SMART INDIA HACKATHON 2024

- **Organization :** AICTE, MIC-Student Innovation
- **PS Code :** 1598
- **Problem Statement Title :** Student Innovation
- **Team Name :** ARchive Culture
- **Team Leader Name :** Ravishankar S Bevinal
- **Theme :** Heritage and culture
- **PS Category :** Software
- **Team ID :** 7978

Idea and Approach

Problem Understanding

- India's cultural heritage faces growing challenges in engaging younger, tech-savvy generations, to whom traditional methods like physical visits often fail to capture their interest.
- In an increasingly digital world, there's an opportunity to make heritage and history more accessible and relevant through mobile devices, bringing heritage directly to users.

Key Ideas

Promote Indian heritage by leveraging new technologies.
Revolutionize interaction through immersive experience.
Enhancing cultural appreciation and education.
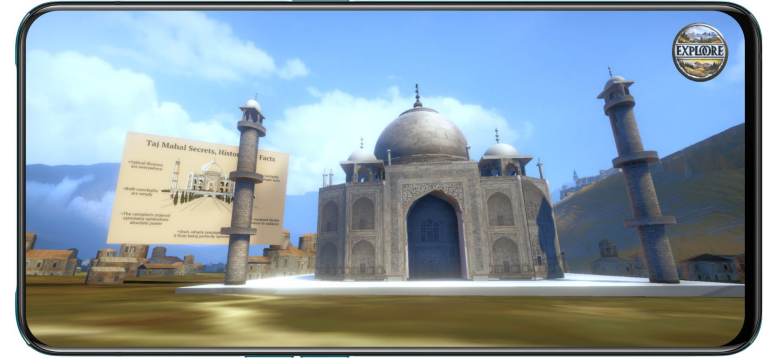Capturing younger generations using gamified and personalized virtual content.

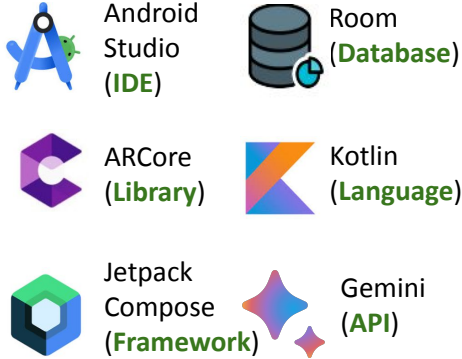Fig 1 . VR Game

Fig 2 . AR application

Approach

- **Immersive AR/VR App:** Engaging virtual experiences of cultural sites with visually stunning, high graphic game like scenes.(**Mobile** & **Desktop**)

- **Interactive Gamification :** Play/Build with 3D assets in playground and provide informative quizzes for interesting rewards.(**Better Engagement**)

- **Generative AI :** Create personalized (*Tour Plans/ Trip suggestions / Shopping suggestion*) content based on user interests.

- **3D Reconstructed Models:** In-House Reconstructed Novel 3D assets using SOTA models
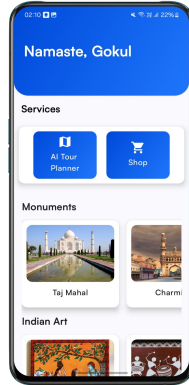
Techstack and Prototype

Android Development
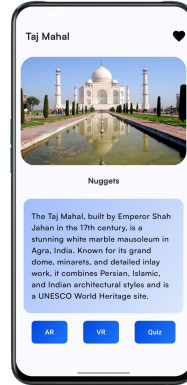
- Android Studio **(IDE)**
- Room **(Database)**
- ARCore **(Library)**
- Kotlin **(Language)**
- Jetpack Compose **(Framework)**
- Gemini **(API)**

Home

Cultural Insights

Fun Quiz

Shop
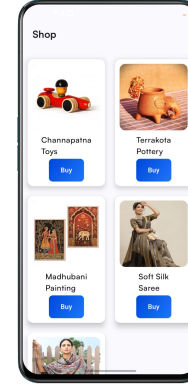
AI tour planner
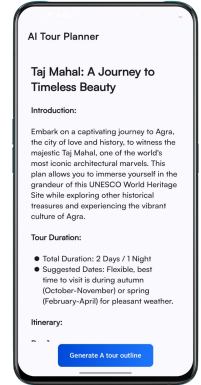
Start Menu

