OCULUS RIFT

- The Oculus Rift is an upcoming virtual reality head-mounted display, being developed by Oculus VR

- Oculus Rift was invented by a virtual reality enthusiast named Palmer Luckey and later developed with the help of John Cormack.

WHAT IS VIRTUAL REALITY?

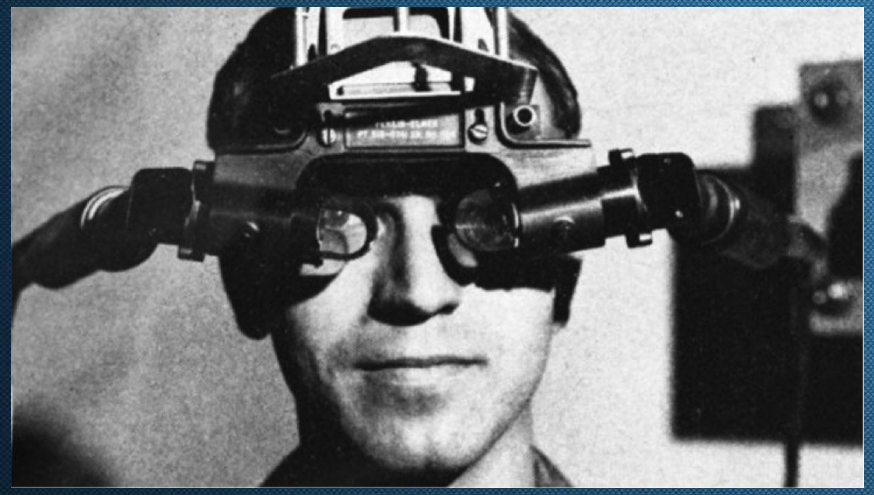
- Virtual Reality (VR), is a computer-simulated environment that can simulate physical presence in places in the real world or imagined worlds.
- Virtual Reality Simulations have widespread uses in the fields of Fine Arts, Music, Gaming, Military Training, etc.
- It involves the recreation of human senses (sight, sound, touch, taste, smell)

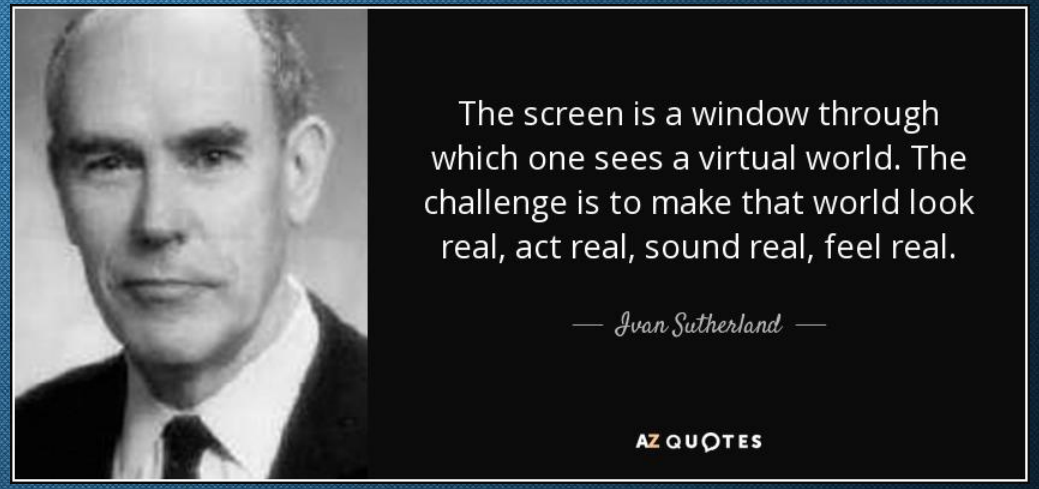
EARLY INVENTIONS IN VR FIELD

Sensorama by Morton Heilig in 1962

- Displayed stereoscopic 3D images in a wide-frame view
- Supplied stereo sound

Sword Of Damocles by Ivan Sutherland in 1968





- **First virtual reality head-mounted display**
- **Supported head tracking**

The Eyephone in 1984

- First consumer head-mounted display
- Displayed colour graphics
- Used hand gestures to interact with a virtual world

