Ticketless Entry in Heritage Museums

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Abstract—E-ticketing systems comprise one of the largest networks within the ticketing sector, with more than 1,025,000 km of coverage and a daily servicing of over 23 million visitors. The cost of running such systems is over CR 95,000, while about CR 23,000 is invested in paper alone [1]. With cities going toward intelligent infrastructure and the need for digital solutions growing, conventional ticketing processes are no longer the norm. Smart ticketing has become the need of the times, particularly for cultural centers such as museums and heritage sites. Through the use of smartphones, which are now a part of everyday life, paperless tickets can be realized, cutting operational expenses by a considerable margin. Electronic validation of identification documents can simplify visitor verification, minimizing man-power needs and security risks. Moreover, the shift helps local museums by generating increased revenue and curbing unauthorized entry. Through the integration of a secure web-based platform with a robust database system, E-ticketing networks are able to implement Smart Ticketing solutions effectively. This not only updates visitor management but also raises user satisfaction levels through smooth digital experiences.

Index Terms—E-Ticketing, Smart Ticketing Systems, QR Code Technology, Digital Transformation, Visitor Authentication, Online Booking, Cultural Heritage Management.

I. Introduction

In today's fast-evolving digital age, technology is the driving force for achieving maximum convenience and operational efficiency across industries. Ticketless is one of them - an e-ticketing website that is transforming museum visit experience [4]. As India consolidates its leadership position in digital growth, Ticketless and such websites are set to optimize profitability and convenience in public visitation systems. By eliminating the need for manual ticket validation, ticketless solutions simplify museum access, ushering in an era of efficient visitor management.

Electronic ticketing systems, using QR code technology, provide a convenient and secure way for visitors to gain access to museums. Visitors receive their e-tickets via email, doing away with the need for printing or carrying tickets. This transition to electronic admission not only reduces waiting time at ticket counters but also significantly enhances overall visitor satisfaction. Electronic ticketing systems also offer unprecedented convenience through online booking, flexible time slot selection, and easy changing of bookings. All these make more people come to museums, resulting in increased visits.

Besides, online ticketing systems also give museums vital information about the profile and conduct of visitors, which can be applied in data-driven marketing strategies and improved visitor engagement [1]. Physical ticketing processes within cultural sights are normally time-consuming, leading to administrative delays and long queues [6]. There is also the risk of physical ticket loss or theft, complicating visitor tracking and security. Ticketless entry systems eliminate these problems by lowering the expense of utilizing traditional ticketing, promoting flexibility in visitors, and reducing administrative burdens.

The aim of this research is to examine the feasibility and viability of implementing ticketless entry systems within museums and heritage sites with a view to overcoming potential drawbacks and enhancing overall visitor satisfaction. Further, ticketless systems allow the visitors to plan their museum visits better through the facilitation of ancillary services such as guided tours and viewing special exhibitions in the online reservation process. Heritage museums can provide effective, modern, and user-centered experiences through the application of ticketless technology, thus increasing cultural accessibility and engagement [1].

II. Literature Review

Most of the current e-ticketing systems insist on the users logging in or registering as soon as they access the system, even just to check the availability of the tickets. This is time-consuming and even frustrating for people who may only want to look at ticket options without actually buying anything. In order to make the user experience better, an enhanced approach is suggested whereby authentication only takes place when the user buys a ticket. This alteration makes the site more open to casual users while maintaining security for transactions.

The same principle has been tested in the paper "Android

Application for Ticket Booking and Ticket Checking in Suburban Railways" published in the Indian Journal of Science and Technology. This study investigates the application of QR codes provided through SMS for ticket reservation and verification [7]. But because of SMS technology limitations, that do not allow image sending, the approach is limited to text ticketing. To compensate for this weakness, the solution generates a QR code on the site, and the user can capture it as a screenshot for future verification. The approach guarantees secure storage and transmission of the ticket while including encryption and verification for added security.

By allowing users to check ticket availability without mandatory login and generating encrypted QR codes directly on the web page, the proposed system enhances flexibility, efficiency, and user satisfaction. It eliminates unnecessary barriers for guest users and ensures seamless ticket transmission and verification[2]. These improvements align with the goal of creating a more efficient and user-friendly e-ticketing platform.

