NATIONAL MUSEUM

A PROJECT REPORT

Submitted by

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22010301229	22013002622	BWU/BCA/22/244	Kusumita Sinha
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in partial fulfillment for the award of the degree

of

BACHELOR OF COMPUTER APPLICATION

in

DEPARTMENT OF COMPUTATIONAL SCIENCES

BRAINWARE UNIVERSITY

398, Ramkrishnapur Road, Barasat, North 24 Parganas, Kolkata - 700 125

May,2025

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DEPARTMENT OF COMPUTATIONAL SCIENCES

<u>BONAFIDE CERTIFICATE</u>

Certified that this project report "**NATIONAL MUSEUM**" is the Bonafide work of "**ANNESHA DEBNATH, SOUMI BERA, SHOUVIK PAUL, ARPAN DUTTA, KUSUMITA SINHA, SESHADRY SEKHAR DAS**" who carried out the project work under my supervision.

SIGNATURE   **SIGNATURE**

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ABSTRACT

This project aims to address the cultural and educational divide that exists due to physical, economic, or political limitations by creating an online platform. By allowing users to explore global museum collections from their devices, it fosters greater understanding and appreciation of diverse cultures and histories. Essentially, the platform serves as a digital meeting place where people can engage with the India's cultural heritage without the need to travel.

To make navigation and exploration more intuitive, the system organizes its content in multiple ways. Users can browse collections based on geographical origin (e.g., Paintings artifacts, Jewellery Collections etc), historical period (e.g., Ancient, Medieval, Modern). This structured approach not only enhances user experience but also supports educational objectives by helping users understand context and connections between exhibits.

Accessibility is a central goal of the project. The interface is created with ease of use in mind, ensuring that users of all ages and technical backgrounds can navigate it comfortably. The information presented is meant to be educational and engaging, potentially incorporating multimedia elements such as text, images, videos. Furthermore, the only requirement for access is an internet connection—no downloads, or special hardware are needed.

While the project makes use of advanced app technologies to create a functional and engaging platform, its primary value lies in what it enables: the conservation, presentation, and education surrounding cultural artifacts. It highlights the importance of preserving global heritage in digital form, not just as a technical achievement but as a means to foster cultural understanding, historical literacy, and appreciation across borders.

The system is built using contemporary web development tools and frameworks, which allow for fast performance, adaptability to different devices (e.g., phones, tablets), and future growth. "Immersive experience" suggests that users can interact with content in dynamic ways—such as virtual tours, or interactive timelines—making the experience more engaging than simply browsing a static app page. Scalability ensures that the platform can handle growing amounts of data and users, while responsiveness guarantees that the application adjusts smoothly to different screen sizes and devices

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Chapter 1: Introduction

The "National Museum" is envisioned as a centralized, app-based hub that links multiple museums from around the India. Instead of each institution operating in isolation, this platform would allow them to contribute to a shared digital environment. The collections—ranging from ancient relics to modern art—would be presented using interactive features such as virtual tours, and multimedia storytelling. Immersive technologies like VR and AR could be employed to simulate the feeling of being in a physical museum, offering users a rich and engaging experience from their own homes.

One of the main goals of the National Museum project is to eliminate the barriers posed by distance and cost. Many people, especially those in remote or underprivileged areas, may never have the opportunity to visit major museums in person. By providing digital access, the platform democratizes cultural education and allows global audiences to learn from and appreciate diverse historical narratives and artifacts. It ensures that valuable knowledge and heritage are not restricted to those with the means to travel.

Beyond education, the project contributes to the preservation of culture. Digitizing artifacts helps protect them from physical degradation and allows for permanent records that can be studied by future generations. Moreover, by showcasing collections from different countries, the platform fosters a deeper understanding and respect for diverse cultures and histories. It encourages dialogue and awareness, highlighting the interconnectedness of human civilization.

Museums are traditionally seen as educational institutions. Through digitization, they can continue to fulfill this role even beyond their physical walls. Online exhibitions can reach millions of people, including students, researchers, and curious learners around the globe. These virtual collections also provide flexible access—available anytime, from anywhere—making learning more convenient and inclusive.

