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Supermarket and Tourism Using Extended Reality Technology

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Abstract— **Supermarket and Tourism Using Extended Reality Technology (STUERT) is an Extended reality application for Android users which can be used by all walks of life (differently abled, elderly, normal) where the user can glance at a wide range of multimedia information about different products, tourist places before buying or visiting and alsoused for navigation and text translation. In this paper, we introduce an Augmented Reality app that is used to identify the real world entities like tourist attractions, currency notes and augment them with digital multimedia information. Virtual Reality enables the users to visualize tourist attractions without being physically present at the place with the use of stereoscopic videos. For visually impaired/elderly users, the app will be audio-based. For hearing impaired and mute users, the User Interface will be text, images, 3D objects and videos with subtitle based. The app can open up to a new marketing strategy enabling companies to invest in it. On the whole this app urges the humankind to explore, learn and educate as it acts to be a local guide irrespective of a native or a foreign place.**

Keywords: ***Extended reality, Android, Augmented Reality, Virtual Reality, stereoscopic video, digital multimedia, visually impaired, elderly users, navigation, text translation, audio-based, 3D objects.***

I. INTRODUCTION

Extended Reality is a superset of Augmented Reality, Virtual Reality and Mixed Reality. It encapsulates all the real and virtual world environments into one. Augmented Reality is a technique used to overlay 2D or 3D virtual objects generated by a computer device on a real world environment using a camera. The virtual object created by computer may be comes in two or three dimensional object. Augmented reality works by analyze the real objects which capture by camera as an input and then create additional virtual objects combined with the real objects and shown as an output [1].Virtual Reality creates a 3D immersive environment in which user is simulated with a virtual environment. It takes the image being captured by the phone camera as the input and compares with the already stored image targets in the database. Virtual Reality immersion is the state of being physically present in a non-physical world.

II. LITERATURE SURVEY

Real-time tracking to cultural heritage can be performed using either computer vision techniques or sensors technologies (i.e. GPS and gyroscopes).A prototype system is used to explore how AR and mobile computing might together make possible wearable computer systems that can support users in their everyday interactions with the world. In 2002, and indoor VR applications a unified interface was designed to support outdoor mobile AR applications and the AR solution incorporated 3D interaction techniques, modelling techniques, tracked input gloves and a menu control system, to build VR/AR applications that can be applied to construct complex models of objects in both indoor and outdoor environments[1].

Tourism activities can also be influenced by mobile Augmented Reality (AR) applications with two functional concepts: (a) vision-based; and (b) location-based. In the vision-based concept, the prevalent applications such as AR for tourist guide, is able to display cityscapes and site[4].

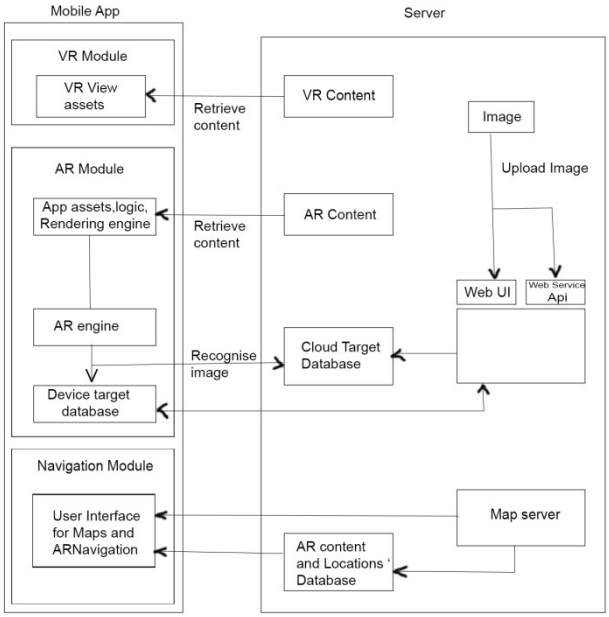
Information system (AR recommended GIS) to support tourists' excursion behavior by making the accumulating, sharing, and recommending of information concerning urban tourist spots possible. In order to support tourists' excursion behaviors by integrating SNS, Twitter, Web-GIS, recommendation system, and Smart Eyeglass, in addition to making the accumulating, sharing, and recommending of information regarding urban tourist spots possible, the AR recommended GIS was designed and developed[2].