Nintendo Virtual Boy released in 1995

- Marketed as the first portable game console that could display “true 3D graphics”
- Monochromatic display
- Used oscillating mirrors to create a 3D effect

Oculus Rift

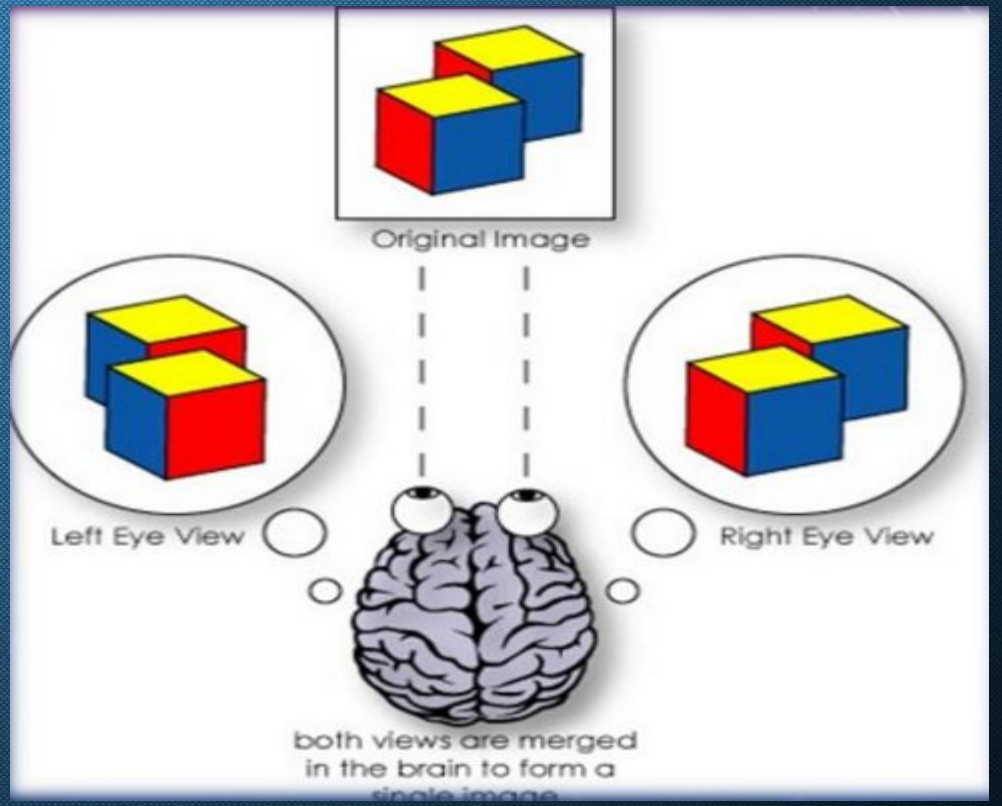
- Uses lenses and a split screen to display 3D graphics

It uses a 7 inch LCD display screen with a resolution of 1280 by 800 pixels.
Screen is divided into 640 by 800 pixels per eye, with a fixed distance between lens centers.

