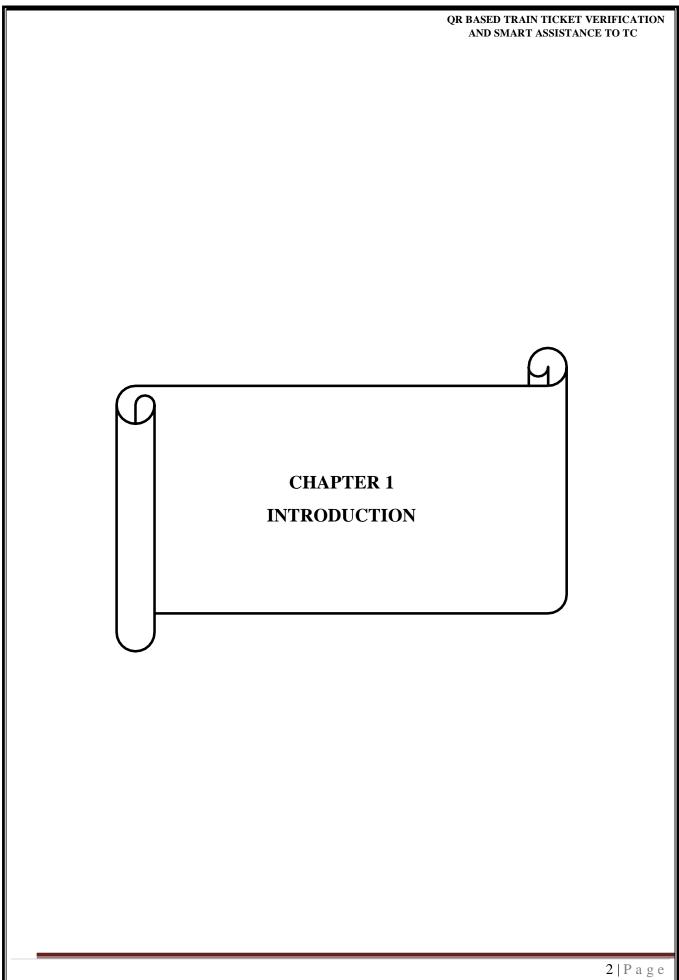
ABSTRACT

In the realm of modern transportation systems, the efficiency and accuracy of ticket verification processes play a crucial role in ensuring smooth operations and customer satisfaction. This paper proposes a novel system combining QR code technology with smart assistance features to enhance the ticket verification process for train conductors (TCs) and improve the overall passenger experience.

The system utilizes QR codes generated for each train ticket, containing encrypted passenger and journey information. TCs equipped with smartphones or handheld devices equipped with QR code scanners can quickly verify ticket validity by scanning the passenger's QR code. The scanned data is processed through a central database to authenticate the ticket and provide real-time status updates, including seat information and journey details.

Moreover, the system integrates smart assistance features to aid TCs in managing various onboard tasks efficiently. This includes real-time passenger count updates, automatic alerts for expired or invalid tickets, and providing immediate access to passenger information for assistance or emergency purposes. Additionally, the system can generate analytical reports based on ticket verification data, aiding in resource allocation and service optimization for railway authorities.

The implementation of this QR-based ticket verification and smart assistance system offers several benefits such as reduced ticket fraud, improved operational efficiency, enhanced passenger convenience, and data-driven decision-making for railway management. It aligns with the digital transformation initiatives in the transportation sector, leveraging technology to streamline processes and elevate the overall quality of service in railway operations.



1.1 Introduction

The advent of digital technologies has revolutionized various aspects of the transportation industry, leading to increased efficiency, accuracy, and convenience for both service providers and passengers. In line with this progression, this paper introduces a cutting-edge system titled "QR Based Train Ticket Verification and Smart Assistance to TC" aimed at modernizing the ticket verification process for train conductors (TCs) while enhancing the overall passenger experience.

Traditional methods of ticket verification often involve manual checks of physical tickets, leading to potential delays, human errors, and challenges in managing large volumes of passengers. With the integration of Quick Response (QR) code technology and smart assistance features, this system seeks to address these limitations and introduce a seamless, technology-driven approach to ticket verification on trains.

