

## Virtual Reality and Augmented Reality

Virtual reality and Augmented reality are new technologies that has recently blown up. Virtual reality has become big in the gaming industry with PlayStation VR recently released as well as a new partnership with oculus and Xbox. Augmented reality hasn't picked up as much as Virtual Reality this is because Augmented reality is still partly in development and as of yet only Google Glass is the only working Augmented reality glasses however these died out after a few months from release.

What is Virtual Reality?

Virtual reality is the use of computer technology to create a 3D or 2D virtual environment, virtual reality then places the user inside this virtual world letting them experience it instead of viewing it on a flat screen.

Virtual Reality tries to simulate as many of the user's sense such as vision and sound newer games apps and systems try to add the sense of touch.

What is Augmented Reality?

Augmented Reality is the integration of digital information and environments and overlaying and interacting with the user's environment in real time.

Augmented Reality uses the existing environment and then overlays the information over it such as graphics, as well as showing information Augmented Reality not only displays the information it also allows the users to interact with it using hand movements and eye movements.

Differences between AR and VR

“Augmented reality and virtual reality are inverse reflections of one in another with what each technology seeks to accomplish and deliver for the user. Virtual reality offers a digital recreation of a real life setting, while augmented reality delivers virtual elements as an overlay to the real world.”  
(Augment News)

Augmented reality uses sensors found on the side of the headset and math to determine the position and orientation of a camera, then the technology renders 3D or 2D graphics and objects as they would appear from the point of the camera overlaying the users view of the real world.

Virtual Reality uses similar methods for creating the world's using sensors that are placed out in the real world to determine the size available in the real world for the user to move around in the Virtual world, the head set is also picked up with the sensors so the virtual world has the position of the user's eyes. When the user's head turns the graphics react creating a convincing interactive world.

### The history of Virtual Reality

Virtual reality is considered to have begun in the 1950's but early elements of it can be traced back to the 1860's and long before the development of digital technology.

One of the earliest examples of "Virtual Reality" which isn't virtual but still helped in the development of Virtual reality is the large 360 degree murals which engaged the observer/users with the artwork on a simple level.

Another early example of Virtual Reality is of the work from French playwright Antonin Artaud who used to do plays around the audience and event within the audience.

1920s is when early simulation devices were used for training pilots with the development of the world's first flight simulator by Edwin Link, this capsule was a 180 screen of a digital world where the pilots could take off, fly and land the virtual plane.

1957 the first type of multimedia device in the form of an interactive theatre experience by Morton Heilig this device was called Sensorama this device was invented in 1957 but was not patented until 1962. The sensorama was a viewing screen within an enclosed booth which displayed stereoscopic images, oscillating fans which simulated wind, speakers and devices which emitted smells. The viewer/user would sit on a rotating chair which enabled them to face the screens.

HMD head mounted display was first developed in 1968 this was developed by engineers at Philco Corporation, this device was called Headsight which was designed to be used by helicopter pilots who needed to be able to see their surroundings whilst flying at night.

Ivan Sutherland created the Ultimate heads mounted display that had to be attached to a computer which let the user experience a virtual world however

the device was so heavy that the display had to be attached to a suspension device from the ceiling.

1970s saw the development of the first interactive map, this map was of Aspen, Colorado which was made by researchers at the Massachusetts Institute of Technology. This was a multimedia technology which let the users walk through the town of Aspen.

1980s Virtual Reality was used on projects for NASA which let astronauts experience life on rockets and space stations before having to go to space as well Dr Michael McGreevy carried out research into new forms of human computer interaction.

1990s Virtual Realities profile was boosted thanks to Jaron Lanier who raised the public awareness of the new form of technology Jaron along with Tom Zimmerman marketed a range of virtual reality gear in the 1990s

Virtual Reality continued to be popular throughout the 1990s but the hype and excitement surrounding the technology had a negative effect and led to the decrease in popularity this was because many people felt that Virtual Reality did not deliver on its early promises and resulted in the audience losing interest.

### The history of Augmented Reality

Thomas Caudell a former Boeing researcher who is believed to have come up with the term Augmented Reality in 1990 however Augmented Reality has been around since 1960s

Augmented Realities history is much the same as Virtual Reality history with each event in Virtual Reality also contributing to the history of Augmented Reality.

1975 Myron Krueger developed a device called Videoplace this device allowed the user to interact with virtual objects for the first time. Videoplace was an artificial reality laboratory which surrounded the user and responded to their movements and actions without being weighed down by a head mounted display.

2008 early mobile applications began to appear and several Augmented Reality mapping and social tools appeared. Some apps let the user explore their own world finding events, objects or characters letting the user interact with a artificial world within their own world.

