A GENERIC FRAMEWORK ON ENCYCLOPAEDIA USING AUGMENTED REALITY

Project Reference No.: *48S_BE_4820*

College   :   Global Academy Of Technology, Bengaluru
Branch   :   Department Of Computer Science And Engineering
Guide   :   Prof. J Madhuri Latha
Student(S):   Ms. Arbeena Hassan

Ms. B M Shrinija
Ms. Meena S

Keywords:

Augmented Reality, Education, Encyclopedia, Marker-based AR.

Introduction:

Augmented Reality (AR) bridges real-world and digital experiences by overlaying interactive content onto physical environments. This project develops a marker-based AR encyclopedia to provide dynamic, real-time information overlays when users scan specific objects or images. It aims to transform traditional learning into a more engaging, accessible, and technology-driven experience, especially for underserved and rural areas.

Objectives:

Develop an interactive and immersive platform using Augmented Reality (AR) to present information across various subjects, making it engaging and accessible.

1. Transform traditional learning methods by introducing interactive 3D models and simulations.

2. Familiarize users with AR/VR technologies, paving the way for tech-savvy learning.

3. Tailor content to suit rural communities, emphasizing topics related to education, environment, and healthcare.

4. Demonstrate the use of AR/VR in bridging knowledge gaps by adding 3D visuals.

Methodology:

The project follows a structured and iterative approach to develop an offline, marker-based AR educational application.

1. **Problem Identification & Goal Setting**:
   Identified the gap in interactive rural education; set the objective to build an offline AR learning app.

2. **Technology Stack Selection**:
   Selected Unity 3D and Vuforia SDK for AR development; targeted Android for wide accessibility.

3. **Content Creation & AR Marker Integration**:
   Designed multilingual 3D models (dinosaurs, monuments, human anatomy) linked with image markers, enabling marker-triggered 3D content with narration.

4. **UI/UX Design & Prototype Development**:
   Built a child-friendly, intuitive interface; developed an initial prototype connecting Unity scenes with marker tracking.

5. **Testing, Feedback & Optimization**:
   Conducted pilot tests in rural schools; refined models, narration clarity, and app performance based on feedback.

6. **Deployment & Scalability Planning**:
   Released an Android APK; structured for modular addition of new subjects and expanded learning content.

Results & Conclusion:

- Delivered a fully offline, marker-triggered AR app.

- Achieved 95% object recognition accuracy, <1s load time, and 60 FPS on Android devices.

- Integrated over 5 educational 3D modules across diverse subjects.

In conclusion, the project validates AR's potential to make education interactive, accessible, and scalable, particularly for low-infrastructure regions. The offline-first approach solves connectivity issues, while the marker-based system provides a novel and immersive method for knowledge dissemination. The framework lays strong groundwork for future expansion into broader subjects and markets.

Project Outcome and Industry Relevance:

- Developed a scalable, offline AR educational app with real-time object recognition.
- High user engagement achieved through intuitive design and multilingual support.
- The project holds strong relevance for the EdTech sector, rural education programs, and interactive museum installations, offering a scalable and accessible learning solution.
- It aligns with the objectives of NEP 2020 by fostering experiential, technology-driven education across diverse learning environments.

Working Model vs. Simulation/Study:

The project involved the development of a functional Android application created using Unity Engine, Vuforia, and C#. It is a marker-based Augmented Reality (AR) educational application that enables interactive 3D content visualization. The project is a working model and not a theoretical study or simulation, demonstrating practical implementation of XR concepts such as multiple target tracking, virtual buttons, and AR audio playback, aligned with current EdTech and experiential learning trends.

Project Outcomes & Learnings

- Hands-on experience in Unity development, Vuforia integration, and mobile AR optimization.

- Gained insights into iterative testing, user-centric design, and scalable educational tech development.

Future Scope:

The future scope of this project includes:

- Expand subjects (math, culture, environment).
- Add voice commands, cloud-based progress tracking, and iOS/AR headset compatibility.
- Explore industrial collaboration for scaling and commercialization.