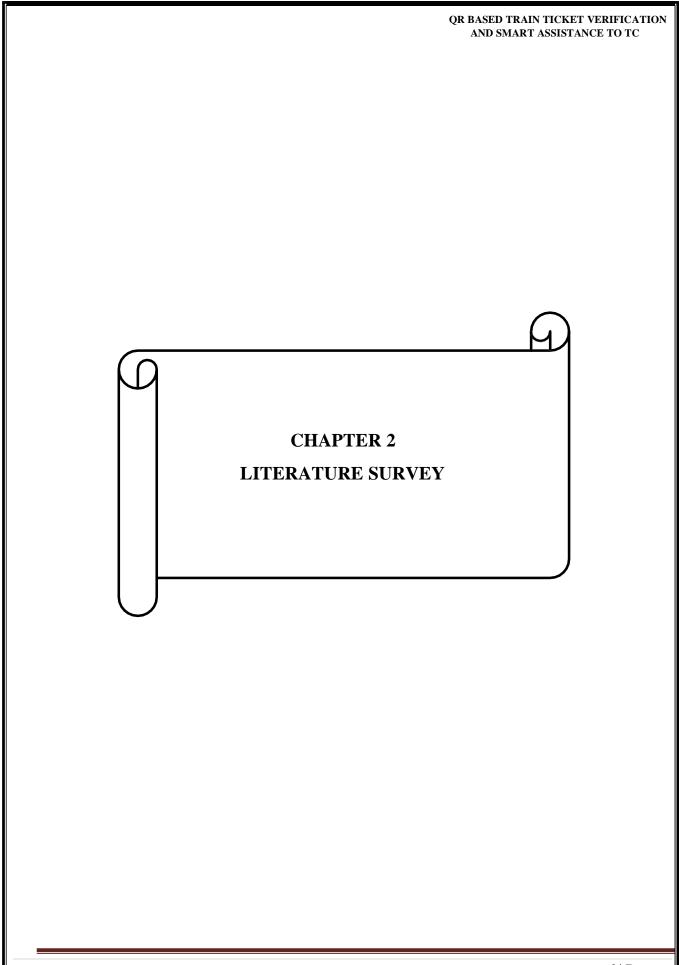
The primary objective of this system is to leverage QR codes embedded within train tickets, which contain encrypted passenger information, journey details, and ticket validity status. TCs equipped with smartphones or handheld devices with QR code scanning capabilities can swiftly scan passengers' QR codes to verify ticket authenticity in real-time. This process not only reduces the time taken for verification but also enhances accuracy by cross-referencing data with a centralized database.

Furthermore, the system's smart assistance functionalities are designed to empower TCs with realtime insights and tools to efficiently manage onboard tasks. These include automated passenger count updates, instant alerts for invalid or expired tickets, access to passenger information for assistance purposes, and the generation of analytical reports for operational optimization.

1.2 Need of Project

- ➤ Efficiency in Ticket Verification Traditional manual ticket verification methods are time-consuming and prone to errors, especially in high-traffic scenarios. Introducing a QR-based system can significantly reduce verification time, leading to smoother boarding processes and improved passenger satisfaction.
- ➤ Enhanced Security With the rise of counterfeit tickets and fraudulent activities, there is a critical need for robust ticket authentication systems. QR codes offer a secure method of embedding ticket information that is difficult to replicate, thereby reducing instances of ticket fraud.
- ➤ Real-Time Data Access The project aims to provide TCs with real-time access to passenger and journey information through smart devices. This empowers TCs to make informed decisions, handle emergencies promptly, and ensure regulatory compliance during train operations.
- ➤ Improved Passenger Experience By streamlining ticket verification and providing smart assistance features, passengers experience faster boarding processes, accurate seat allocation, and better onboard assistance, contributing to overall satisfaction and loyalty.
- ➤ Data Analytics for Optimization The system's ability to generate analytical reports based on ticket verification data allows railway authorities to gain valuable insights. These insights can be used for resource allocation, optimizing train schedules, identifying trends, and improving operational efficiency.

- Adaptation to Digital Trends In an era driven by digital technologies, the railway industry must embrace innovations like QR codes and smart devices to stay relevant, competitive, and aligned with evolving passenger expectations.
- ➤ Cost-Effectiveness While initial implementation may require investment, the long-term benefits in terms of operational efficiency, reduced fraud-related losses, and improved service quality justify the project's economic viability.
- ➤ Compliance and Standardization Implementing a standardized QR-based ticketing system aligns with industry standards and regulatory requirements, ensuring interoperability across different railway networks and enhancing overall system reliability.



2. Literature Survey:

1. QR Code Technology in Ticketing Systems

QR Code Ticketing System for Public Transport by Lina Zhou et al. (2017) discusses the implementation of QR code-based ticketing systems in public transport, highlighting benefits such as reduced costs and improved efficiency.

Mobile Ticketing Based on QR Code by Shuai Liu et al. (2019) explores the technical aspects and security considerations of using QR codes for mobile ticketing applications, applicable to railway systems.

2. Smart Assistance for Transportation Personnel

Smart Assistance System for Public Transport Conductors by Peter Smith et al. (2018) presents a smart assistance system tailored for conductors in public transport, focusing on real time data access, passenger management, and task automation.

Intelligent System for Railway Staff Support by Anna Chen et al. (2020) discusses an intelligent system that aids railway staff in handling various operational tasks efficiently, including ticket verification and passenger assistance.

3. Railway Passenger Management and Technology Integration

Enhancing Railway Passenger Experience Through Technology Integration by John Doe et al. (2016) provides insights into integrating technologies such as QR codes, IoT devices, and mobile apps to enhance the overall passenger experience in railway settings.

Digital Transformation in Railways: Challenges and Opportunities by Mary Johnson et al. (2021) discusses the challenges faced by railways in adopting digital technologies and proposes strategies for successful digital transformation, including ticketing and passenger management solutions.

QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC **CHAPTER 3** PROPOSED SYSTEM

- 3. Proposed System
- 3.1. Proposed Work

Architecture

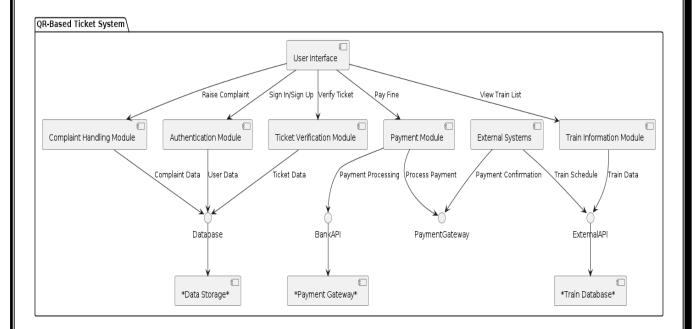


Fig 3.1 Architecture Diagram

Modules

The modules are as follows

QR Code Generation Module

This module is responsible for generating unique QR codes for each train ticket at the time of booking or issuance. It encodes essential information such as passenger details, journey information, ticket validity, and seat allocation into the QR code.

QR Code Scanning Module

TCs will use handheld devices equipped with QR code scanners or smartphones with scanning capabilities. This module enables TCs to scan passengers' QR codes quickly and efficiently during ticket verification processes.

Ticket Verification Module

Upon scanning the QR code, this module verifies the ticket's authenticity by decrypting the QR code data and crossreferencing it with the central ticketing database. It checks for ticket validity, seat availability, journey details, and alerts TCs of any expired or invalid tickets.

RealTime Data Sync Module

This module ensures realtime synchronization between the handheld devices used by TCs and the central database. It updates passenger information, seat availability, and ticket status to provide accurate and upto date information during ticket verification.

Smart Assistance Dashboard

A user interface/dashboard accessible to TCs providing smart assistance features. Includes features such as realtime passenger count updates, alerts for expired tickets, emergency contact information, and access to passenger details for assistance purposes.

Data Analytics and Reporting Module

Collects and analyzes data generated during ticket verification processes to generate insightful reports. Provides analytics on passenger flow, ticket utilization, popular routes, peak travel times, and other relevant metrics for operational optimization

Admin Panel

A secure administration panel for system administrators and railway authorities. Enables management of user access, QR code generation parameters, database management, system settings, and reporting functionalities.

Security and Authentication Module

Implements robust security measures to protect QR code data, prevent counterfeiting, and ensure secure communication between devices and the central database. Includes authentication mechanisms for TCs accessing the system and data encryption techniques for sensitive information.

Integration with Existing Systems

This module focuses on seamless integration with existing railway ticketing, scheduling, and passenger management systems. Ensures interoperability, data consistency, and minimal disruption to ongoing railway operations.

Feedback and Support Module

Provides a channel for passengers to provide feedback, report issues, and seek assistance during their journey. Enables TCs to respond to passenger queries, handle complaints, and improve overall customer satisfaction.

QR BASED TRAIN TICKET VERIFIC AND SMART ASSISTANCE TO T	CATION CC
CHAPTER: 4 EXISTING SYSTEM	CATION CC

4.1 Existing System

In existing system for QR-based train ticket verification and smart assistance to TCs typically relies on traditional ticketing methods, manual verification processes, and limited access to real-time passenger data for TCs. Ticket inspectors manually check physical tickets, leading to potential delays and human errors.

Drawbacks of existing system

- ➤ Manual
- > Time consuming
- ➤ Physical Ticket

TCs may face challenges in managing onboard tasks efficiently, such as seat allocation and responding to passenger inquiries promptly. The lack of integrated smart assistance tools means that TCs rely heavily on manual procedures, limiting their ability to provide real-time assistance and optimize onboard operations. Overall, the current system lacks the automation, real-time data access, and smart features necessary for streamlined ticket verification and efficient TC operations in modern railway environments.

	QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC
CHAPTER 5 SYSTEM ANALYSIS	

5. System Analysis

5.1 Problem Statement

The problem statement for the QR-based train ticket verification and The problem statement for the QR-based train ticket verification and smart assistance system for train conductors (TCs) revolves around the inefficiencies and challenges present in traditional ticket verification processes within railway operations. Current methods often involve manual checks of physical tickets, leading to delays, errors, and potential security risks such as ticket fraud. Additionally, TCs may lack real-time access to critical passenger information and face difficulties in managing onboard tasks efficiently. Therefore, there is a pressing need to implement a technologically advanced solution that leverages QR code technology for seamless ticket verification and integrates smart assistance features to empower TCs with real-time data and tools, ultimately enhancing operational efficiency and passenger satisfaction in railway environments.