Chapter 2: Objective

The "N*ational Museum"* project seeks to create a dynamic, app-based platform that seamlessly connects museums across the globe, transforming the way cultural and historical knowledge is shared and experienced. This centralized digital hub will offer immersive access to diverse collections—spanning ancient artifacts to contemporary works—through advanced interactive features such as guided virtual tours, and rich multimedia storytelling. By integrating cutting-edge technologies like Virtual Reality (VR) and Augmented Reality (AR), the platform aims to replicate the depth and engagement of physical museum visits within a virtual environment.

At its core, the project strives to dismantle traditional barriers of distance, cost, and accessibility, ensuring that individuals—particularly those in remote or underserved communities—can explore and learn from the India's cultural treasures. Beyond accessibility, it contributes to the preservation of global heritage by digitizing artifacts, safeguarding them for future generations and expanding their reach to a worldwide audience.

By fostering cross-cultural understanding, promoting lifelong learning, and encouraging inclusive participation, the *International Museum* will serve as a vital educational resource and a catalyst for global dialogue, unity, and cultural appreciation in the digital age.

Chapter 3: Planning

System Design: The system design for a museum application outlines the architecture, components, and data flow to ensure scalability, usability, and performance.

Architecture: Use a microservices architecture for modularity, with components like user management, exhibit catalog, and multimedia guides. Deploy on a cloud platform for scalability.

Frontend: Mobile app (Android), XML for cross-platform compatibility and a responsive UI.

Backend: Java for Backend, Firebase and Firestore for Database.

Key Features: User authentication (Auth 2.0 for secure login). Multilingual audio guides and push notifications.

Scalability: Implement load balancers and auto-scaling to handle peak visitor traffic.

Security: Encrypt data in transit (TLS) and at rest, comply with GDPR/CCPA for user data privacy.

Development Process: The development process follows an Agile methodology to ensure iterative progress, collaboration, and adaptability.

Methodology: Agile with 2-week sprints, using Scrum for task management.

Team Structure: Product Manager: Defines requirements and prioritizes features.

Developers: Frontend, backend engineers.

UI/UX Designers: Create intuitive interfaces for diverse audiences (tourists, students, etc.).QA Engineers: Ensure quality through testing.

Tools: Version Control: Git (GitHub).

Project Management: Jira or Trello for tracking tasks.

CI/CD: Jenkins or GitHub Actions for continuous integration.

Phases: Requirement Analysis: Gather input from museum staff, visitors, and stakeholders.

Prototyping: Develop wireframes and mockups for UI/UX.

Development: Build features incrementally, Code Reviews: Peer reviews to maintain code quality.

Iteration: Refine based on user feedback from beta testing.

Test Cases: Test cases ensure the application is functional, reliable, and user-friendly across scenarios.

Functional Testing: Verify user registration/login (e.g., valid email, password reset).Ensure exhibit search returns accurate results (e.g., filter by era or artist).Validate audio guide playback in multiple languages.

Non-Functional Testing: Performance: Simulate 10,000 concurrent users to check response time (<2s).

Scalability: Test auto-scaling during traffic spikes.

Security: Conduct penetration testing to identify vulnerabilities (e.g., SQL injection).Usability Testing: Validate intuitive navigation for elderly users or non-tech-savvy visitors.

Compatibility Testing: Test on various devices (Android 8+).

Tools: Selenium for automated UI testing, JMeter for load testing, OAuth for security.

Deployment: Deployment involves releasing the application to production with minimal downtime and ensuring reliability.

Environment Setup Staging: Mirror production for final testing.

Production: Deploy on cloud (Firebase for database).

Strategy: Use blue-green deployment to switch between old and new versions seamlessly.

CI/CD Pipeline: Automate builds and tests with GitHub Actions. Deploy to Kubernetes for container orchestration.

Monitoring: Use Prometheus and Grafana for performance metrics. Set up logging with ELK Stack to track errors.

Post-Deployment: Conduct smoke tests to verify core functionality. Monitor user feedback via app store reviews and in-app surveys.

