



Augmented Reality – Introduction

Augmented Reality (AR) is a general term for a collection of technologies used to blend computer generated information with the viewer's natural senses. A simple example of AR is using a spatial display (digital projector) to augment a real world object (a wall) for a presentation. Augmented reality technology was invented in 1968, with Ivan Sutherland's development of the first head-mounted display system. However, the term 'augmented reality' wasn't coined until 1990 by Boeing researcher Tim Caudell. The term “augmented reality,” as well as the first true device of this kind, was created back in 1990 by Boeing researcher Tom Caudell and his colleague David Mizell. Augmented reality was first achieved, to some extent, by a cinematographer called Morton Heilig in 1957. He invented the Sensorama which delivered visuals, sounds, vibration and smell to the viewer. Just two years later, Louis Rosenberg created Virtual Fixtures, the first AR system that was used by the U.S. Air Force. The device made use of a heads-up display (HUD) connected to two physical robot arms that the user could move through an upper-body exoskeleton that acted as a controller. The user saw the computerized robot arms in his visor, together with other computer-generated virtual overlays that simulated objects, barriers or guides existing in the real world. Today, in less than 30 years, AR technology has made a huge leap forward both in terms of performance and usability as well — so much that these clunky early models look like hilarious sweded movie cardboard equivalents of the modern devices! Augmented reality (AR) is a technology that lets people superimpose digital content (images, sounds, text) over a real-world environment. AR got a lot of attention in 2016 when the game Pokémon Go made it possible to interact with Pokémon superimposed on the world via a smartphone screen.

Augmented reality has been a hot topic in software development circles for a number of years, but it's getting renewed focus and attention with the release of products like Google Glass - Wearers communicate with the Internet via natural language voice commands Augmented reality is a technology that works on computer vision based recognition algorithms to augment sound, video, graphics and other sensor based inputs on real world objects using the camera of your device. It is a good way to render real world information and present it in an interactive way so that virtual elements become part of the real world. Augmented reality displays superimpose information in your field of view and can take you into a new world where the real and virtual worlds are tightly coupled. It is not just limited to desktop or mobile devices. Google Glass, a wearable computer with optical head-mounted display, is a perfect example. A simple augmented reality use case is: a user captures the image of a real-world object, and the underlying platform detects a marker, which triggers it to add a virtual object on top of the real-world image and displays on your camera screen.

Real-World Examples 3



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AR applications can become the backbone of the education industry. Apps are being developed which embed text, images, and videos, as well as real-world curriculums. Printing and advertising industries are developing apps to display digital content on top of real world magazines. With help of AR, travelers can access real-time information of historical places just by pointing their camera viewfinder to subjects. AR is helpful in development of translation apps that can interpret text in other languages for user. Location based AR apps are major forms of AR apps. Users can access information about nearest places relative to current location. They can get information about places and choose based on user reviews. With the help of Unity 3d Engine, AR is being used to develop real-time 3D Games.

The Opportunity Although going forward AR seems to have a huge potential market, there are some factors which could slow down mass adoption of augmented reality. Some of the factors are:

It is estimated that 2.5 billion AR apps will be downloaded annually and will generate revenue of more than \$1.5 billion by 2015. This is because AR apps will not be limited to conventional mobile apps. There will be new markets like Google Glass which will open more forms of development and use.

Development

To develop augmented reality apps ... First - need to choose development tools. There are two major forms of augmented reality, marker-based AR and marker-less AR. A marker-based AR works on concept of target recognition. The target can be 3D object, text, image, QR Code or human-face called markers. After detection of the target by AR engine, you can embed the virtual object on it and display it on your camera screen. Qualcomm Vuforia SDK is our recommended framework to develop native apps. Marker-less AR, also known as location-based AR, uses GPS of mobile devices to record the device position and displays information relative to that location. Some of the examples of marker-less AR are apps like Layar and Wikitude that let you view information of nearby restaurants and other establishments.

Barriers - need to cross

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Public

Awareness and reach of Mobile AR

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Technological Limitations

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Addressing Privacy Issues

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Mobile Internet Connectivity in Emerging Markets AR can be considered a technology between VR and telepresence. While in VR the environment is completely synthetic and in telepresence it is completely real, in AR the user sees the real world augmented with virtual objects.

A telepresence robot is a remotecontrolled, wheeled device that has wireless internet connectivity. Typically, the robot uses a tablet to provide video and audio capabilities. TelePresence robots are commonly used to stand in for tour guides, night watchmen, factory inspectors and healthcare consultants.

Examples of telepresence include remote manipulation of probes in the deep sea, working with dangerous chemicals, controlling operations on a space probe, or even manipulating surgical instruments just a few feet away.