Users in urban areas or tourism destinations to locate places of interest near them by moving the camera of the device in all

possible directions to overlay information of places around them. Places captured by the camera are located by adding bins displaying the place name as defined by Foursquare.com database[5].

Simulated course for tour guides is designed to train the students with a vast knowledge of the tourism places and good communication skills before they take the post. It is particularly provided for senior students and lasts for almost one academic term.[6].

III. ARCHITECTURE



Vuforia Software Development Kit(SDK) is used for creating Augmented Reality applications. Vuforia implements edge detection algorithm and uses computer vision to detect the objects in the real world. Developers are enabled with image registration capability to orient and position virtual 2D or 3D objects which interact with the real world image targets. Vuforia supports a variety of 2D and 3D targets, along with markerless targets and 3D multi-target configurations. Vuforia provides various Application Programming Interfaces(APIs) in C++, Java,etc. Developers can create applications compatible to a wide range of mobile devices including the iPhone, iPad, and Android phones and tablets running Android OS version 2.2 or greater.

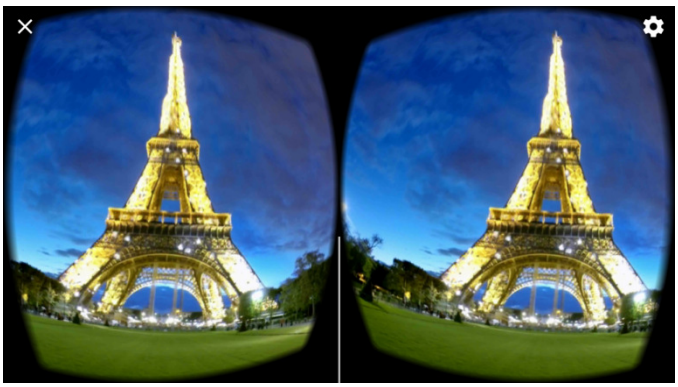
Google VR SDK is used for creating virtual reality experiences for devices like google cardboard,htc vive, oculus and other VR devices. By using GVR, the stereoscopic images or videos can be shown to the user to emulate virtual experience. GVR takes an input such as 360 degree image or a video and is overlaid on to a sphere container to provide a 360 view of the image/video to the user.The input image and video can be taken form 360 degree cameras. The input to the GVR can be locally saved or can be retrieved from servers.

Mapbox is a location data platform for mobile and web applications to provide building blocks to add location features like maps, search and navigation with an Augmented experience to the users. It provides online customized maps to different users. The data for Mapbox is taken from the open sources like OpenStreetMap and NASA and from proprietary data sources, such as DigitalGlobe.

IV. PROPOSED WORK

A. *Virtual visit*

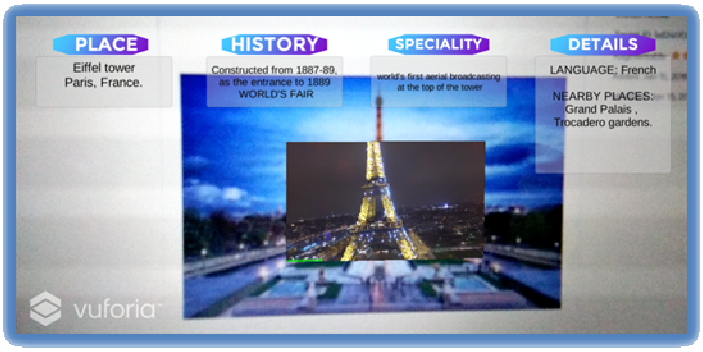
Virtual visits are stereoscopic video recordings where the control is like a panaromic shot in which a view in every direction is shot at the same time. Stereoscopic videos create an immersive videos which include the depth of simulation to the user. These videos are viewed using VR headsets. It helps the users to tour virtually to different places.