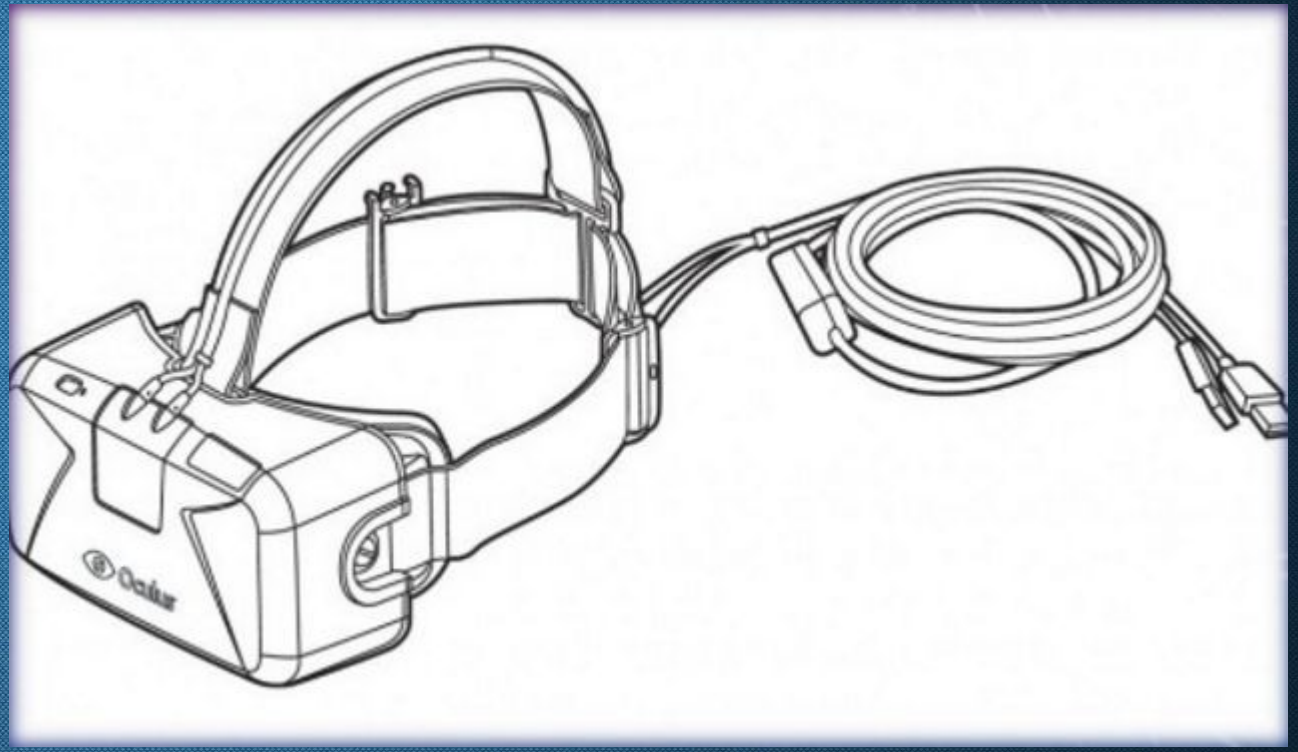
- 110 degree field of view

HOW DOES IT WORK?

STEREOSCOPIC 3D IMAGES

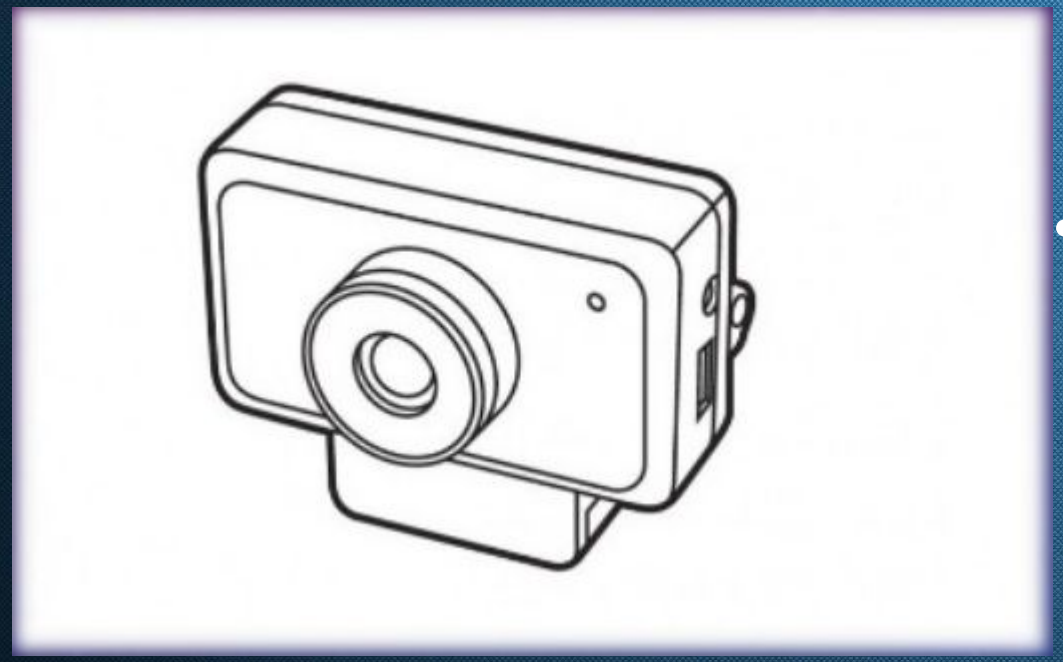


THE CABLE



- Video is sent to the Oculus Rift via HDMI cable.
- It also includes USB, which carries data and power to the device.