#### Modern day Virtual Reality

In the modern day (2010-2017) Virtual Reality has become very popular with new games, apps and movies being made for the technology. The hype around virtual reality continues to grow which head mounted displays becoming cheaper and easier to use. Being able to make the audience experience a virtual world is great for things like horrors games and movie this being the most popular media for virtual reality.

Virtual Reality is still being used for projects by Nasa but not as much now with the development of Augmented Reality. Virtual Reality is also still used hugely by the military for shooting ranges, war simulation and to train combat pilots.

#### Modern day Augmented Reality

Augmented Reality is slowly being implemented in to everyday life with things like fridge freezers having built in screens that let you adjust temperatures and even place orders.

New mobile apps like Pokémon go and snatch that make the user travel the world in hopes to find Pokémon or prizes.

Augmented reality is also being used in NASA and the military just like Virtual Reality NASA is using HoloLens for building the new mars rover and having Augmented Reality built in to the astronaut's helmets. The military are starting to use augmented reality by adding artificial horizon that tracts the pilot's height angle and speed all built in to their helmets.

#### The future of Virtual Reality

Heather Bellini of Goldman Sachs Research has said that by 2025 Virtual Reality and Augmented Reality would become an \$80 billion market which is about the same size market as desktop PC.

In a few years Virtual Reality will be needed to play future games with consoles now being made to use and play with Virtual Reality headsets and that some games already allow Virtual Reality use.

A problem with Virtual Reality today is the cost which now could cost you almost over a grand for the head sets and a system to run it however lately there has been releases and development of cheaper headsets though not as power or as high definition but still allowing the user to experience Virtual Reality.

Nanotech has been mentioned in the world of Virtual Reality allowing us to go beyond the boundaries of the human body and allowing us to enter into the digital world letting the user basically become one with the virtual environment. One scary development is allowing the user to upload their brain or a nanotech version of it into a computer system or network would could possible lead to immortality however this is a few years away and will most likely not be experienced for a few lifetimes

Virtual Reality is being heavily developed for the gaming industry with new advances in gaming technology like letting the user touch and move things in the world a new vest that allows the user to feel when they get hit as well as development of a system that lets you sense smells.

#### The future of Augmented Reality

Augmented Reality is seen as the technology of the future however it is already making its way in to the market place but only for manufacturing or top brand companies.

Augmented Reality is wanting to be used in theme parks and movies like Virtual Reality is used in roller-coasters letting the users experience a virtual world and the adrenalin of the roller coaster how ever it takes away the fear where as using Augmented Reality the users will still be in the real world and see everything around them as well as virtual objects letting them experience the ride and a virtual world.

When it comes to using Augmented Reality in films the augmented Reality glasses would replace the 3D glasses but without having to distort the screen also allowing people at home to experience a real 3D experience.

Augmented Reality is slowly being used in medical practise such as surgeries letting the surgeons see the heart rate of the patient and the heart rate of the doctor. As well Augmented Reality is being used in the military for things like piolets and tank drivers but there is development for it to be used for control over drone and other combat machines.

## Social media

In 2014 Facebook brought the Virtual Reality company Oculus in hopes of making a Virtual Reality Facebook social space where people would get their own avatar and interact with each other.

2015 Facebook and Samsung team up to create contact for the Samsung's version of Virtual Reality.

At the end of 2016 Facebook released a demo showing what the new Virtual Reality space would look like, each person involved has an avatar that looked like them and the social space could be changed from a front room to a park and the users could interact with each other as well as being able to message and video call people not using Virtual Reality allowing the other user to see them too, another aspect they shown was the ability to take pictures or selfies of your avatars in the virtual spaces and to event include the person on the end of the video call.

End of 2016 Xbox and Oculus (Facebook) teamed up to make a virtual space for Xbox allowing people to meet with friends as avatars and even play games on virtual screens trying to bring back the feel of going to your friend's house and playing games sat on the sofa.

## Oculus

Oculus Rift with one of the 1<sup>st</sup> Virtual Reality headsets that was on the market which was made possible through a kickstarter starting off as impossible to get hold off unless you had a few £1000 to spare but come 2015 Oculus Rift was released to the public at a reasonable price thanks to Facebook.

In 2017 Oculus released Oculus Touch which is the most up to date interactive Virtual Reality controller which allows the user to interact with the world with more precision and human like feel.

## HTC Vive VR

HTC Vive was developed by HTC a mobile company it is being made in partnership with Valve Corporation the HTC Vive is part of the Valve Corporations SteamVR project which is a project for a new steam Virtual Reality system which was demonstrated during 2014 E3.

## PlayStation VR

PlayStation VR was released in 2016 before release it was called project Morpheus it was designed to be able to fully function with the PlayStation console however for the best experience the user would need to get a PlayStation Pro console which was released at the same time. PlayStation VR only works for PlayStation but is focus on games but also allowing some other media to be used on it.

