

Augmented Reality: Implementation in Technological Institute

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Abstract— Augmented Reality (AR) is one of the newest innovations in the electronics industry. Augmented Reality (AR) is an emerging form of experience in which the Real World (RW) is enhanced by computer-generated content tied to specific locations and/or activities. Over the last several years, AR applications have become portable and widely available on mobile devices. Augmented reality systems superimpose graphics for every perspective and adjust to every movement of the user's head and eyes. Augmented reality is the merging of synthetic sensory information into a user's perception of a real environment. Augmented reality is implemented using ARToolKit in many applications like medical, manufacturing, Robot path planning, Entertainment, annotation and visualization, education institutes and many which require heavy Head Mounted Devices along with graphics kit. So, in this paper, AR is implemented using image processing in MATLAB which even reduces hardware and easily can be used in technological institutes as MATLAB is available. This proposed method is very effective to implement AR in technological institutes i.e. in college to show campus as well as in teaching and learning activities where virtual objects can make students to learn interactively as they provide the information which we cannot detect with our own senses .

Keywords— Augmented Reality (AR), ARToolKit , Head Mounted Devices, MATLAB, superimpose graphics, synthetic sensory , virtual objects

1. INTRODUCTION

Augmented reality (AR) is an emerging form of experience in which the real world (RW) is enhanced by computer-generated content which is tied to specific locations and/or activities. In simple terms, AR allows digital content to be seamlessly overlaid and mixed into our perceptions of the real world. In addition to the 2D and 3D objects which many may expect, digital assets such as audio and video files, textual information, and even olfactory or tactile information can be incorporated into users' perceptions of the real world. Collectively, these augmentations can serve to aid and enhance individuals' knowledge and understanding of what is going on around them. Rather than seeming out of place, the digital markups inherent in AR lets users perceive the real world, along with 'added' data, as a single, seamless environment the virtual and real objects coexisted in the same space.

While we can easily imagine applications for AR in many fields, perhaps most exciting are the possibilities inherent for education. With AR, educators' dream of ubiquitous learning can become a reality. As never before, through AR, learners will be able to gain immediate access to a wide range of location-specific information, compiled and provided by a variety of sources. With that in mind, this paper offers an overview of AR, examines recent AR developments, explores the impact of AR on learning and education

The combination of virtual and real world in AR is accomplished through Head-Mounted Device (HMD) and trackers. A typical AR system consists of a HMD equipped

with one or two cameras. When a user looks around, certain features in the video images captured by the camera are detected to track the camera's position and orientation relative to the objects in the real world. The graphic images generated with this information are rendered on the HMD. A typical wearable computer may be composed of a computer processor and a battery mounted on a belt or backpack, a head mounted display (HMD), wireless communications hardware and an input device such as a touchpad or chording keyboard or voice input capabilities. A wearable computer enables mobility and promises exciting applications with augmented reality .A prominent example is Columbia's "Touring Machine", which assists a user in locating places and allowing a user to query information about items of interest, like campus buildings and library. Augmented Reality can be implemented by using ARToolKit and MATLAB.

Besides adding objects to a real environment, Augmented Reality also has the potential to remove them. Current work has focused on adding virtual objects to a real environment. However, graphic overlays might also be used to remove or hide parts of the real environment from a user. For example, to remove a desk in the real environment, draw a representation of the real walls and floors behind the desk and "paint" that over the real desk, effectively removing it from the user's sight. This has been done in feature films. Doing this interactively in an AR system will be much harder, but this removal may not need to be photorealistic to be effective.

2. APPLICATIONS OF AR

2.1 Annotation and Visualisation

AR could be used to annotate objects and environments with public or private information. Applications using public information assume the availability of public databases to draw upon. For example, a hand-held display could provide information about the contents of library shelves as the user walks around the library. At the European Computer-Industry Research Centre (ECRC), a user can point at parts of an engine model and the AR system displays the name of the part that is being pointed at. Fig.1 shows this, where the user points at the exhaust manifold on an engine model and the label "exhaust manifold" appears.



Fig.1: Engine model part labels appear as user points at them.

Alternately, these annotations might be private notes attached to specific objects. Researchers at Columbia demonstrated this with the notion of attaching windows from a standard user interface onto specific locations in the world, or attached to specific objects as reminders. Fig.2 shows a window superimposed as a label upon a student. He wears a tracking device, so the computer knows his location. As the student moves around, the label follows his location, providing the AR user with a reminder of what he needs to talk to the student about.



Fig. 2: Windows displayed on top of specific real-world objects.

