UAE 4D Business Directory

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***Abstract*— In this paper, we propose a new system for a business directory (yellow pages) for UAE. We call the new system UAE 4D explorer. The explorer gives directions to any listed business using a 3D virtual reality map of the UAE. The user can also view/visit virtual reality maps of the UAE in the past and the future. This is what is meant by 4D, i.e. the fourth dimension is time. The two main contributions of the system are: 1) 3D virtual reality directions to a business or landmark in the UAE, 2) Virtual reality tours of UAE tourist landmarks or businesses in the past, the present and the future if available. This system will make visiting UAE 4D explorer web site an amazing experience. It will put the UAE at the forefront of Technology and Tourism sectors. It is a unique system that has never been build before and UAE will be the first in the world to have such an advanced and innovative system.**

Fig. 1. Web site of UAE Yellow pages by Etisalat company

I. Introduction

Etisalat maintains a business directory for the UAE known as yellow pages [1]. Currently you can search for a business coordinates in these yellow page. But in order to find directions to the business location one needs to search manually in a 2D maps, such as the detailed digital Satellite maps presented by the Geographic Information System (GIS) Center [2].

Online maps that automatically find driving directions already exist; for example map.yahoo.com, www.mapquest.com and maps.google.com. Google maps has recently introduced 3D maps of some landmarks in their Google Earth product [3]. Other navigation systems that give advanced driving directions are also commonly found in high-end cars such as BMW, Cadillac and others.

In this paper, we propose a new improved business directory for the UAE, that will combine Etisalat yellow pages with a 3D mapping system. Our system also provides driving directions to the given business location in virtual reality using 3D maps, which provides a superior experience to 2D driving directions provided by other online maps. The driving direction given in virtual reality will also help reduce traffic accidents on UAE roads. Tourists and new comers to the UAE will find this innovative online map very useful.

This system can be applied to the tourism industry. People around the world will be able to visit UAE in virtual reality. They will be able to have a virtual visit to tourist destinations of UAE such as museums, forts, souqs, the Palms [4], the world [4], Hydropolis [5], and others. Not only that, but the users can also view these landmarks of the UAE at some point in the past. They can also have a peak at the future of the UAE according to the planned new construction projects. This is what is meant by the fourth dimension (4D). The system can also be expanded to include online shopping for various products and services.

II. System description

This system is a combination of Etisalat Yellow pages [1] and Google earth 3D maps [3]. A user searches the directory pages for a particular business. When he finds that business he will be able to follow a hyper link and visit it in virtual reality. He will be able to see where exactly the business is located and he will be able to quickly find road directions. The system will start with a home page that can be just like Etisalat yellow pages as seen in Figure 1.

When a user finds the business he is looking for he can click on a button and the system will show its location on a satellite map such as the one developed by Google Maps [3], or UAE Geographic Information Systems(GIS) Center [2]. For example, suppose you make a search for AUD on the etisalat yellow pages. The resulting page will look like the on in Figure 2 and Figure 3

For the proposed system, the link ”map it” will take us to the 3D map with the location clearly highlighted as shown in Figure 4. The system will also show the user driving direction to the location in virtual reality, where he can see real views

Fig. 2. A Search on Etisalat Yellow Pages using AUD as an example.

Fig. 3. A Search result page from Etisalat Yellow Pages using AUD as an example.

of the road and landmarks around it as illustrated in Figure 5. This will add a significant value to business directory. Currently, the UAE business directory does not have any mapping features. People resort to looking the address in a 2D map which is usually very hard to find, especially for visitors and new comers. Even if the user finds the exact location on the map, it is usually difficult to find the correct driving rout to the location. Our system will allow the user to drive to the wanted location in virtual reality. Thus he will know the correct way to get to the location before going on the road and lose time and money looking for the place. This will also help reduce accidents on UAE roads, since people will focus on driving instead of looking at signs and landmarks.

3D maps have been already developed by Google earth [3]. However, unlike Google Earth, in our system you can also go inside the buildings and view the location of interest from inside, given the owner of the location has subscribed to this service. For example, the prototype we have built, allows you visit part of the American University in Dubai (AUD) building from the inside as shown in Figure 6. This feature will be mostly suitable for tourism landmarks, however, some governmental or private organizations may choose to participate in this service.

Furthermore, we also propose to add 3D views from the past and in the future for tourism landmarks. This is what is meant by 4D, in other words, the fourth dimension is time.