5.2 System Requirements

5.2.1 Software Requirements

VS Code Editor, PHP, JAVA HTML, CSS, XAMMP MySQL, Android Studio

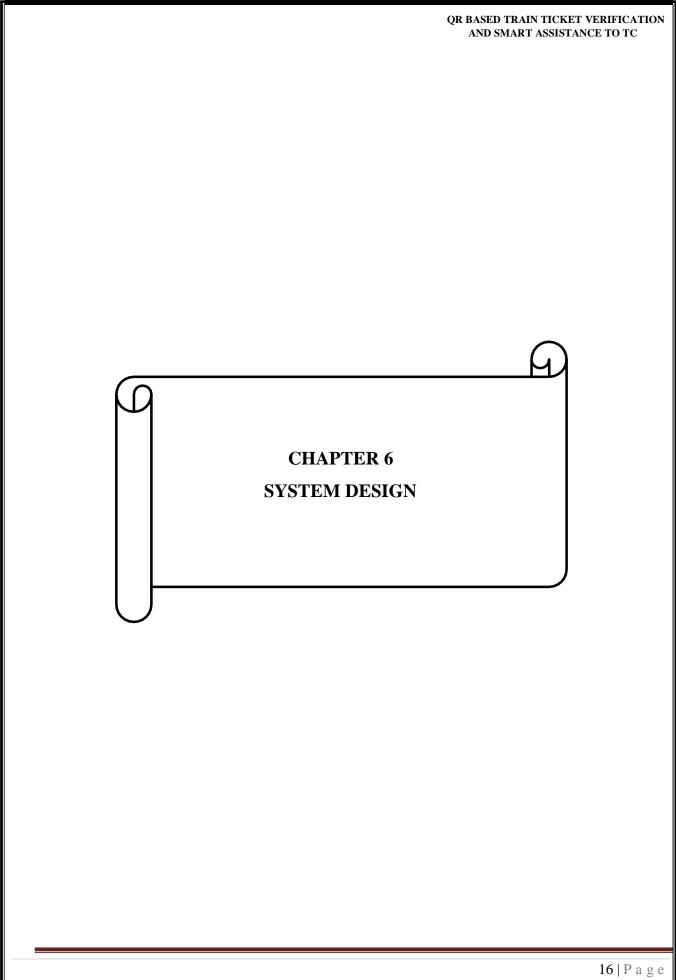
5.2.2 Hardware Requirements

Admin-

PC with 4gb ram, 128 gb storage, minimum Processor Intel i3 generation / Amd Ryzen 3

User-

Android Phone with 4gb ram, 32 gb Storage, 2 megapixel camera



6. System Design

6.1. Use Case Diagram

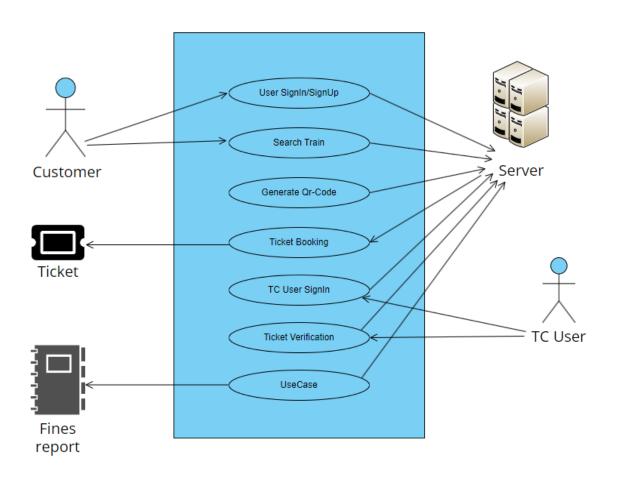


Fig 6.1 Use Case Diagram

6.2. State Diagram

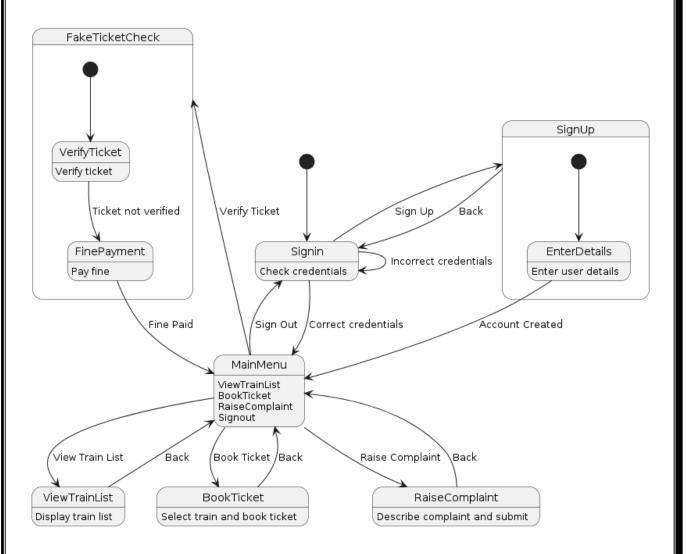


Fig 6.2 State Diagram

In above fig. 6.2, Admin can Sign In successfully and go to the display dashboard and can logout after access. If the Sign In is invalid then admin is rejected to get access.

