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Augmented Reality

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ABSTRACT

Augmented Reality is a type of reality that aims to duplicate the world's environment in a computer. It generates a composite view for the user that is the combination of the real scene viewed by the user and a virtual scene generated by the computer that augments the scene with additional information. Virtual reality replaces the real world with simulated one. Augmented Reality is changing the way we view the world. AR systems currently developed use only locational information to generate images. This is because the research focus of AR is currently on implementing correct registration of 3D images on a real scene. However, by incorporating other external factors such as real world Ids, the usefulness of AR could be much more improved. The main advantages of AR include Live Implications, Military and video game applications.AR also improves the interactions. It is mainly used in engineering design, Manufacturing and other industries, Entertainment.

INTRODUCTION

Augmented Reality is a type of reality that aims to duplicate the world's environment in a computer. It generates a composite view for the user that is the combination of the real scene viewed by the user and a virtual scene generated by the computer that augments the scene with additional information. AR is not the same as "virtual reality". . It is related to a more general concept called mediated reality , in which a view of reality is modified (possibly even diminished rather than augmented) by a computer.

HARDWARE COMPONENTS USED

Hardware components for augmented reality are: processor, display, sensors and input devices. Mobile devices contain these elements which often include a camera and sensors, making them suitable AR platforms. A HMD is a display device paired to a headset such as a harness or helmet. HMDs place images of both the physical world and virtual objects over the user's field of view.

AR displays can be rendered on devices resembling eyeglasses. Versions include eyewear that employ cameras to intercept the real world view and re-display its augmented view through the eye pieces and devices in which the AR imagery is projected through or reflected off the surfaces of the eyewear lens pieces.

In modern day, the augmented reality uses contact lens,virtual retinal display and other eye tap devices as a medium for the use of augmented reality.in that the eye tap is a device that catches the ray of light that

would pass through the senter of the eye of the wearer.

An alternate approach to AR is to project the desired virtual information directly on those objects in the physical world that are to be augmented. In the simplest case, the augmentations are intended to be coplanar with the surface on which they are projected and can be projected monoscopically from a room-mounted projector, with no need for special eyewear. Examples include a projection of optical paths taken through simulated elements on a virtual optical bench, and an application where a remote user controls a laser pointer worn by another user to point out objects of interest.

Another approach for projective AR relies on head-worn projectors, whose images are projected along the viewers line of sight at objects in the world. Multiple users can see different images on the same target projected by their own head-worn systems, since the projected images cannot be seen except along the line of projection. By using relatively low output projectors, non-retroreflective real objects can obscure virtual objects.

A key measure of AR systems is how realistically they integrate augmentations with the real world. The software must derive real world coordinates, independent from the camera, from camera images. That process is called image registration which uses different methods of computer vision, Many computer vision methods of augmented reality are inherited from visual odometry. Usually those methods consist of two parts.

While these are strong advantages, the use of projectors poses a challenge for the design of lightweight systems and optics. One interesting application of projection systems is in Mediated Reality. Coating a haptic input device with retroreflective material and projecting a model of the scene without the device camouflages the device by making it appear semi-transparent. some recent AR systems have demonstrated robust and compelling registration in prepared, indoor environments, much remains to be done in tracking and calibration. Ongoing research includes sensing the entire environment, operating in unprepared environments, minimizing latency, and reducing calibration requirements.

Augmented reality vs virtual reality

The main difference is that Virtual reality immerses the viewer into computer-generated environments. The user wears required equipment which completely obstructs the visual view of physical objects in the real world.but the augmented reality immerses the real world collaborating with the virtual generated environment i.e the augmented reality is just opposite to the virtua reality. We can also say that Augmented reality "augments" or adds graphics, audio, and other sensory enhancements to the natural world as it exists. User is not required to wear any equipment.

Applications

In modern day world the augmented reality is used in wide variety of areas like in education,industry,art,entertainment,

medicinal fields etc,the brief description about the use of augmneted reality in different fields

Archaeology

AR can be used to aid archaeological research, by augmenting archaeological

features onto the modern landscape, enabling archaeologists to formulate conclusions about site placement and configuration.

Another application given to AR in this field is the possibility for users to rebuild ruins, buildings, landscapes or even ancient characters as they formerly existed.

Handheld devices

A handheld display employs a small computing device with a display that fits into a user's hand.

It uses global positioning systems (or GPS) to connect the data with the viewer's location.

Smartphones with phone apps are the most commonly used handheld devices.

Advertising applications

Advertising Applications promote products and places via interactive AR applications, such as city buildings, Nissan car specifications, Best Buy circular with AR code, or Disney outdoor advertising.

The first example is Disney's outdoor advertising.As you walk near one of the 'Prince of Persia' outdoor posters and open the layer, the beautiful movie-character Tamina speaks to you and explains that you should watch the movie trailer and enter the augmented reality game to answer 3 questions. If you answer all questions correctly, you earn 50 Movie Minutes.

The other example is a city sites tour available in most major metropolitan areas.

Architecture

AR can aid in visualizing building projects. Computer-generated images of a structure can be superimposed into a real life local view of a property before the physical building is constructed there. AR can also be employed within an architect's work space, rendering into their view animated 3D visualizations of their 2D drawings. Architecture sight-seeing can be enhanced with AR applications allowing users viewing a building's exterior to virtually see through its walls, viewing its interior objects and layout.

Educational applications

The augmented reality has wide application in the educaion field it is widely applied in the mechanical and designing or engineering fields.Teach critical thinking, science, and social studies through AR gaming. AR gaming can be used to teach critical thinking, archaeology, history, or geography by using a game board that becomes a 3D setting when viewed through a mobile device or webcam.

Navigation

AR can augment the effectiveness of navigation devices. Information can be displayed on an automobile's windshield indicating destination directions and meter, weather, terrain, road conditions and traffic information as well as alerts to potential hazards in their path.Aboard maritime vessels, AR can allow bridge watch-standers to continuously monitor important information such as a ship's heading and speed while moving throughout the bridge or performing other tasks

Marketing Applications

Marketing Applications assist consumers on location when shopping and dining by providing ratings, reviews, menus, and other types of information.

DRAWBACKS

AR does have its drawback.When it comes to accuracy, currently the margin of error is large.

For example, it is 10 meters on today's GPS systems and when you're trying to superimpose an image on another at close range, that is not accurate enough.

With regard to standards, there are no open standards among the current crop of AR browsers. A user must make a judgment call on the platform of choice because data cannot be shared between platforms at this point in time.

Currently AR is limited to SmartPhones because SmartPhone's internal hardware components--GPS, camera, compass, 3D rendering capability, and more.

Conclusion

the augmented reality is the ability to overlay computer graphics onto the real world.

- What can AR do?
  - Combines real and virtual realities to turn an empty space into a very rich educational experience
- How can AR be used in education?
  - Offers seamless interaction between the real and virtual worlds, a tangible interface metaphor, and a means for transitioning between real and virtual worlds to create learning opportunities and knowledge connections