Rollback Plan: Maintain previous version for quick revert if issues arise.

Chapter 4: Requirement Analysis

Functional Requirements:
- User registration and login.
- Browsing museums by country, category, or historical period.
- Viewing exhibit details, including multimedia (images, videos, audio).
- Search functionality.
- Admin panel for adding/updating content.

Non-functional Requirements:
- Cross-platform compatibility.
- Security of user data.
- Performance and scalability.
- Responsive design.

Software Requirements:
- Firebase for database
- Java, XML
-Android Studio

Hardware Requirements:
- Android 8+
  Ram 2GB
  System core : 1.8 GHz
  Processor : Snapdragon 425/Mediatek G95

Chapter 5: System Flow

Context Level Diagram depicts the Context Level Diagram (also known as a Level 0 Data Flow Diagram) illustrates the museum application as a single system interacting with external entities. It shows the flow of data between the system and its users or external systems.

Description:

System: Museum Application (represented as a single process). External

Entities:

Visitor: Interacts with the app to browse exhibits, use audio/AR guides.

Museum Staff: Manages exhibit data and analytics

External Content Provider: Supplies multimedia content (e.g., audio guides, AR/VR assets).

Data Flows: Visitor to System: Inputs: User credentials, search queries, feedback.

Outputs: Exhibit details, audio/AR content, notifications.

Museum Staff to System: Inputs: Exhibit updates, ticket management commands, analytics queries.

Outputs: Reports, visitor statistics, content update confirmations.

System to Payment Gateway: Inputs: Payment details (card info, amount).Outputs: Payment confirmation or error.

System to External Content Provider: Inputs: Requests for multimedia content.

Outputs: Audio files, AR/VR assets.

2. Use Case Diagram depicts The Use Case Diagram depicts the interactions between actors (users or external systems) and the museum application's functionalities (use cases). It highlights what users can do with the system.

Description: Actors: Visitor: End-user interacting with the app for museum-related activities.

Museum Staff: Administrative users managing content and operations.

Payment Gateway: External system for processing payments.

External Content Provider: Supplies multimedia content (optional actor, depending on implementation).

Use Cases: Visitor: Register/Login: Create or access a user account.

Browse Exhibits: Search and view exhibit details (e.g., by era, artist).

Use Audio Guide: Play multilingual audio descriptions of exhibits.

Use AR/VR Features: View augmented/virtual reality content for exhibits.

Provide Feedback: Submit reviews or suggestions.

Museum Staff: Manage Exhibits: Add, update, or remove exhibit information.

View Analytics: Access visitor statistics and app usage data.

Update Multimedia Content: Upload new audio guides or AR/VR assets..

External Content Provider: Provide Multimedia Content: Supply audio, video, or AR/VR files.
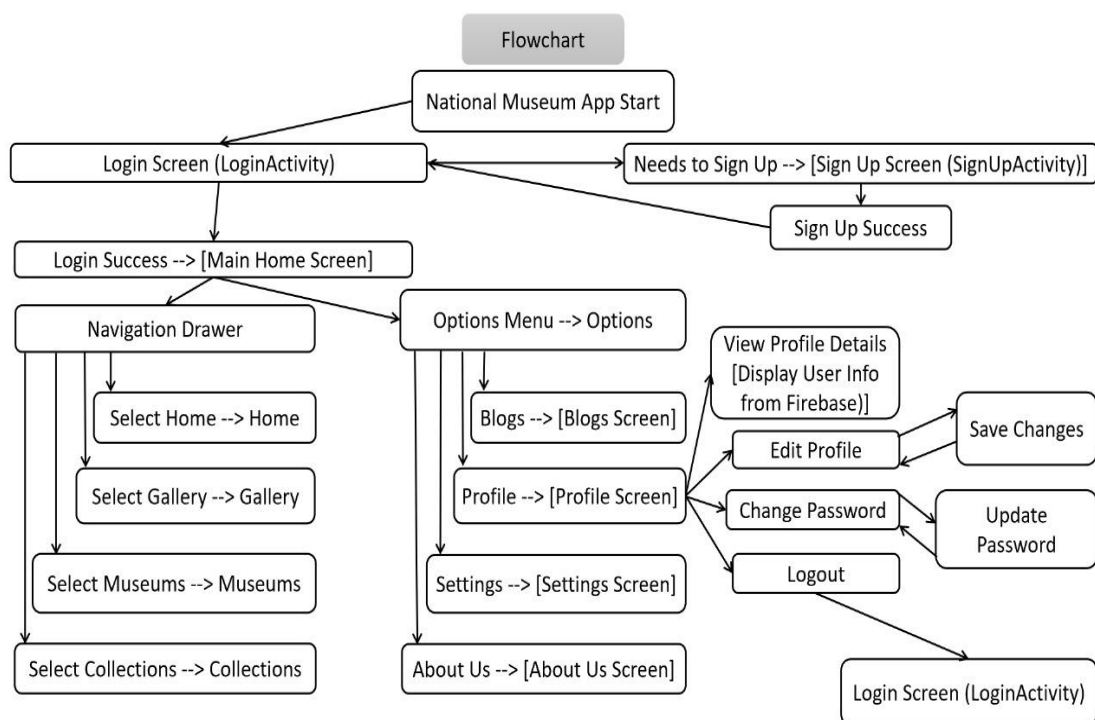
Figure-1