## Samsung Gear VR

Samsung Gear Vr is a mobile Virtual Reality device developed by Samsung Electronics in collaboration with Oculus The Samsung Gear VR is compatible with most Samsung mobile phones and tablets having both a USB and a Micro USB port the Samsung Gear VR head set is the first mobile VR headset to have a controller that interacts with the users phones.

## Mobile Virtual Reality

Mobile VR is a new Virtual Reality type that allows the user to use their mobile device and place it inside a headset this is also cheaper than other headsets but losing the ability to play VR games the user would have to use apps with Virtual Reality capabilities which normally is short films or animations.

## Google Glass

Google Glass was one of the first publicly marketed Optical Head Mounted Display (OHMD) which is the basic type of Augmented Reality. Google Glass was design to look like a stylish pair of glasses and that could be worn daily. It was known as Project glass and was in development for a few years before it was shown in a demo 2013 it had all the basic functions as a smart phone.

## HoloLens

HoloLens also known as Windows Holographic which is a mixed reality computer platform letting applications project live images and presentations on the real world which are referred to as holograms one application that was demonstrated at E3 2015 was the ability to play games such as Minecraft and space invaders. The HoloLens lets users experience each other's experiences by showing what everyone see in real time and having eye tracking and hand gestures.

## Market and audience

Virtual Reality is targeted at gamers of the ages 15 between 30 years of age this is because of the horror games that have taken over the Virtual Reality market. When the Oculus Rift was being developed it wanted to be its own system and not have to rely on desktops or consoles to use being aimed at a new breed of gamers who could just put it on with out any other technology to set up being good for the older generation.

Another target audience Virtual Reality is aimed at is artist this is because it is a new technology that lets you interact and even see inside and artiest work as well many versions of Virtual Reality headsets come with painting and modelling apps as well most 3D modelling software's now let Virtual Reality interact with them.

Augmented Reality is targeted at people who have busy life styles as Augmented Reality eye wear let the user do things on the fly without having to stop what they are doing or setting up their computers.

Although when the HoloLens was demonstrated they made a big fuss about how games would run on the HoloLens and how it would interact with Xbox ones and the new Project Scorpio.

## Strengths and weaknesses

Virtual Reality changes the idea of communication giving people over the internet a more physical relationship.

Virtual Reality can be used in many different fields to help train people in ways that would usually put them at risk.

Can help people with disabilities letting them experience a life in a virtual world.

Virtual Reality can make tourism and visiting places of interest by give them a detailed virtual view of the places

Virtual Reality can give the user a chance to experience things that are impossible to see or do in real life like fighting zombies or experience a space walk

Virtual Reality is expensive and limits the audience to those who have money. Because the technology is being developed fast and new online world are coming about there is little laws and online safety regulations making it possible for anyone to interact with anyone as whoever they want.



People may become addicted to the virtual world that they are in and may end up causing harm to themselves or those around them neglecting their responsibilities.

The technology is still being developed so there are many flaws and bugs still being worked on.

Virtual reality can cause Motion sickness when using the Virtual Reality headsets.

Augmented Reality pretty much has the same pros and cons as Virtual Reality does changing how we can communicate and interact with one another the only difference is that we can interact and communicate with the real world around us.

Augmented Reality would be good for traveling being able to display GPS and to display information on landmarks or places the user is visiting.

As well Augmented Reality is being developed for use in the film industries to replace 3D glasses.

Augmented Reality is still in development so is not available to the public market and once it is available it will cost more than what Virtual Reality does.

### Opinions

Some opinions are different between generations, the younger generations (12 to 25) believe that Virtual Reality is the way forward and will be the next big media outlet and would soon be in everyone's homes. The middle aged generations (26 to 45) are torn believing that this could be a good thing and the way forward but others believe it could ruin human relationships and turn people away from the real reality. The older generation (46 plus) are again torn some being scared of the advancement in technology and others accepting the new technology and thinking it is "cool" or can help with the problems the older generations have such as loneliness or not being able to leave the house.

Companies such as NASA are already using this technology and pushing the boundaries of it for simulations and training which they believe has made things easier and faster for training without the possibility of causing harm to trainee and is cost effective being cheaper than what they use to have to do.

My opinion on both Virtual Reality and Augmented Reality is that it is a good step forward I believe that both these new technologies can and will change the way humans interact with each other and the world which from the

research that I have done may not all be good like the nanotechnology and copying peoples brain waves and patterns on to a computer how ever other than that I think that this technology could help with advancements in medical science and military advancements but as a gamer I can see that VR and AR will change how gaming is used and make it more physical again this can be both good and bad as most people who game like to sit and chill while playing and with Virtual Reality you would have to get up and move around though at the moment gaming and Virtual Reality is basic with all games looking and feeling the same.