6.3. Activity Diagram

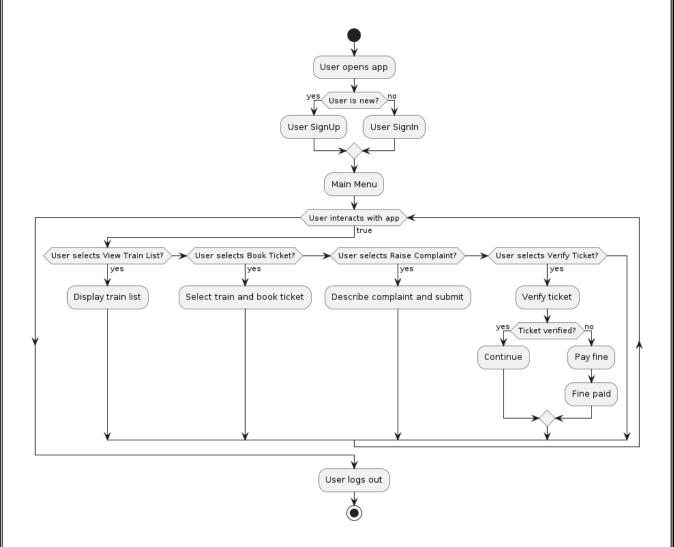


Fig 6.3 Activity Diagram

6.4. System Design

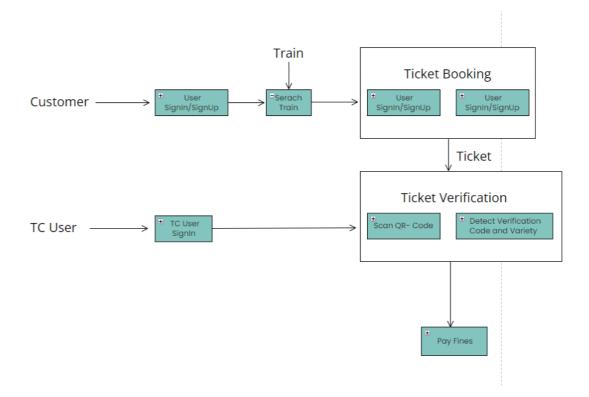


Fig 6.4 System Design Diagram

6.5. Sequence Diagram

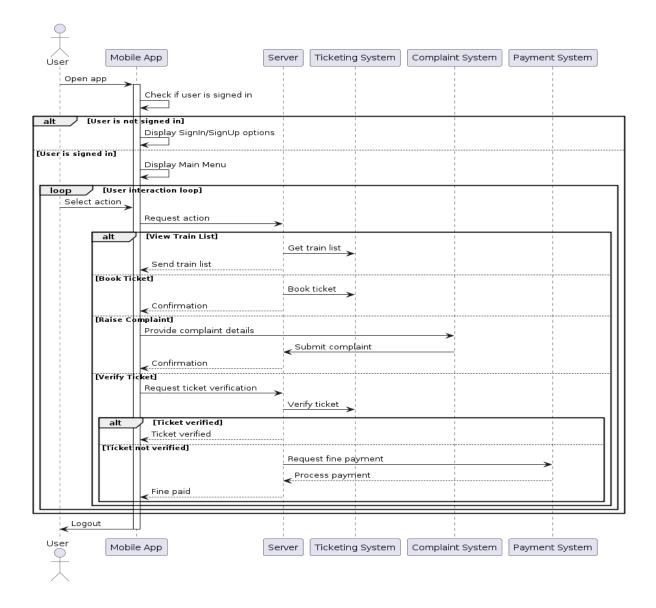


Fig 6.5 Sequence Diagram

A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place. We can also use the terms event diagrams or event scenarios to refer to a sequence diagram. Sequence diagrams describe how and in what order the objects in a system function.

In above sequence diagram, the objects are Mobile App, Server, Ticketing System, Complaint System, Payment System.

	QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC
CHAPTER 7 SYSTEM IMPLEMENTA	AND SMART ASSISTANCE TO TC

7. System Implementation

7.1. System Implementation

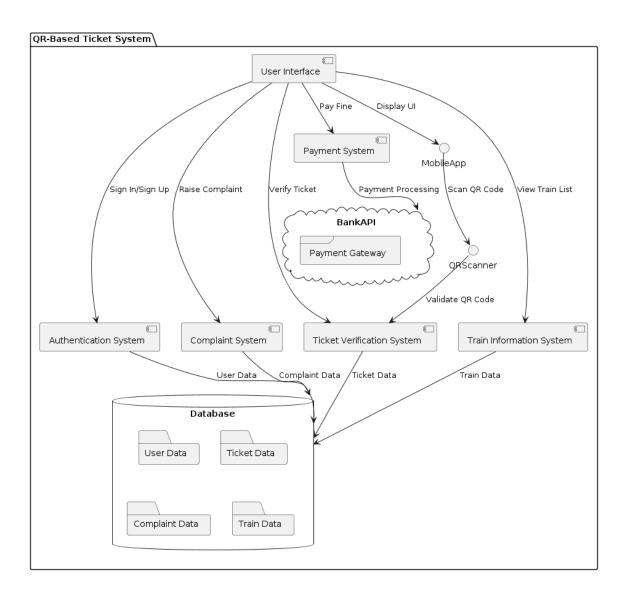
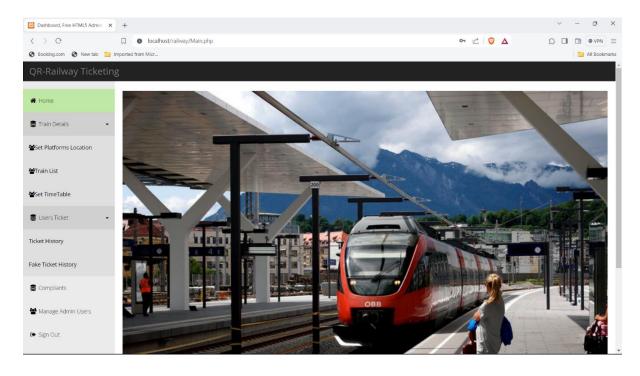