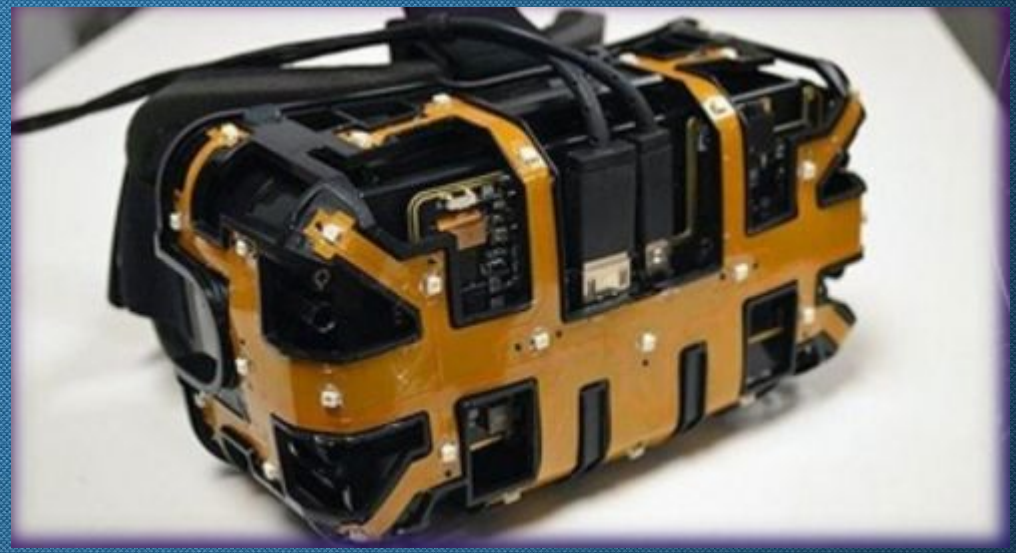
THE POSITIONAL TRACKER



- Tracking the position of your head in 3D space is critical to the way the Rift works.

- One of the ways it achieves this is with a series of infrared LEDs embedded in the headset, which are monitored by a webcam-like camera placed nearby

THE HEADSET



- Feed is send into the headset, which connects to your head via vertical and horizontal straps, with the uppermost strap including the HDMI and USB cable.

- Further customisation is achieved with two pairs of lenses, which magnify the screen so it fills your field of view

THE COMPONENTS

- Within the headset sits a single custom motherboard, which includes an ARM (Advanced RISC Machines) processor and control chips for the LEDs.
- The “Adjacent Reality Tracker" which was developed independently of the Oculus Rift, but has since become a key component

THE COMPONENTS

- The ART features a magnetometer, a gyroscope and an accelerometer, all of which combine to accurately track the rift across all three dimensions of three-dimensionality.

- The ART can track infinitesimally tiny head movements, even if you're on a rollercoaster during an earthquake.

THE SCREEN

- Its 1920 x 1080 HD resolution delivers a 960 x 1080 display to each eye.
- Its refresh rate of 60 Hz keeps things smooth

THE FEEDBACK LOOP

- A huge amount of data is continually sent back and forth between the positional tracker, the headset, the computer and its software.
- It results in an incredibly smooth VR experience.
- Adjustments such as brightness and contrast are made via Oculus' software.
- It also includes the ability to calibrate the Rift, set your height and enter your interpupillary distance (IPD), i.e., the size of the gap between your pupils

THE AUDIO

- Oculus Audio SDK allows the use of Head-Related Transfer Function (HRTF) technology.
- HRTFs simulate the changes to a sound when it reaches your head from a point in space.
- It does this by referencing data that represents changes that would happen to a sound coming from that direction.

ADOPTION

Games currently with full or partial support include:

- **Left 4 Dead**
- **Skyrim**
- **Half-Life 2**
- **BioShock**
- **Star Citizen**
- **Elite: Dangerous 20**

SHORTCOMINGS

- Users encounter Motion Sickness.
- Current Model not very glass friendly.
- Heavy Weight Design.
- High Cost.

Thank you!