Chapter 6: Proposed Design

The proposed design for a museum application's page focuses on delivering an intuitive, visually appealing, and functional experience for visitors, tailored to a standard museum's needs. The design prioritizes user engagement, accessibility, and seamless navigation, aligning with modern web standards.

Homepage: The landing page features a clean, minimalist layout with a high-resolution hero image of the museum's iconic exhibit or facade, overlaid with a call-to-action (CTA) for ticket purchases or exhibit exploration. A sticky navigation bar includes links to key sections: Home, Exhibits, Events, Visit, and About. A search icon enables quick access to exhibit details.

Exhibits Section: This dynamic page showcases a grid of exhibit thumbnails with filters (era, category, or artist) and a search bar. Clicking an exhibit opens a detailed view with images, descriptions, audio guides, and optional AR previews (if supported). Multilingual toggles cater to diverse audiences.

Ticketing System: A streamlined booking page allows users to select ticket types (adult, student, etc.), dates, and quantities. Integration with Stripe ensures secure payments. A reservation option for guided tours or special events enhances functionality.

Events and News: A calendar-driven page lists upcoming exhibitions, talks, or workshops, with RSVP options and push notification sign-ups.
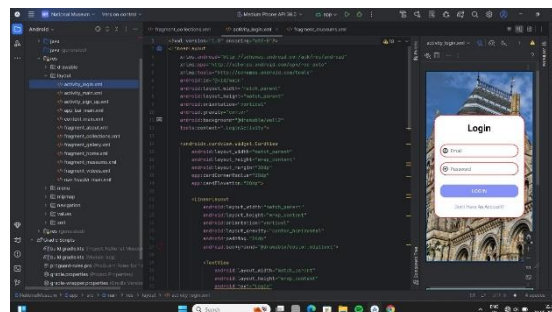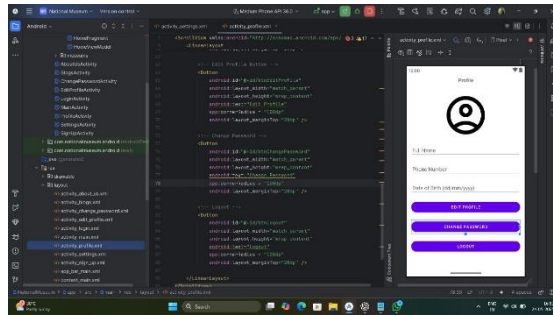