## References

Marxentlabs.com. (2015). What is Virtual Reality? [Definition and Examples]. [online] Available at: <http://www.marxentlabs.com/what-is-virtual-reality-definition-and-examples/> [Accessed 24 Apr. 2017].

WhatIs.com. (2016). What is augmented reality (AR)? - Definition from WhatIs.com. [online] Available at: <http://whatis.techtarget.com/definition/augmented-reality-AR> [Accessed 24 Apr. 2017].

Augment News. (2015). Virtual Reality vs. Augmented Reality - Augment News. [online] Available at: <http://www.augment.com/blog/virtual-reality-vs-augmented-reality/> [Accessed 24 Apr. 2017].

Virtual Reality. (2015). How did virtual reality begin? - Virtual Reality. [online] Available at: <https://www.vrs.org.uk/virtual-reality/beginning.html> [Accessed 5 May 2017].

EducationAR.wikispaces.com. (2016). EducationAR - History of Augmented Reality. [online] Available at: <http://educationar.wikispaces.com/History+of+Augmented+Reality> [Accessed 5 May 2017].

Goldman Sachs. (2016). Goldman Sachs | Our Thinking - The Real Deal with Virtual and Augmented Reality. [online] Available at: [http://www.goldmansachs.com/our-thinking/pages/virtual-and-augmented-reality.html?cid=PS\\_02\\_04\\_07\\_00\\_01\\_16\\_01](http://www.goldmansachs.com/our-thinking/pages/virtual-and-augmented-reality.html?cid=PS_02_04_07_00_01_16_01) [Accessed 6 May 2017].

Virtual Reality. (2016). What to expect in the future - Virtual Reality. [online] Available at: <https://www.vrs.org.uk/virtual-reality-games/future-expectations.html> [Accessed 6 May 2017].

T-immersion.com. (2016). The Future of Augmented Reality. [online] Available at: <http://www.t-immersion.com/augmented-reality/future-vision> [Accessed 6 May 2017].

Oculus.com. (2014). Oculus Rift | Oculus. [online] Available at: <https://www.oculus.com/rift/> [Accessed 6 May 2017].

En.wikipedia.org. (2016). PlayStation VR. [online] Available at: [https://en.wikipedia.org/wiki/PlayStation\\_VR](https://en.wikipedia.org/wiki/PlayStation_VR) [Accessed 6 May 2017].

En.wikipedia.org. (2014). HTC Vive. [online] Available at: [http://en.wikipedia.org/wiki/HTC\\_Vive](http://en.wikipedia.org/wiki/HTC_Vive) [Accessed 6 May 2017]

The Official Samsung Galaxy Site. (2014). Samsung Gear VR with Controller. [online] Available at: <http://www.samsung.com/global/galaxy/gear-vr/> [Accessed 6 May 2017]

. Dominguez, S. (2015). How To Market Virtual Reality – Sophia Dominguez – Medium. [online] Medium. Available at: <https://medium.com/@sophiaedm/the-future-of-marketing-is-in-virtual-reality-4d5861187ed4> [Accessed 7 May 2017].

Imediaconnection.com. (2016). The pros and cons of augmented reality. [online] Available at: <http://www.imediaconnection.com/articles/ported-articles/red-dot-articles/2011/aug/the-pros-and-cons-of-augmented-reality/> [Accessed 7 May 2017].

the Guardian. (n.d.). Virtual reality | Technology | The Guardian. [online] Available at: <https://www.theguardian.com/technology/virtual-reality> [Accessed 7 May 2017].

Virtual Reality. (2016). Pros and Cons. [online] Available at: <http://virtual-reality.weebly.com/pros-and-cons.html> [Accessed 7 May 2017].

Engadget. (2015). NASA trains astronauts with zero-G virtual reality. [online] Available at: <https://www.engadget.com/2017/03/27/nasa-is-teaching-iss-astronauts-to-maintain-the-iss-using-vr/> [Accessed 7 May 2017].

Nasa.gov. (2017). NASA - Augmented Reality Application for Maintenance, Inventory and Stowage. [online] Available at: [https://www.nasa.gov/mission\\_pages/station/research/experiments/2350.html](https://www.nasa.gov/mission_pages/station/research/experiments/2350.html) [Accessed 7 May 2017].

Evans, C. (2016). Virtual reality may look cool, but it will feel empty without community | Claire L Evans. [online] the Guardian. Available at: <https://www.theguardian.com/commentisfree/2016/aug/23/virtual-reality-cool-empty-community-oculus-rift> [Accessed 7 May 2017].