Smart Location Awareness System for Historical Places in Smart City

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Abstract— A project AR based cultural heritage app guide, was described to provide cultural-heritage sites with archaeological information to visitors without any help of the guides. An interactive visualization system based AR technologies was developed to experience cultural tourism including historical tourism on mobile devices because it is very easy and affordable to any person. One design, Augmented Historical place, with information sharing and filtering was proposed for tourist guide based on AR technology. The design of AR interfaces was approached for guided tours (visiting cultural heritage places) using android devices. An accessible and collaborative platform was provided for tourist guide based on AR technology and mobile devices so that there is no need of extra helping hands to describe the beauty and history of that place. AR technologies were used to enhance the tourist's knowledge exploration experience, exhibitions, mobile multimedia museum guide and viewing in the museum with the help of interactive audio and videos.

Key words: AR, Archaeological, Augmented

I. INTRODUCTION

The term Augmented Reality (AR) is defined as a live direct or indirect view of a physical, real-world environment whose elements are augmented by computer generated sensory input as a sound, video, graphics or GPS data. "Augmenting" reality is meaningless in itself because reality cannot be increased, but its perceptions can be.

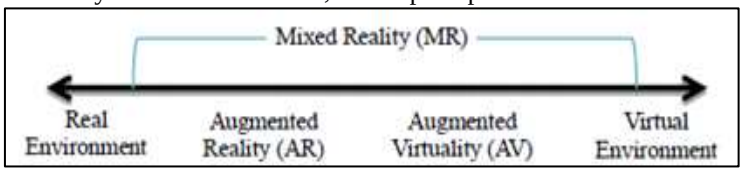

Fig. 1: Milgram's Reality-Virtuality Continuum (adapted from [5])

There are five features of AR systems:

1) Changeability: vital information about the real world can be changed according to its event.
2) Synchronicity and instant: during the changes of the real-world content, the augmented reality must be updated synchronously and instantaneously.
3) Antecedent: the real world content in the augmented reality system is happening before the virtual counterpart.
4) Partial one to one: there is only one and only one real world content to correspond to the virtual content with the augmented reality.
5) Hidden Reality: in the augmented reality, generating the virtual information can result in the obstruction of real world information.

Devices such as smart phones and the iPad are other ways that uses augmented reality. These devices contain software, sensors, a compass and small digital projectors which display images onto real world objects.

Fig. 2: Contrary to traditional map displays (left), AR 2.0 will augment navigation information on top of the images captured by mobile phones (right). Users will also be able to create and update 3D registered content, creating a location-based social network.

In this paper, we describe the Augmented Reality 2.0 concept and present existing work on mobile Augmented Reality and web technologies that could be used to create Augmented Reality 2.0 applications [1]. It introduces technologies that enable an augmented reality experience, and also clarifies the boundaries that exist between AR and Virtual Reality, and focus on the contributions of mobile technology in AR [2]. We also present a hardware and software platform that we have developed which meets these needs, and a demonstration prototype application created using the platform [7]. In the remainder of this paper, we

first review earlier related work, and describe the lessons learned from this which our research builds on. Then we discuss the hardware and software platform, we developed, and fi- Nally present the Smart Location Awareness Sytem for Historical Places.

II. LITERATURE SURVEY

Developing a framework that can be used in many different scenarios as location based AR and marker based AR. The test application is developed in eclipse and android studio software.

- Step detection & Indoor mapping AR.
- Location based AR & Crowdsourcing Framework used by open source technologies available.

This program initial creation of the prototype of an augmented reality development tool is continuously improving and new features are added by us. The created development framework enables programmers to integrate augmented reality in their own applications by which other Future applications for historical sites can also be developed easily. Open Source technology is used here that is only used for educational purposes (As it is a non-commercial educational use we can use it). We are developing framework using different open source technology that will evolve into AR of our college and historical site as an educational information system [1, 2].

Fig. 3: Adapted schema of a virtuality continuum. Inspire from Milgram et al. [3].