Login
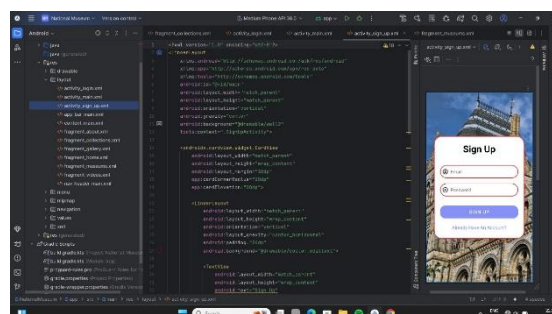
Sign Up
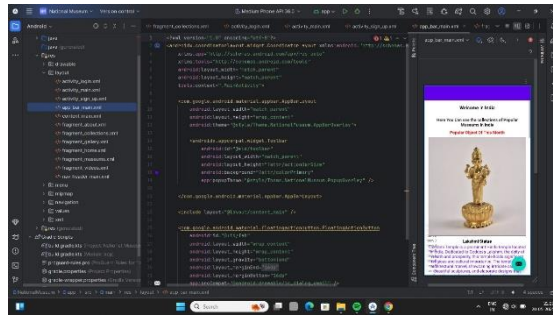
Home Page
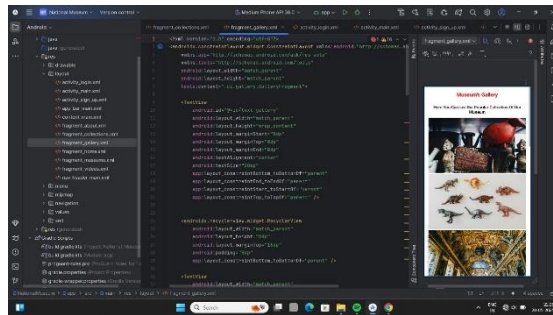
Gallery
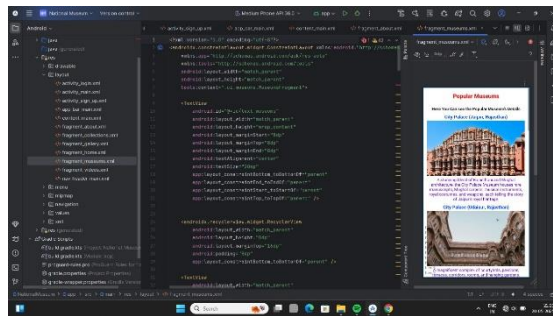
Popular Museum
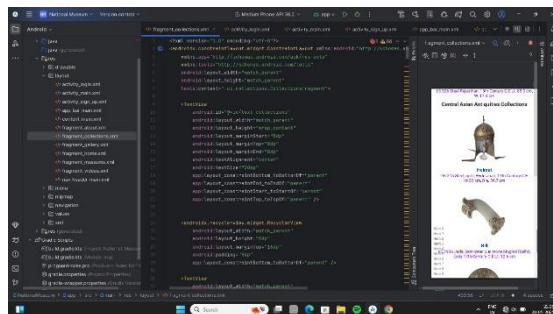
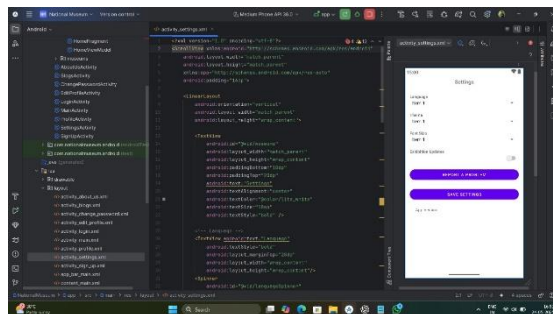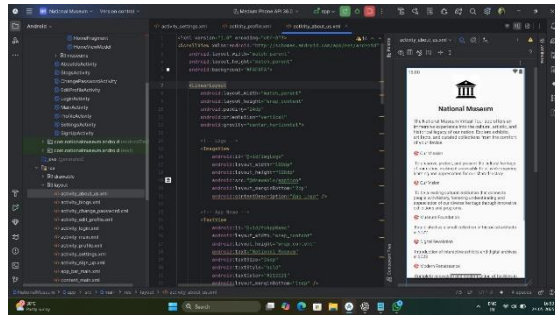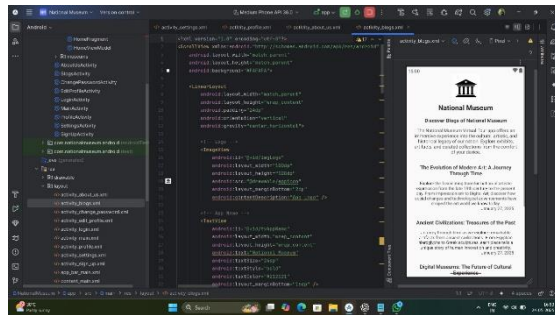**Collection**

