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VIRTUAL REALITY: TYPES &EXAMPLES

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ВИРТУАЛЬНАЯ РЕАЛЬНОСТЬ

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This article provides a brief overview of Virtual Reality and what is it and what types of it and what devices and Areas of which they are used.
Keywords: VR, HMD, VRML, 3D.

What is Virtual Reality

Virtual Reality is the use of computer technology to create a simulated environment. Unlike traditional user interfaces, VR places the user inside an experience. Instead of viewing a screen in front of them, users are immersed and able to interact with 3D worlds. By simulating as many senses as possible, such as vision, hearing, touch, even smell, the computer is transformed into a gatekeeper to this artificial world. The only limits to near-real VR experiences are the availability of content and cheap computing power [1].

History of virtual reality

– 1950's visionary cinematographer Morton Heilig built a single user console called Sensorama. This enabled the user watch television in three dimensional ways. And in 1961, Philco Corporation engineers developed the first HMD known as the Headsight;

– it was in 1965 IVAN SUTHERLAND envisioned what he called the ***"Ultimate Display".*** In 1988, commercial development of VR was began;

– in 1991, first commercial entertainment VR system «Virtuality» was released.In 2001, SAS3 or SAS Cube became the first PC based cubic room, developed by Z-A Production (Maurice Benayoun, David Nahon), Barco, Clarté, installed in Laval France in April 2001;

– in 2010, Palmer Luckey designed the first prototype of the Oculus Rift. This prototype, built on a shell of another virtual reality headset, was only capable of rotational tracking;

– in 2013, Valve discovered and freely shared the breakthrough of low-persistence displays which make lag-free and smear-free display of

VR content possible. This was adopted by Oculus and was used in all their future headsets;

– in February–March 2015, HTC and Valve Corporation announced the virtual reality headset HTC Vive and controllers. The set included tracking technology called Lighthouse, which utilized wall-mounted "base stations" for positional tracking using infrared light;

– in early 2017, a patent filed by Sony showed they were developing a similar location tracking technology to the VIVE for PlayStation VR, with the potential for the development of a wireless headset.

Types of virtual reality

Virtual Reality could be classified into two main types according to the degree of immersion and interface in the synthetic environment. The two types include Immersive use VRML is a language for describing three-dimensional image sequences and possible user interactions to go with them. And second type is non-immersive Virtual Reality systems like an HMD uses small monitors placed in front of each eye which can provide stereo, bi-ocular or monocular images Fig. 1 [5].
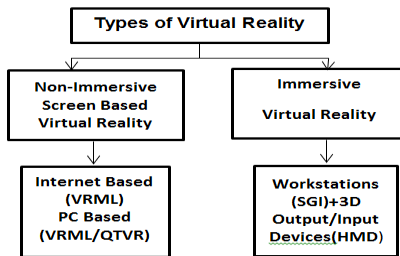

Fig. 1. Types of Virtual Reality Systems

Uses of Virtual reality

1. *Education.* A few of the favorite ways that in the community is using this technology:

   Field Trips. This one is perhaps the most obvious – these technologies enable students to virtually visit locations that they aren't able to physically visit – ranging from an Amazon rain forest to the surface of Mars.

   Training. Virtual reality gives students the opportunity to experience the activities they are learning about, whether that is working an archaeological dig site, guiding airplane landings on an aircraft carrier, or conducting surgical procedures.

   Design. Perhaps one of the best early uses of virtual reality is in architecture – being able to visit and explore a building before any construction ac-

tually begins is a huge step forward for this field.

2. *Video games.*
3. ***Cinema and entertainment.*** Virtual reality is applied in 3-D movies to try and immerse the viewer into the movie and/or virtual setting and environments.
4. ***Engineering.*** Virtual reality has been used in automotive, aerospace, and ground transportation original equipment manufacturers (OEMs) in their product engineering and manufacturing engineering. Engineers can view the virtual bridge, building or other structure from any angle.
5. *Music and concerts.*
6. ***Marketing.*** Virtual reality presents a unique opportunity for advertisers to reach a completely immersed audience. Companies such as Paramount Pictures, Coca-Cola, McDonald's and Disney have applied VR into marketing campaigns.
7. ***Heritage and archaeology.*** The first use of a VR presentation in a heritage application was in 1994, when a museum visitor interpretation provided an interactive "walk-through" of a 3D reconstruction of Dudley Castle in England as it was in 1550. This consisted of a computer controlled laserdisc-based system designed by British-based engineer Colin Johnson.