Fig. 4: Showing information through the composite view that is overlapping of camera view and virtual view together known as Augmented Reality (AR).

A. Augmented V's Virtual Reality

The term Augmented Reality (AR) is defined as a live direct or indirect view of a physical, real-world environment whose elements are augmented by computer generated sensory input as a sound, video, graphics or GPS data.

Virtual reality is all about the creation of a virtual world that users can interact with. This virtual world should be designed in such a way that users would find it difficult to tell the difference from what is real and what is not.

1) Purpose

AR enhances experiences by adding virtual components such as digital images, graphics, or sensations as a new layer of interaction with the real world, whereas VR creates its own reality that is completely computer generated and driven.

2) Delivery Method

VR is usually delivered to the user through a head-mounted, or handheld controller. This equipment connects people to the virtual reality, and allows them to control and navigate their actions in an environment meant to simulate the real world. AR is being used more and more on mobile devices such as laptops, smart phones, and tablets,to change how the real world and digital images, graphics intersect and interact.

It is not always VR vs. AR– they do not always operate independently of one another, and in fact they are often blended together to generate an even more immersing experience. Virtual reality and augmented reality are great examples of experiences and interactions fueled by the desire to become immersed in a simulated land for entertainment and play, or to add a new dimension of interaction between digital devices and the real world. Alone or blended together, they are undoubtedly opening up worlds-both real and virtual alike.

3) Pokemon go

Pokémon Go combines the use of AR technology with the GPS and camera functions of various smart devices. Developed by Niantic, a company specializing in augmented reality games, Pokémon Go prompts players to explore the real world in search of characters from the Pokémon franchise. After creating and designing an avatar, players view a main map that overlays real-world geographic details such as streets with in-game items and destinations, called PokéStops and Pokémon gyms. As the player moves in reality, the avatar moves on the AR map.

When a player encounters a Pokémon, he has the option of viewing it in front of a digital background or superimposed over a real-world image in AR mode. In the later case, the game utilizes the device's camera to cause it to appear as if the virtual character exists in the natural world, making the player's attempts at capturing the Pokémon seem all the more realistic.

III. PROPOSED WORK

This application is a consumer based product, aimed at enhancing the user experience. The designed application uses the concepts of augmented reality and Android phone's sensor data to achieve 3-D registration in real time. All information is engrossed on live camera feed. Augmented Reality is more supportive of getting some additional information. This information is then displayed on the Smartphone's screen to get the required response depending on the type of query given. The 3-D representation is more likely appreciated which helps the user to get to a specific place. In Augmented Reality mode, the places are assigned to a tag. Those tags are then shown when a user directs a camera in a specific direction. The sample application projects 3D models of landmarks over markers via a mobile device.

This approach addressed how the creation of a modular system could improve the ability of developers to harness and adapt to augmented reality related software technologies. Our proposed framework provides a means for reducing the cost and time involved in the development of these systems, thereby making them easier to deploy. One of the most useful features the proposed framework is the ability for developers to create software that allows for a user to navigate freely through immersive environments. By providing an interface to dynamic feature mapping implementations we allow augmented reality applications to be created that are independent of a predefined physical environment.

This Historical Place AR application serves the basic purpose of the need to design an Android application in order to make university related information available to the students in an easier and faster way.

The most obvious enhancement is to take many more historical places pictures and load them into the database. Ideally the application would be tested by having the "naïve" users take the android pictures of buildings to see if the database has adequate pictures for building identification in reasonable time. This was a "prototype", in that only a handful of buildings were catalogued into the database. Add a website containing the listing application, and instructions for communicating with the thesis rather about additions to the picture database. Since, the AR is leveraged in the android world, there is a very good scope the enhancements to this application in the future. Below are the few enhancements that would make this application look and feel more efficient. One of the features that needs to be added and will be of great help is the "location based services". So, this helps tourists to go to the historical places by enabling the location identification service within the app. Links to access the historical places websites.