III. Proposed Methodology

The study has the goal of creating a QR-based ticket system, with hardware as needed, to provide enhanced visitor experience and efficient crowd control in museums and heritage destinations. Conventional ticketing has often resulted in inefficiencies in terms of wait time and raised operating expenses because of printing and dissemination. The intended system proposes solutions to such limitations by allowing users to buy and use tickets in digital form using QR codes in their smartphones.

Major goals are reducing booking costs through the abolition of paper tickets and increasing ticket sales through the ability of visitors to buy tickets at any time, anywhere. The system can revolutionize museum and heritage site operations by streamlining visitor convenience, lowering administrative costs, and maximizing resource efficiency. Through the incorporation of cutting-edge technology, the suggested solution provides a creative and effective way of managing visitor traffic and maximizing the overall experience.

The main goal of this project is to create a website that completely digitalizes ticketing processes, providing a smooth and easy-to-use interface designed specifically for the requirements of museum visitors. The platform will include necessary functionalities such as:

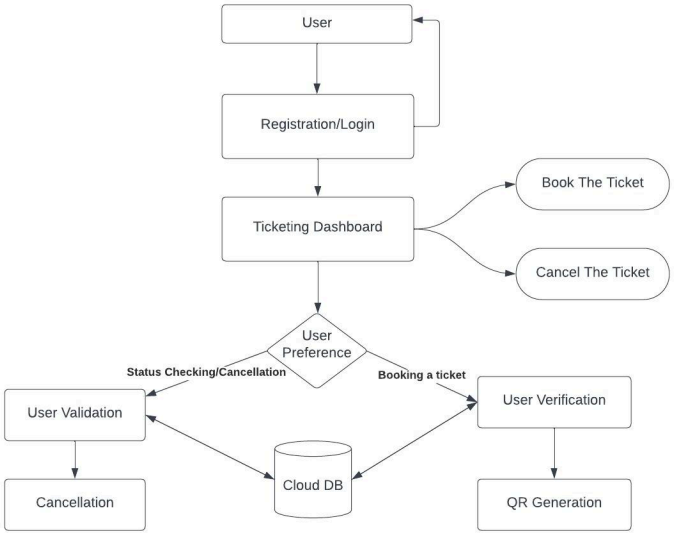
1. Ticket booking
2. Viewing ticket status
3. Ticket cancellation [Refer to Figure-a]

By integrating these features, the system aims to enhance convenience, streamline the ticketing process, and improve the overall visitor experience.

In order to cancel or view a ticket, users need to log in to their registered account with the required credentials. After being authenticated, they can go ahead with the cancellation request or view the status of the ticket. To confirm the availability of tickets, users are required to enter applicable information regarding the museum. After confirming availability, they can book a ticket by logging in to their registered account.

The ticket reservation process is made to be efficient, providing a smooth and speedy experience. Upon reservation, a secure QR code is produced and shown on the website, where users can screenshot it for future reference. The QR code acts as an electronic ticket, which can be scanned for verification at entry.

Further, biometric technology can be included for visitor authentication, correlating identities to a secure database. Digitizing ticket validation and verification, the system increases security and efficiency, creating a completely digital museum ticket booking system with advanced verification methods.



A. Ticketing Options

The preview screen of the website provides three key options:

1) Verifying ticket availability
2) Ticket status view
3) Cancelling tickets

For cancelling a ticket or inquiring about its status, users need to log in to their registered account accessed for booking. After successful authentication, they can go ahead with the intended action. But inquiring about ticket availability is not user-authenticated, so visitors can easily check for availability before they go on to book it.

B. Availability of the Tickets

The user has to provide information regarding the museum he wants to visit, as well as the date he plans to visit and preferences regarding ticket availability. After the system receives this information, it processes the data and shows a list of available museums.

Once a preferred museum is chosen, the user is presented with the actual availability of tickets in real-time. Depending on this, they can choose to go ahead and book. If tickets are available and the user wants to book, the user will be requested to authenticate to provide safe access. This ensures that only registered users are allowed to book, providing security as well as ease of use.

C. Booking a Ticket

1) Customer Side Module: New users are required to create an account by entering their login details, such as a username, password, and necessary personal information. Existing users can log in with their previous login details. After logging in, users can simply book tickets by filling in the required information. In the case of multiple visitors booking, each visitor's information needs to be entered.