B. *Tourist place augmentation*

Vision-based place recognition involves the task of accurately and efficiently recognize the tourist place by comparing with the given query image.For any tourist place in an image, interesting points on the tourist place can be extracted to provide a "feature description" of the place.To perform reliable recognition, it is important that the features

extracted from the training place be detectable even under changes in image scale, noise and illumination. Such points usually lie on high-contrast regions of the tourist place, such as building or monument edges.



C. *Currency detection and manipulation*

Tourists find difficult for recognition of foreign currency and its actual value. Enabling them with the information of currency and its value helps them to spend it correctly for the right purpose. This is implemented using the marker based AR which involves a database set of different currencies from various currencies and the information to be manipulated after detection or recognition. The database set during uploading sets markers for the colour, contrast and size of a bank note. These markers help to detect the test currency being shown using the application. The original markers are compared with the present test currency bank note, if there is a match then the necessary action is taken for displaying output.

D. *Language translation*

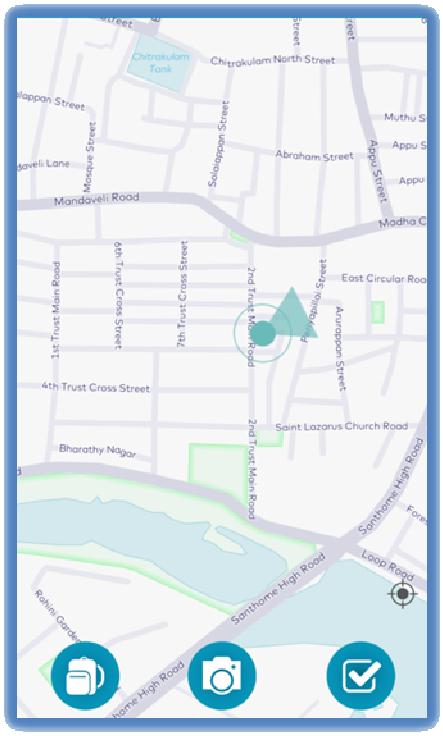
Translators are crucial in the tourism sector. Accuracy and spped of translation are much needed during a tour. The most common and widely used language is English. Almost allmenus at restaurants and cafes in countries around the world can be translated. A perfect combination of both vacation and study helps people to learn and educate themselves in a more entertaining approach.

E.*Shopping*

In this module Augmented Reality technology is used to identify the products anddisplay their relevant information and advertisement by the integration of digital information withthe user's environment in real time. Buying what we need is always a troublesome task with a widerange of products available and it's a struggle for elderly and differently abled people (who arevisually impaired or hearing impaired and mute). But this technique enables everyone to chooseand buy products in a new and easier way by using their Smartphones. A single application withdifferent User Interfaces depending upon the type of user. That could be chosen at the opening ofthe application. For normal users, the module will consist of images, 3d objects, text, audio andvideo-based. For visually impaired/elderly users, the module will be audio-based. For hearing impairedand mute users, the User Interface will be text, images, 3d objects and videos with subtitle based. This technique also can be used in marketing of supermarket and their products by advertising withposters which come alive and allowing to test products using Augmented Reality.

F. *Navigation*

Augmented Reality in GPS navigation technology allows a virtual overlay to live cameras in real time. Users can follow an augmented GPS navigating system than an animated system being currently used. Incorporation of AR into navigation is not only intuitive but also safer than the traditional navigation applications. As the real world camera is being used for navigation there is a possibility of decrease in the number of collisions on the road.



V. CONCLUSION AND FUTURE WORK

The database updating access can be given to everyone which involves stages of verification for updating it. Illegal or inappropriate content can be filtered by the inclusion of Google Cloud Vision. There can be the incorporation of Microsoft Azure content moderator API too.

For making the application as a voice controlled one, IBM Watson can be implemented with it. By making so, the application can be speech recognizable and there is an ease of usage by all walks of life.

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