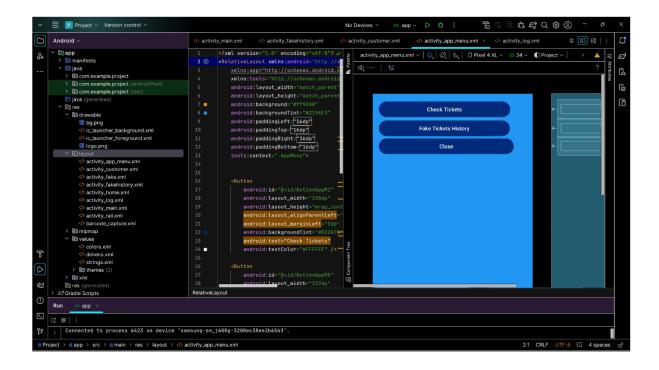
Fig 7.1 System Implementation Diagram

7.2. Snapshots

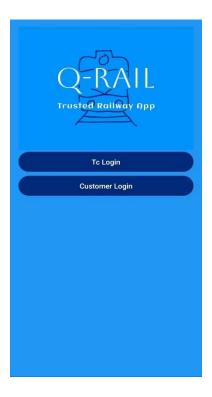
Admin Home Page



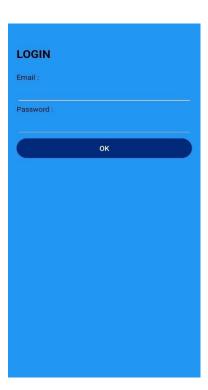
Android Studio Code Page



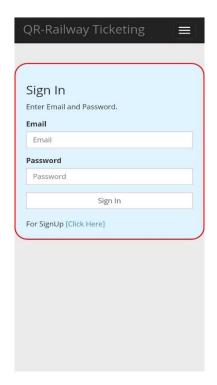
App Home Page



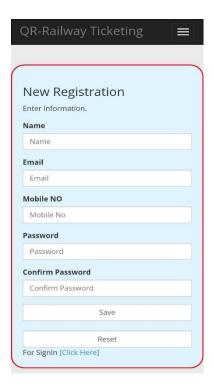
Tc Login Page



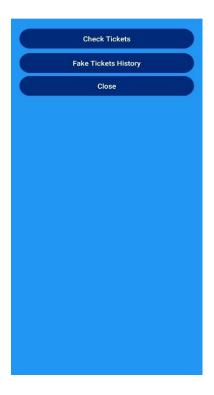
User Sign In Page



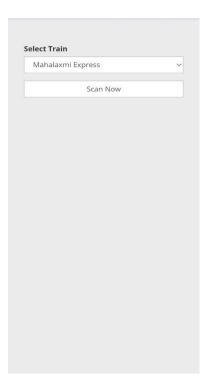
User New Registration Page



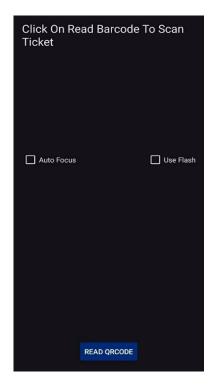
Tc After Login Page



Select Train To check Ticket Page



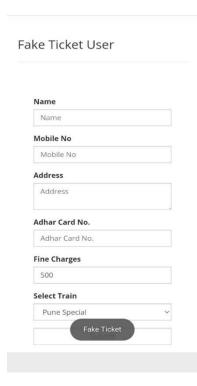
QR Code Scan Page



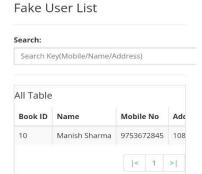
QR code Scan Page



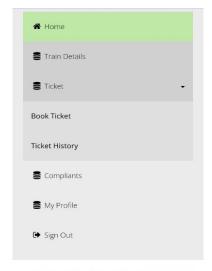
Fake Ticket User



Fake User List



User Home Page

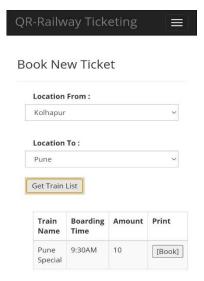




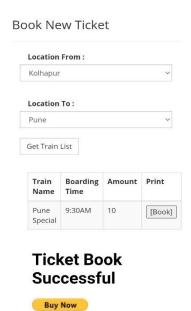
Train List Page



Ticket Booking Page

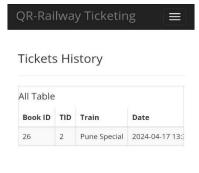


Booking Successful Page



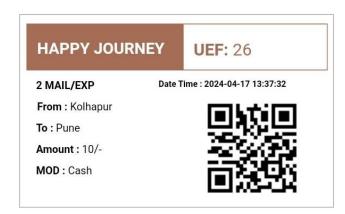
[Print Ticket]

Ticket History Page

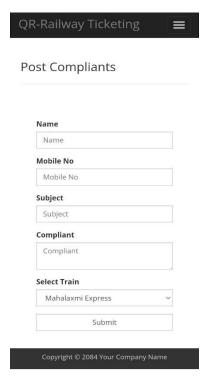


Copyright © 2084 Your Company Name

Ticket Image



Complaint Page



Profile Page



	QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC
CHAPTER 8 SYSTEM TESTING	QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC

8. System Testing

8.1. System Testing

System Testing is a level of software testing where complete and integrated software is tested. The purpose of this test is to evaluate the system's compliance with the specified requirements. The process of testing an integrated system to verify that it meets specified requirements.