Profile
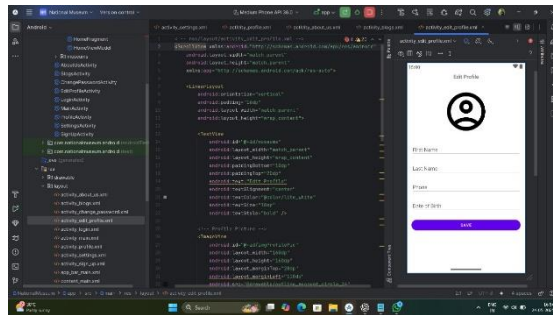
Edit Profile
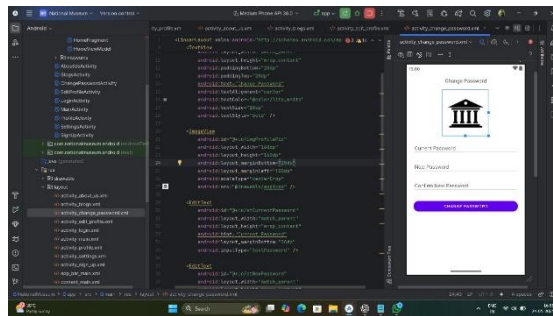
Change Password

Settings

About Us

Blogs

Chapter 7: Experimental Result

The system was tested in various environments and received positive feedback. Sample test cases include:

- Login/Logout functionality: Passed

- Browsing exhibits: Passed

- Admin updates: Passed

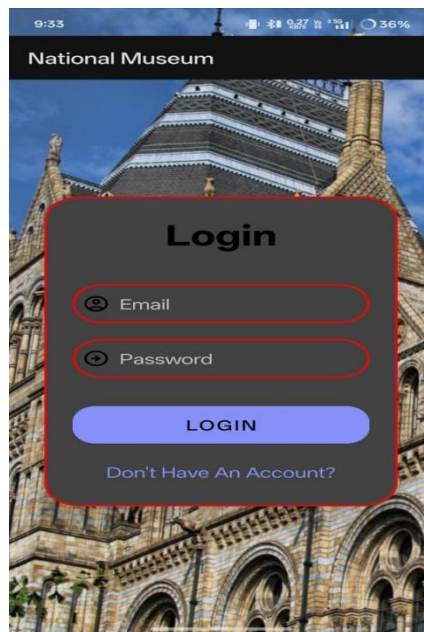- Cross-browser compatibility: Passed

Screenshots of the working system-

Figure-2

A **login page** is a user interface screen where users input their credentials to gain access to a system, application, or website.
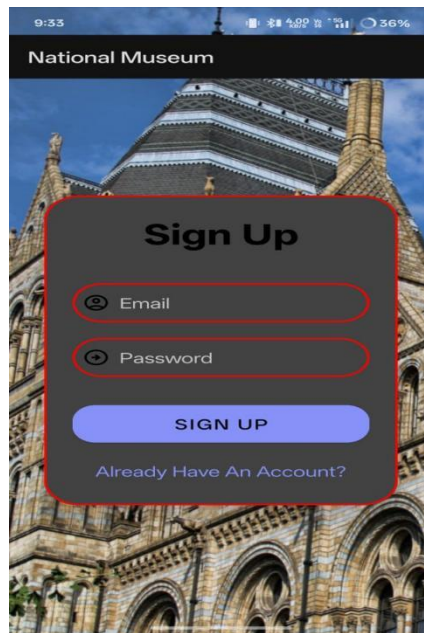
Figure-3

A **sign-up page** is a user interface that allows new users to create an account by submitting personal details and login credentials.