Landing scene

Monument Gallery

3D Monument

Game Development

- Unity **(Game Engine)**
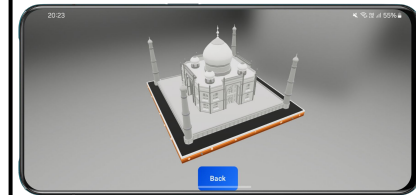- Unity 3D **(IDE)**
- C# **(Language)**

3D Reconstruction

SFM : Structure From Motion

NeRF : Neural Radiance Fields

3DGS : 3D Gaussian Splatting

VR and AR features

Flow Diagram

User

Visual stunning (GTA)
Game like experience

Informative AR/VR app
with AI integration

Open World Unity Game

Mobile App

Monuments, Artifacts, Instruments

Shops promoting

Gamification

Teleport back

Galleries

| Monuments | Artifacts | Food | Clothing | Festival | Others |

Choose a gallery

select favourite monuments

AI Tour Plan Generator

Gemini API

VR Viewer

AR Explorer

Discover Cultural Insights

✔ Fine Tuned AI
✔ Latest Infromation

Unlocks AR models

Choose Model

Playground Mode

Teleport to 3d model

Add

3D Inventory

Fetch

Place/Move/Remove 3D Models

Get Information through play cards

Feasibility, Impact and Stakeholders

Feasibility

Technological

- **AR/VR Integration :** Needs optimization for device compatibility and efficient 3D rendering

- **3D Reconstruction :** Challenging to obtain or create high-quality datasets for 3D asset construction.

- **Generative AI :** Ensuring cultural authenticity and historical accuracy through effective prompt engineering.

Operational

- **Content Authenticity:** Ensures cultural validation and historical accuracy

- **Cultural Sensitivity :** Collaborates with experts to prevent data misrepresentation.

- **Market Adoption :** Aligns with growing AR/VR trends in education and tourism.

Impact

Cultural

- **Preserving Heritage**: Showcases India's cultural heritage in 3D, boosting awareness and education.

- **Cultural Sensitivity & Inclusion :** Provides respectful and authentic experiences, bridging cultural gaps.

- **Virtual Tourism :** Offers immersive previews and affordable access, increasing interest in cultural tourism.

Educational

- **Interactive Learning :** Uses gamified 3D models to enhance engagement and knowledge of Indian history and culture.

- **Advancing AR/VR :** Demonstrates AR/VR's potential in education and cultural preservation

- **Personalized Education :** Offers tailored learning experiences with generative AI, deepening cultural connections.

Stakeholders

Culturally Interested Individuals with barriers to Cultural Participation

- **Students** with academic schedules or financial limitations

- **Individuals with financial barriers**

- The **Elderly** or **people with disabilities** limited by mobility or health issues

Underexposed to Indian Culture & Heritage

- **Younger individuals** unfamiliar with Indian culture and heritage

- **Non-Resident Indians (NRIs)** and **foreign tourists** who may have limited exposure to India's cultural roots and heritage.

Research and References

Research:

- Understanding Indian Heritage & Culture:
https://www.researchgate.net/publication/359938147_Understanding_Indian_Culture_and_Heritage
https://indianculture.gov.in/research-papers
https://whc.unesco.org/en/statesparties/in
https://www.indiaculture.gov.in/about-us/autonomus-bodies/museum

- AR & VR in education:
https://www.sciencedirect.com/science/article/pii/S2590291123001377
https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-023-00405-6
https://ieeexplore.ieee.org/document/6624226

- AR & VR market in India - research and stats:
https://www.researchgate.net/publication/376085684_Augmented_Reality_in_Marketing

  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9244620/
https://www.statista.com/outlook/amo/ar-vr/india
https://academyofanimatedart.com/virtual-reality-statistics/

References:

- 3D models acquired and generated:
https://sketchfab.com/search?q=india&type=models
https://rigmodels.com/index.php?manualsearch=1&searchkeyword=India
https://poly.cam/