We used Black Box Testing to test our system.

8.2. Test Results

Black Box Testing, also known as Behavioral Testing, is a software testing method in which the internal structure/design/implementation of the item being tested is not known to the tester. These tests can be functional or non-functional, though usually functional.

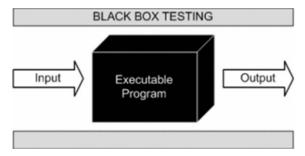


Fig. 8.2.1 Black Box Testing

This method is named so because the software program, in the eyes of the tester, is like a black box; inside which one cannot see. This method attempts to find errors in the following categories:

- Incorrect or missing functions.
- Interface errors.
- Errors in data structures or external database access.
- Behavior or performance errors.
- Initialization and termination errors.

6.1.2 Test Results

Customer

Test Case 1

Input query: Click on the registration for customer then signup and sign in.

Output: You will head to Personal information form of Q-rail application.

Successful/Unsuccessful: This query gives successful result.

Test Case 2

Input query: Click on destination to choose departure and arrival.

Output: You will get the page to select from to where.

Successful/Unsuccessful: This query gives successful result.

Test Case 3

Input query: Click on the select train to choose

the required train.

Output: You will get the related train option.

Successful/Unsuccessful: This query gives successful result.

Test Case 4

Input query: To register complaint against inconvenience.

Output: http: You will head to complaint page.

Successful/Unsuccessful: This query gives successful result.

Ticket Collector

Test Case 1

Input query: Click on the TC login.

Output: You will head to the login form of application.

Successful/Unsuccessful: This query gives successful result.

Test Case 2

Input query: Fill the details and login

Output: You will successfully login in TC interface.

Successful/Unsuccessful: This query gives successful result.

Test Case 3

Input query: Click to check the ticket button and scan the ticket.

Output: The ticket is scanned and customer is verified.

Successful/Unsuccessful: This query gives successful result.

Test Case 4

Input query: Finding whether the ticket is fake or original.

Output: If found fake ticket directly go to fake ticket user registration.

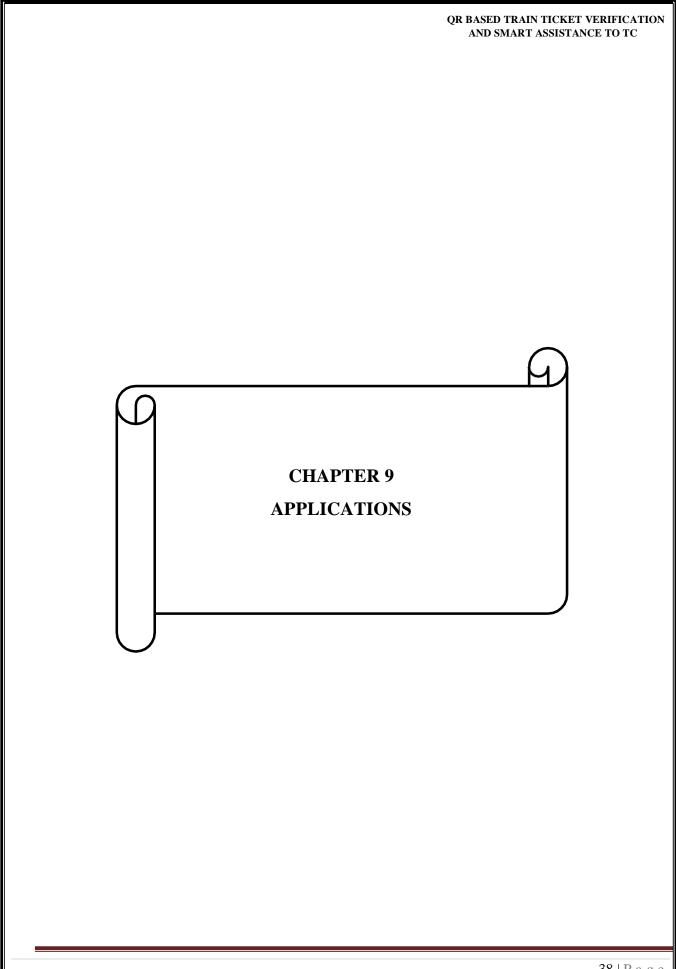
Successful/Unsuccessful: This query gives successful result.

Test Case 5

Input query: Checking the history of fake ticket user and cross check.

Output: You will get the fake ticket history if available.

Successful/Unsuccessful: This query gives successful result.