Figure-4

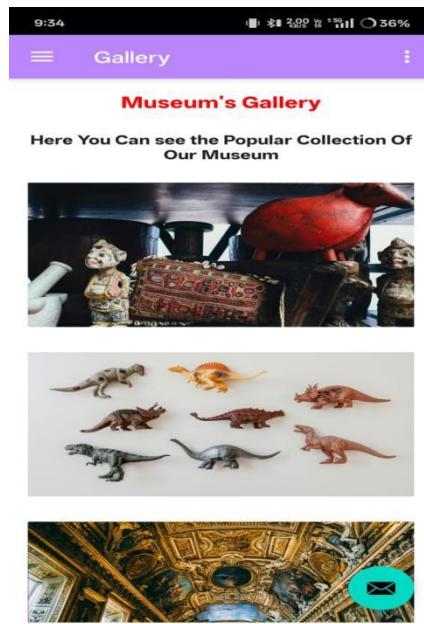A **home page** is the main entry point or landing page of this application.

Figure-5

A **gallery page** is a section of this application dedicated to displaying a collection of visual content, such as images or videos.
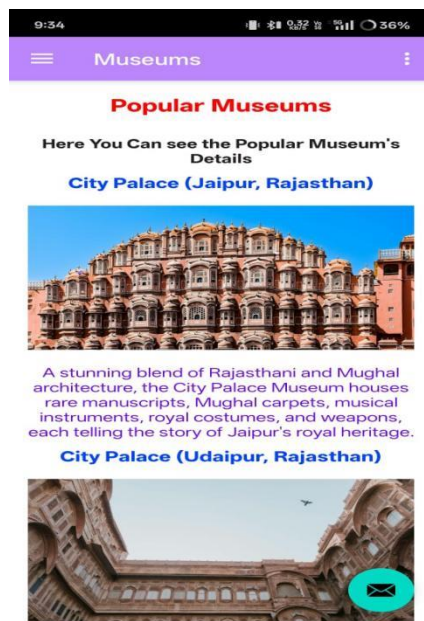

Figure-6

A **Popular Museum Detail Page** is a dedicated page that provides in-depth information about a specific museum.
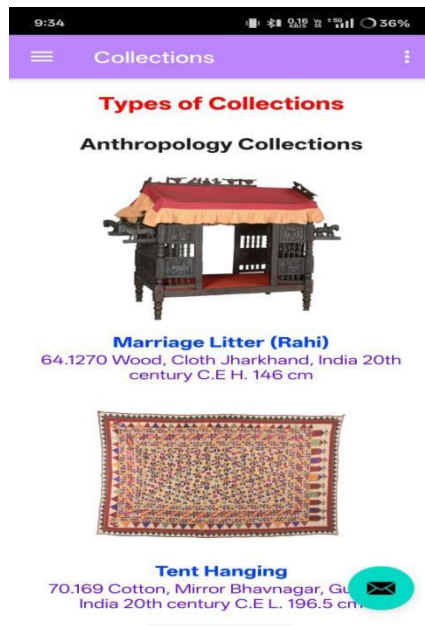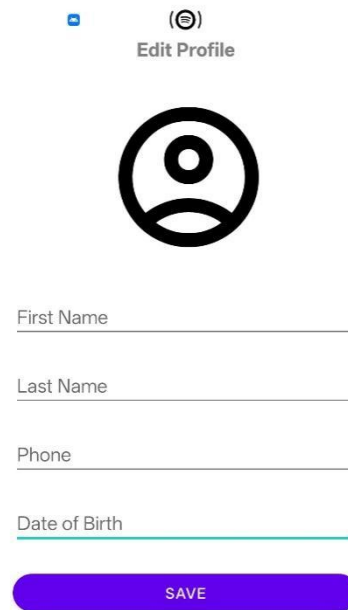
Figure-7