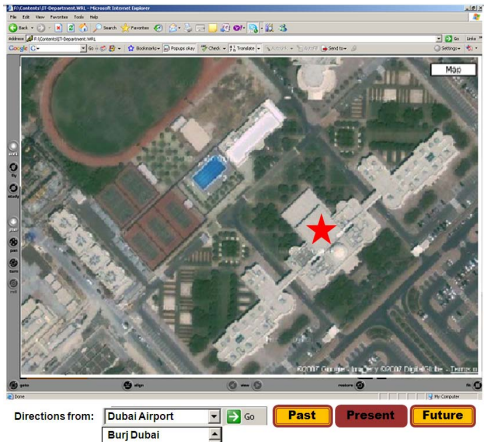

Fig. 4. Satelite map of AUD location.

Fig. 5. The new system will give virtual reality driving direction to a given location

Imagine visiting great tourist landmarks in UAE in virtual reality and being able to see it at some point in the past and also for many projects under construction how it will look like in the future. These virtual reality shows of future projects are already widely used by the construction industry for promotional purposes. We will just add these VR shows to our platform at the point in time when it is scheduled to be complete.

Many other features can be added to the system such as a virtual Tourist guide, and virtual friends. Users will be able to create virtual personas for themselves and interact with other users from all over the world who are using the system to meet and chat with them. The system can also be expanded to include online shopping for various products and services.

It is for these major benefits that we believe this system will be successful. The revenue for the system will come mainly from subscription fees paid by organization listed in the directory and also by tourism promotion programs, and finally advertisements.

III. PROTOTYPE

We have implemented a simple prototype for the 3D system mapping system using 3D Studio Max [6] and Virtual Reality Modeling Language(VRML) [7], [8]. The prototype represents

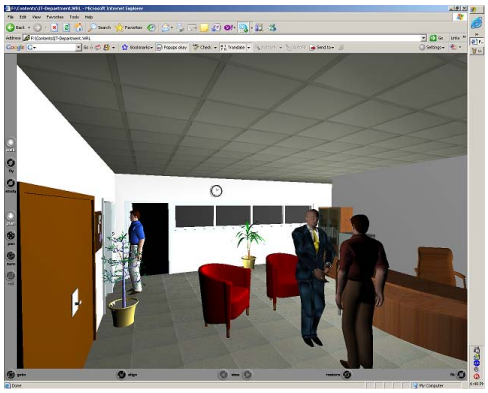

Fig. 6. Snapshot from the virtual reality show of one of the AUD buildings.

a virtual reality show about the university.

A. Graphics for the virtual reality

Since the system will be accessed online, polygon count and loading speed are two factors that need to a minimum to make it successful. To power the graphics engine, we have used the VRML, which is a standard file format for representing 3-dimensional (3D) interactive vector graphics, designed particularly for the World Wide Web.

In the prototype that we have implemented, 3D graphics are produced by 3D studio Max. But other graphics modeling packages such as Alias Maya [6] and Maxon Cinema 4D [9] can be used. The graphics can be optimized for the web using techniques mentioned below.

1) Texture Baking: Using the graphics modeling tools above, we build high resolution version of the scene with all desired textures and lighting effects. Then we bake these models into one skin fils. The skin file can be applied to lower resolutions version of the same model; resulting in a good quality product at a fraction of the polygon count [10].

2) Culling System: A culling system only renders the parts of the a scene level that are not covered by other objects. Common Culling systems are the Binary Space Partitioning (BSP) tree [11] or portal [12] based. The BSP tree system is the fastest and most effective, especially for indoor levels, where the indoor rendering speed is independent of the level size and number of objects. This allows the graphics to run with faster frame rates [13]. It has the disadvantage that the BSP tree must be precalculated by the level editor. Most commercial 3D engines [13] use BSP tree based culling system.

3) Levels of Detail(LOD): A LOD system increases the frame rate in outdoor levels. It automatically switches to 'switch' shapes of objects when they are far away from the camera, thus reducing the overall number of polygons drawn per frame [13].

This way we will guarantee the high quality 3D graphic that is needed to make the virtual tour as efficient and fun as possible.

IV. Conclusion

We have proposed an innovative system called UAE 4D explorer which provides an online business directory and virtual reality tours for the UAE. The two main contributions of the system are: 1) 3D virtual reality directions to a business or landmark in the UAE, 2) Virtual reality tours of UAE businesses or tourist landmarks in the past, the present and the future if available.

For the future work, we plan to continue to develop the prototype to include more 3D models of landmarks in the UAE. We should also use the new standard for virtual reality modeling known as X3D. Furthermore, we need to research and develop the navigation subsystem of the digital maps.

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