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Principal's Message

Technology is introducing us to new concepts every day. We are all familiar with Virtual Reality where users are immersed in a fully artificial digital environment. The new buzz word today is Augmented Reality involving 3D animated graphics placed overtop what you see in the real world. With applications in Healthcare, Robotics, Education, Military, Industrial design etc. Augmented Reality has the potential to become core to many areas of life.

I am happy that our BCA Department is bringing up this new issue of Bits N Bytes focused on Augmented Reality. Through this electronic platform our students and teachers of Computer Applications can express their views and ideas in this emerging field that could benefit society at large.

I congratulate Asst. Prof Mildred Lemos and all who have contributed to Bits N Bytes.

I hope and wish Bits N Bytes will inspire and ignite many minds.

Rev. Dr. Simão R. Diniz
Principal

Introduction to Augmented Reality

- Asst. Prof. Mildred Lemos

The word "augment" means to increase, extend, or make better. Augmented reality can be understood as a form of virtual reality where the real world is expanded or enhanced through the use of virtual elements, usually overlaying those elements on the view of the real world through the use of a visual device.

The primary value of augmented reality is that it brings components of the digital world into a person's perception of the real world, and does so not as a simple display of data, but through the integration of immersive sensations that are perceived as natural parts of an environment.

Hardware components for augmented reality are: processor, display, sensors and input devices. Various technologies are used in augmented reality rendering, including optical projection systems, monitors, handheld devices, and display systems worn on the human body. A head-mounted display (HMD) is a display device worn on the forehead, 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

employs cameras to intercept the real world view and re-display its augmented view through the eyepieces.

Types of Augmented Reality

Marker-based AR - Also called as image recognition, it requires a special visual object and a camera to scan it. It may be anything, from a printed QR code to special signs. The AR device also calculates the position and orientation of a marker to position the content, in some cases. Thus, a marker initiates digital animations for users to view, and so images in a magazine may turn into 3D models.

Markerless AR - Location-based or position-based augmented reality, that utilizes a GPS, a compass, a gyroscope, and an accelerometer to provide data based on a user's location. This data then determines what AR content you find or get in a certain area. With the availability of smartphones this type of AR typically produces maps and directions, nearby businesses info. Applications include events and information, business ads pop-ups, navigation support.

Projection-based AR - Projecting synthetic light to physical surfaces, and in some cases allows to interact with it. These are the holograms we have all seen in sci-fi movies like Star Wars. It detects user interaction with a projection by its alterations.

How is Augmented reality different from Virtual Reality ?

Augmented reality uses the existing real-world environment and puts virtual information on top of it to enhance the experience. Conversely, virtual reality involves users inhabiting an entirely different environment altogether, notably a virtual one. Users may be immersed in an animated scene or an actual location that has been photographed and embedded in a virtual reality app. Through a virtual reality viewer, users can look up, down or any which way, as if they were physically there.

Virtual reality (VR) immerses users in a fully artificial digital environment.
Augmented reality (AR) overlays virtual objects on the real-world environment.

It is not always virtual reality vs. augmented reality– they do not always operate independently of one another, and in fact are often blended together to generate an even more immersing experience.

The first commercial augmented reality experiences were used largely in the entertainment and gaming businesses, but now other industries are also getting interested about AR's possibilities for example in knowledge sharing, educating, managing the information flood and organizing distant meetings. Augmented reality is also transforming the world of education, where content may be accessed by scanning or viewing an image with a mobile device.

Applications of Augmented Reality

- Asst. Prof. Ramakrishna Reddy

Augmented reality is technology that combines virtual reality with the real world in the form of live video imagery that is digitally enhanced with computer-generated graphics. AR can be experienced through headsets that people wear and through displays on mobile devices.

Augmented reality may complement our everyday activities in various ways. For instance, one of the most popular applications of AR is gaming. New AR games provide much better experiences to players, some even promote a more active outgoing way of life (PokemonGo, Ingress). Gaming grounds are being moved from virtual spheres to real life, and players actually perform certain activities. For instance, a simple gym activity for kids by the Canadian company SAGA, where to crack cubes moving on a wall children hit it with a ball.

Military AR Uses

The Heads-Up Display (HUD) is the typical example of augmented reality when it comes to military applications of the technology. A transparent display is positioned directly in the fighter pilot's view. Data typically displayed to the pilot includes altitude, airspeed and the horizon line in addition to other critical data. The term "heads-up" name applies because the pilot doesn't have to look down at the aircraft's instrumentation to get the data he needs.

The Head-Mounted Display (HMD) is used by ground troops. Critical data such as enemy location can be presented to the soldier within their line of sight. This technology is also used for simulations for training purposes.

Medical AR Uses

Medical students use AR technology to practice surgery in a controlled environment. Visualizations aid in explaining complex medical conditions to patients. Augmented reality can reduce the risk of an operation by giving the surgeon improved sensory perception. This technology can be combined with MRI or X-ray systems and bring everything into a single view for the surgeon.

AR Apps for Navigation

Navigation applications are possibly the most natural fit of augmented reality with our everyday lives. Enhanced GPS systems use augmented reality to make it easier to get from point A to point B. Using the smartphone's camera in combination with the GPS, users see the selected route over the live view of what is in front of the car.

Maintenance and Repair

Using a head-worn display, a mechanic making repairs to an engine can see superimposed imagery and information in his actual line of sight. The procedure might be presented in a box in the corner, and an image of the necessary tool can illustrate the exact motion the mechanic needs to perform. The augmented reality system can label all the important parts.

AR Gaming Takes Off

With recent advances in computing power and technology, gaming applications in augmented reality are on the upswing. Head-worn systems are affordable now and computing power is more portable than ever. Before you can say "Pokemon Go," you can jump into an AR game that works with your mobile device, superimposing mythical creatures over your everyday landscape.