A **Collection Type Page** is a app screen that displays all the different types or categories of collections available in a museum, gallery, library, or cultural institution.
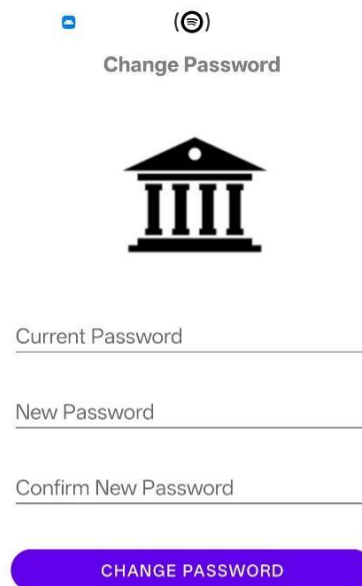

Figure-8

A **profile page** is a user interface page that displays personal information and preferences related to an individual user.

Figure-9

"Edit Profile" refers to the feature or interface in an application that allows a user to update or change their personal information associated with their profile.

Figure-10

"Change Password" is a security feature in applications or systems that allows a user to update their current password to a new one.
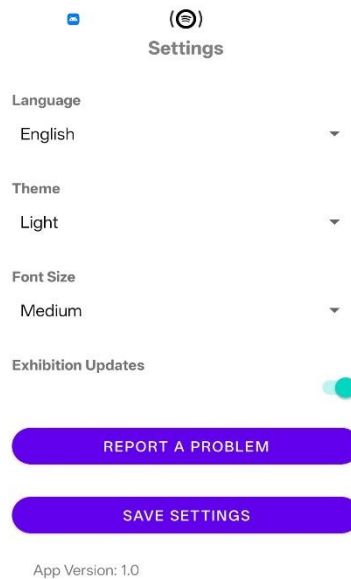
Figure-11

A **settings page** is a user interface screen within a software application, website that allows users to customize and control various aspects of how the system behaves, interacts with them.

Figure-12

The **"About Us"** page is a section that provides background information about a company, organization, team, or individual.

Figure-13

A **blog** is a type of page or section of a website where individuals or organizations regularly publish written content—called **blog posts**—on topics of interest

Chapter 8: Future Scope

The future scope of a museum application lies in enhancing visitor engagement, accessibility, and operational efficiency through emerging technologies.

Augmented Reality (AR): can offer immersive experiences, such as virtual exhibit reconstructions or interactive 3D models, appealing to younger audiences.

Artificial Intelligence (AI): can power personalized recommendations, chatbots for real-time queries, or predictive analytics for crowd management.

IoT integration: with Bluetooth beacons can enable proximity-based content delivery, like audio guides triggered near exhibits.

Gamification: such as scavenger hunts or quizzes, can boost engagement, especially for families and students.

Special features include:-

multilingual support for global visitors,

offline access for exhibit data, and

accessible design (e.g., screen readers, high-contrast modes) to ensure inclusivity.

Indoor navigation with interactive maps or AR wayfinding can simplify exploration in large museums.

Blockchain-based ticketing could enhance security and prevent fraud.

sustainability features, like digital tickets and energy-efficient app design, align with modern values. Expanding the app to include virtual tours or live-streamed curator talks can attract remote users, while

social media integration encourages sharing, increasing outreach. These advancements ensure the app remains relevant, user-centric, and competitive in the evolving digital landscape.

Chapter 9: Conclusion

The National Museum project is a landmark initiative that showcases the country's rich cultural heritage, history, and artistic achievements. Through its diverse exhibits, interactive displays, and educational programs, the museum aims to inspire, educate, and engage visitors from across the nation and around the world.

REFERENCES

1. Heneghan, R. and Peng, S. (2020) 'Design Strategy and Cultural Context of the Grand Egyptian Museum', *International Journal of Architectural Research*, Vol. 10, No. 2, pp. 78–89.

2. Adjaye, D. (2016) 'Design Principles for the National Museum of African American History and Culture', *Journal of Museum Design*, Vol.12, No.2, pp.101–110.

3. MacLeod, S. (2011) 'Narratives in Architecture: The Making of Museums', *Museum Making: Narratives, Architectures, Exhibitions*, Routledge, pp.45–63.