The Top Best Virtual Reality devices 2016
1. *Oculus Rift.* Invented by a VR enthusiast Palmer Luckey, the Oculus Rift is a set of virtual-reality goggles that will work with your gaming desktop or laptop [3].

2. *HTC vive.* HTC vive is a high-end virtual reality headset developed by HTC and Valve Corporation, released on 5 April 2016. The headset isdesigned to utilize «room scale» technology to turn a room into 3D space via sensors, with the virtual world allowing the user tonavigate naturally, with the ability to walk around and use motiontracked handheld controllers to vividly manipulate objects, interact with precision, communicate and experience immersive environments.

3. *PlayStation VR headset* is a virtual reality headset developed by Sony Interactive Entertainment, which launched on October 13, 2016. It was designed to be fully functional with the PlayStation 4 home video game console.

4. *Google Cardboard* is a virtual reality (VR) platform developed by Google for use with a head mount for a smartphone named for its fold-out cardboard viewer. To use the platform, users run cardboard-compatible applications on their phone, place the phone into the back of the viewer, and view content through the lenses.

5. *Microsoft Hololens* known under development as Project Baraboo, is a pair of mixedreality smart glasses developed and manufactured by Microsoft, it is running under the Windows 10.

6. *Samsung Gear VR* is a mobile virtual reality headset developed by Samsung Electronics, in collaboration with Oculus, and manufactured by Samsung. The headset was released on November 27, 2015. When in use, a compatible Samsung Galaxy device (Galaxy Note 5, Galaxy S6/S6 Edge/S6 Edge+, or Galaxy S7/S7 Edge) acts as the headset's display and processor.

Some information about companies and gadgets of virtual reality is given in Tables 1 and 2.

T a b l e 1

Top 5 Virtual Reality Companies [2].

VR Gadget / Company / Price (av.)	Market Share (worldwide in 2016)	Description
1. Facebook/Oculus VR/599$	8%	The VR company that's the leader, at least in terms of mindshare, is Oculus. It managed to lure two of the top programmers in the country, Michael Abrash and John Carmack, to its development team. Oculus became such a hot property Facebook shelled out $2 billion for a product not even shipping. The headsets began shipping on March 28, 2016 .
2. Google/Google cardboard/15.00$	30%	Google Cardboard. Cardboard is designed specifically for using VR apps on Android smartphones.
3. WorldViz/VR Software	Unknown	WorldViz is a virtual reality company that makes 3D interactive and immersive visualization and simulation solutions aimed at universities, government institutions, and private business alike

4. Bricks & Goggles/VR Software	Unknown	This Dutch software firm transforms construction designs from major CAD and other 3D modeling software into three-dimensional VR environments, which you can then view in a life-like 3D image using any of several headsets
5. Marxent Labs/VR Software	Unknown	Marxent's Visual Commerce 3D Virtual Reality Design Studio & Showroom allows retailers and manufacturers to create a 3D design studio and showroom for building live demos, similar to wat Bricks & Goggles does.

Table 2

Virtual Reality Gadgets [4]

VR Gadget	Price, $	World shared market 2016
1. Oculus Rift	599	8%
2. HTC vive	799	7%
3. PlayStation VR headset	399	21%
4. Google Cardboard	15.00	30%
5. Samsung Gear /VR	99.99	21%

Conclusion

The future of virtual reality is hard to predict but one thing's for sure the world of entertainment is going to see a lot more of it. Virtual Reality offers us a new way to interact with computer. VR enables us to experience the virtual world that is impossible in real world. VR is changing our life, eventually VR will increasingly become a part of our life.

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