AR might aid general visualization tasks as well. An architect with a see through HMD might be able to look out a window and see how a proposed new skyscraper would change her view. If a database containing information about a building's structure was available, AR might give architects "X-ray vision" inside a building, showing where the pipes, electric lines, and structural supports are inside the walls. Researchers at the University of Toronto have built a system called Augmented Reality through Graphic Overlays on Stereo video (ARGOS), which among other things is used to make images easier to understand during difficult viewing conditions.

2.2 Advertising and Marketing

In no other field has the AR excitement exploded in such a huge way than in advertising and marketing. Companies seeking new ways to engage and interest potential customers have implemented a variety of AR applications which present users with virtual objects, apparently sharing their space, which can be explored and manipulated using natural movements and hand-gestures. For example, cutting-edge automotive campaigns are displaying full-size AR virtual cars in shopping centers and other public areas. A markerless interface allows pedestrians, who do not need AR gloves or other controllers, to use their real-time spatial output (movements) to toggle virtual buttons, open doors, fold seats, and rotate virtual model vehicles.

Smaller products, such as toys, can now be viewed virtually in stores and kiosks worldwide, sometimes with integrated 3D animations. Somewhat more sophisticated campaigns allow users to use their smartphones to view, rotate, and resize virtual models of products, such as furniture, anywhere in their environment, so that they can gain a more accurate impression of how the item would complement their current furnishings and decorating scheme.

Other AR applications can be conceptualized as 'marking-up people', by adding virtual clothing or apparel items which they seem to 'wear'. Prominent examples of this can be seen in the kiosks, 'virtual dressing rooms' and 'virtual mirrors' of companies selling designer accessories such as sun-glasses or watches. These applications are being

utilized by corporations to enrich customer shopping experiences, both in real-world and in online retail venues. Shoppers are able to share their choices, or 'likes' through social media, and are often able to make their final purchase through the AR interface.

In a third category of AR marketing applications, real-world objects are 'marked-up' with superimposed, but conceptually unrelated 3D artifacts. Utilizing this strategy, a one company has created a series of AR games in which consumers use actual shoes, in conjunction with a computer and a webcam, to play AR games whose environments seem to pop out of the shoes themselves. Fast-Food and Media companies have utilized AR technology to cause popular 3D characters to spring out of soft-drink cups, and other packaging in fast-food franchises. A similar application of technology is being used for a more utilitarian purpose by the U.S. Postal Service, which allows users to view holographic boxes, projected from any sheet of paper with the appropriate QR Code. This allows customers to compare the size of the items they wish to ship to the size of the virtual box visible on their screen.

3. APPLICATION IN TECHNOLOGICAL INSTITUTE.

The exciting developments and the manifest functionality of AR as an improved user interface technology, researchers believe that AR has vast potential implications and numerous benefits for the augmentation of teaching and learning environments. AR has potential to:

- (a) engage, stimulate, and motivate students to explore class materials from different angles.
- (b) help teach subjects where students could not feasibly gain real-world first-hand experience
- (c) enhance collaboration between students and instructors and among students.
- (d) foster student creativity and imagination.
- (e) help students take control of their learning at their own pace and on their own path.
- (f) create an authentic learning environment suitable to various learning styles

In this paper, Augmented Reality implementation is done by using MATLAB which is replacement of ARTool kit and HMDs to show college campus and to use AR in teaching and learning process. When new students join college or when some guest arrive to college using this technology campus can be viewed. For this, virtual campus is augmented around real person who is visiting the college and all departments of college will come around him and he/she can see campus at standstill position.

4.RESULT

The following fig.3 shows an example of collected database which include captured images of background and CRO which are test objects taken for experimentation purpose.



Fig.3: An example of collected database

The results are obtained by using MATLAB to implement the augmented reality for the data base mentioned above. Fig.4 shows the obtained results which includes both virtual (database as mentioned above) and real images.



Fig.4: Augmented reality

5 CONCLUSION

Although AR is not new, it is still in infancy, especially regarding its educational applications. There are still many problems to overcome and issues to explore in order to optimize existing AR applications and technologies for use in education. Currently, though it is new and captivating, AR content is still quite difficult to create and deploy. However, easier-to-use development kits are the goal of many firms investing in AR, so these problems should ease with time. For the present, educators and researchers should continue to keep up with the development of AR technology, closely monitor the impact of AR on society, consciously evaluate the implications of AR for education, and continuously explore, seeking to determine how AR can best be applied to expand our teaching and learning environments.

When researching the Augmented Reality it was found that there is a lot potential existing. The biggest challenge is to replace AR toolkit which is having high cost. While algorithms are evolving towards more complexity and the hardware is creating problems as for size and implementation. MATLAB is one of the alternate for AR Tool kit which will overcome for all the problems.

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