At the time of booking, the system captures visitor information—name, gender, and age—directly from the Aadhaar database of the Indian government through the input provided. The input provided is used as a foreign key so that the system can retrieve the correct visitor information. The age of the visitor is calculated automatically from the date of birth entered in the Aadhaar database and does not require manual entry.

After the visitor information and visit details are shown, the user is able to go for payment and finalize the booking. Ticket information is then securely retained in the museum's cloud database to ensure hassle-free future verification. This integration of governmental records makes it more accurate, decreases manual labor, and provides an improved experience of booking.

2) Ticket Desk Module: Not everyone visiting a heritage site might be aware of e-tickets or know that there is an online booking system for a specific heritage site. To overcome this, we present a novel solution that streamlines ticketing and improves security. The Facial-Based E-Ticketing System (FBET) revolutionizes conventional ticketing by incorporating facial recognition technology. Ticket vendors merely log in to the e-ticket portal and scan the face of the visitor while he or she is in the queue. This photo is immediately utilized to create a special ID, which is saved in the database with facial biometrics. Meanwhile, the visitor makes the payment for the ticket. After the payment is successful, they move on to the gate, where cameras scan their face and compare it with the generated ID. When the system confirms the match, the visitor is provided with hassle-free access to the museum or heritage location without having a physical ticket. This is not only enhancing convenience but also enhancing security and facilitating crowd control.

D. Generation of QR code

Customers have the option to pay in various ways, such as using debit cards, credit cards, and net banking. After booking the ticket successfully, the system creates a QR code with critical ticket information along with the Aadhar card number provided at the time of booking. When a visitor arrives at the museum, he or she just scans the QR code through his or her mobile for validation. The system also incorporates a biometric scanner to provide secure identity verification. Cross-verifying visitor identity, the system blocks fraudulent activities and allows only the rightful ticket holder to enter. Moreover, this verification system protects against abuse, where unauthorized personnel cannot use a digitally shared QR code.

E. Validation of the Ticket

On arrival at the entrance of the museum, the visitors can confirm their tickets through scanning the QR code using a QR code scanner. The scanner scans the code on the visitor's phone and cross-references the details on the ticket with the data in the database. When the system validates the ticket, the verification process is finalized, and the visitor moves on to identity verification to ensure that the ticket holder is using the ticket of the original person.

F. Visitor Verification

Visitation to the museum demands identity verification to ensure that the ticket is being utilized by the intended visitor. After validation of a visitor's ticket, his/her identity is verified through a biometric system. The biometric information of the visitor is scanned and matched against the Aadhar database. When a match is established, the system extracts the associated Aadhar card number from the database. This extracted Aadhar number is further verified against the one that is saved in the QR code at the time of ticket booking. If both match, the identification of the visitor is confirmed, and they are allowed entry into the museum.

IV. Feasibility of the Proposal

Design feasibility assists in comprehending the practical application of the project and determining its sustainability. It sheds light on the strength of the design and brings to the forefront any fragility that might be linked to it. Feasibility studies should be carried out before implementing in order to measure the efficacy of the project.

Economic Expediency This project can immensely cut down on paper usage in museums, making it an environmentally friendly option. Furthermore, all the technologies necessary for its application are affordable, and therefore, the project is economically viable.

Operational Expediency

Users will have a smooth and trouble-free experience while engaging with the system. The easy operations increase user experience, rendering the project operable.

V. Future Scope of the Proposal

This system can be extended to a more comprehensive electronic ticketing system in the future. Museums and monuments receive a huge number of visitors every day, and implementing this system would streamline ticket sales and make them smoother. With the intention to introduce Google-powered Wi-Fi in large museums, the reach and

accessibility of the system will greatly increase. Moreover, this solution will help in avoiding ticketless entry, which will lead to improved security and revenue management. With digitization, this system has the potential to revolutionize museum visit management through a new and intuitive digital interface.

VI. Conclusion

The main target of this proposal is to create a web-based application that enables users to retrieve different ticketing options in an easy and effective way. By combining QR code technology and biometric readers, the system provides smooth ticket validation and passenger identity authentication. This proposal describes the ticket booking implementation process and secure identity authentication through biometric information. Implementing this system would not only increase digitization but also paper conservation, making it a green and technology-driven measure.

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