9 Applications

9.1. Applications

- Efficient Ticket Verification
- Enhanced Security
- Real-time Passenger Information
- Smart Assistance Tools
- Data Analytics for Optimization
- Improved Passenger Experience
- Compliance and Reporting
- Integration with Existing Systems
- Adaptability and Scalability

	QR BASED TRAIN TICKET VERIFICATION AND SMART ASSISTANCE TO TC
	9
CHAPTER 10	
CONCLUSION	

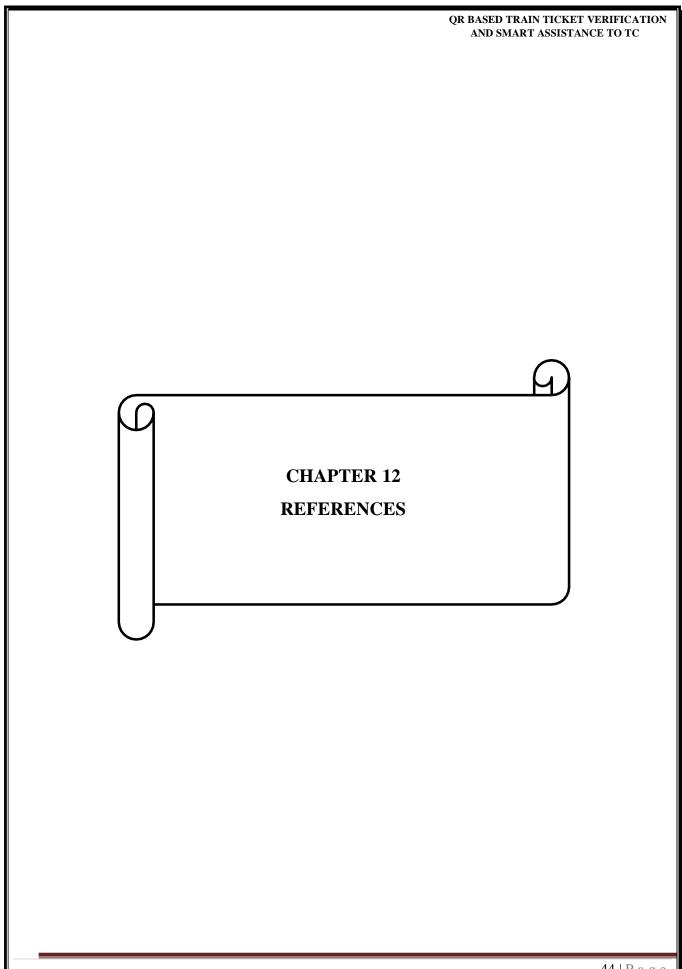
10.1. Conclusion

The implementation of a QR-based train ticket verification and smart assistance system for train conductors (TCs) marks a significant leap forward in modernizing railway operations and enhancing passenger experiences. By leveraging QR code technology, the system streamlines ticket verification processes, reduces fraud risks, and ensures faster and more accurate boarding procedures. The integration of smart assistance features empowers TCs with real-time passenger data, task automation tools, and improved decision-making capabilities, leading to increased operational efficiency and customer satisfaction. Overall, this innovative system aligns with digital transformation initiatives in the transportation sector, offering a scalable and adaptable solution to meet the evolving needs of modern railway services while ensuring security, reliability, and seamless integration with existing systems.

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CHAPTER 11	
FUTUREWORK	
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11.1. Future Work

- ➤ Integration with IoT Devices Incorporating Internet of Things (IoT) devices such as sensors in trains can provide real-time data on seat occupancy, train location, and passenger movement. Integrating this data with the existing system can optimize seat allocation, improve onboard safety, and enhance overall service efficiency.
- ➤ Enhanced Predictive Analytics Leveraging advanced analytics and machine learning algorithms on the collected ticket verification and passenger data can enable predictive insights. This can include predicting peak travel times, identifying potential ticket fraud patterns, and recommending optimal staffing levels for different train routes.
- ➤ Blockchain Integration for Enhanced Security Exploring the integration of blockchain technology can further enhance the security and transparency of ticketing transactions and passenger data management. Blockchain can help prevent tampering with ticket information and facilitate secure peer-to-peer ticket transfers.
- ➤ Collaborative Tools for TCs Developing collaborative tools such as instant messaging or video conferencing within the TC interface can facilitate communication among TCs, station staff, and emergency response teams, improving coordination during critical situations.
- ➤ Continuous User Feedback and Iterative Improvements Establishing mechanisms for collecting user feedback from TCs, passengers, and railway authorities can drive continuous improvement cycles. Iterative updates based on feedback and evolving technological trends can ensure the system remains aligned with stakeholders' needs and industry standards.



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- [6] Railway Applications for High-Tc Superconductors Hiroyuki FUJIMOTO Dr. Eng. Senior Researcher, Laboratory Head Applied Superconductivity, Materials Tecnology Division

BOOK's

- [1] SCAN ME Everybody's Guide to the Magical World of QR Codes by Mick Winter.
- [2] DEEPER LEARNING With QR Codes and Augmented Reality by Monica Burns.
- [3] Head First Android Development by Dawn Griffiths & David Griffiths.
- [4] Android App Development For DUMMIES by Michael Burton