Improvements in the User-Interface by making it more user-friendly. To give the user the opportunity to find more places on city, more data sources (e.g. for the food court and other stores) could be integrated.

Following figures are of the college premises by AR marker.

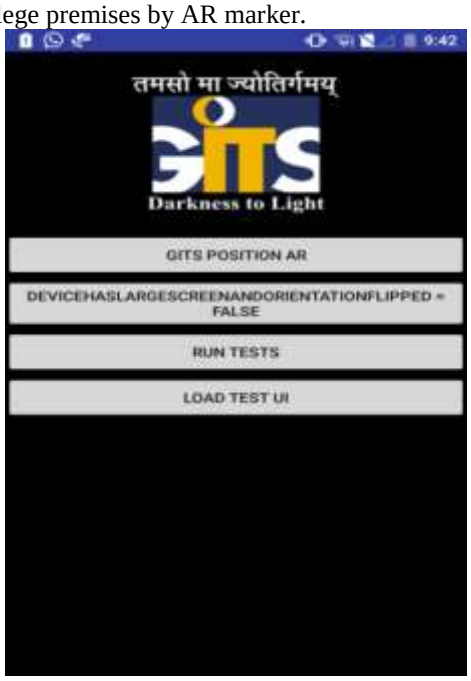

Fig. 5: App based on historical places

Fig. 6: Showing Amphi Theatre of college by AR marker.

Fig. 7: Showing Canteen of college by AR marker.

Fig. 8: Showing Circle of college by AR marker.

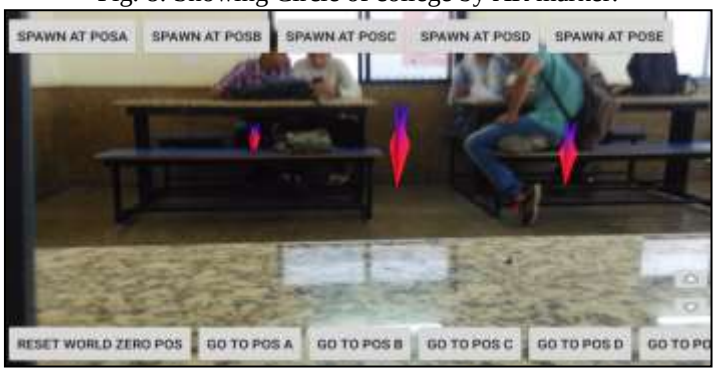

Fig. 9: Showing Mechanical lab,Canteen, Amphi theatre as mention by an arrow in the canteen as per distance.,

IV. CURRENT CHALLENGES

Current challenges that can be faced by the segmented reality are:

- Environment: there are some perceptual matters associated with the environment itself, such matters can cause further problems in the interaction between the environment and the augmentation. Lighting and weather conditions unfortunately. It is indicated that in outside environments, many of the features existing like the natural pictures are not connected to real physical features due to the bad weather.

- Display device: Camera quality and handling in the light of bad lighting conditions, the imaging of camera sensors that are being widespread in devices become poor. Pictures can be fuzzy and colors begin to undergo significant aberration. Color fidelity in outside environments is an extremely difficult issue.
- Users: There are also some user concerns which could be a challenge for AUGMENTING REALITY. The Location of the users is considered a central element of any AR system.

V. CONCLUSION

It can be concluded that there is a significant amount of demand for an integrated approach, and that such an approach is found advantageous.

Indoor location tracking in the current version of the application is not very accurate. With more exact information about the location of the access points and a direct access to the database that stores the Wi-Fi infrastructure details, a more accurate indoor position could be estimated. The current plan of increasing the access point density on historical places would enhance the accuracy even further.

Another huge benefit for the application would be to refine the network dataset for the historical places.

New features to help users on campus could be added to this application. For example, people could get access to helpful information on what is the history behind these historical places. Tourists could access information about their story behind these historical places.

The technology used in smart phones is relatively new and makes great steps forward every year. A long term perspective, based on more accurate location sensors, could offer users better interaction with their environment in the augmented reality view.

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