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**How does Virtual Reality work?**

Virtual Reality simply put is the act of trying to combine the physical world and the virtual and making them indistinguishable from each other. With the invention of HD screens, the difference between an image on screen and in real life has become indiscernible. This is very important because our brains are largely designed around our sense of sight making a virtual world seem like our own would mean having to deceive our eyes. The way designers involved in the development of virtual reality systems accommodate this sense today is through head-mounted devices providing auditory feedback which may also be used in tandem with haptic systems which give users force feedback and touch interaction. Physical Movements are recorded with 3-D sensory trackers and then the feedback of head, hand and body movement is sent to the screen to make movement feel seamless and real (**GC Burdea 2003**).

For 3-D sensory technology to work the environment the user will be using must be tracked and recorded. There are several ways to do tracking for VR but have many similarities. The most commonly used is optical tracking devices. They use light to measure a user's position and orientation. The signal emitter in an optical device typically consists of a set of infrared LEDs. The sensors are cameras that can sense the emitted infrared light. The LEDs light up in sequential pulses. The cameras record the pulsed signals and send information to the system’s processing unit. The unit can then process the data to determine the position and orientation of the target. This gives users 6 degrees of freedom (6DoF) allowing them to move around in the virtual world. The most important part of virtual reality, making the user feel like they’re still in reality. This is how Virtual reality works.

**How to use VR**

Setting up VR seems a bit complicated but is actually very easy to do. With modern VR systems, having a headset and controllers won’t be enough; you'll need a PC console or mobile device to connect it too. Before you set it up having a small space dedicated to using it is a must to ensure safety and easy mobility while using VR. It’ll prompt the user to set the boundaries of where it can be used.

**Controls**

The controls of VR vary depending on what you’re using it for. A Pilot training simulator would have controls quite like a real cockpit to allow them to become better pilots. The controls are built around the needs of a targeted user. Most modern VR consoles come with two hand controllers that have buttons and triggers for all sorts of uses depending on the application. They can act as paint brushes in tilt brush (**Google 2016**) in which the user can take advantage of 6 degrees of freedom to create whatever they want. To look around their environment the user would do the same they would in real life, by moving their head in whichever direction they wanted to look at.

**Games**

Games have always strived to be more and more realistic, which is why VR is often only talked about in terms of gaming capabilities.  Since the early 2010s VR systems have been developed more and more for gaming. Many gaming and tech companies like Sony, Valve, and Samsung have released their own VR setup throughout the last decade to competes. The catalogue of games available in VR at first was quite small, over time game developers began porting already existing highly successful games over to VR such as Minecraft (**Notch 2009**) and Skyrim (**Bethesda 2011**). It’s only quite recent that Big gaming studios have started developing games specifically for VR such as the well-received Half-life Alyx. VR is the next step in gaming as it allows for more immersion and possibilities. There are more opportunities for creation in tilt brush (**Google 2016**). By making the gaming experience more immersive threats and terror in horror games will feel more real and intense such as the popular Alien Isolation.

**Applications of VR**

There are a myriad of applications and uses for virtual reality. It is most commonly used in everyday life for entertainment but can also be used for educational purposes, medical procedures, manufacturing etc. Virtual reality is already used for work related activities in training personnel with equipment where “initial training in a virtual environment can avoid the expense, danger, and problems of monitoring and control associated with training” (**Weiss 1998**) For example it is used in pilot simulation, helps with problems with radioactive waste removal, astronaut training etc. Virtual reality has a huge potential in aiding education. First-hand experiences account for most of our activity and learning of the world (**William Winn 1993**). Students will no longer be observers to information but active participants in constructing it themselves. Those studying history will be able to see, feel and hear important events throughout time, engaging them more in the subject then they would’ve been before. Surgeons today are using VR to allow them to visualise problems with intricate organs like hearts and brains to spot problems before the surgery takes place. VR has also shown potential to be used for rehabilitation. The advantage of using it over conventional therapy for physical therapy is that it’s not as repetitive preventing boredom and keeping the user engaged. It can be used in the patient’s home and without a health care professional reducing cost and giving freedom to the patient being able to use it wherever and whenever they’d like.

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