



**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 Carmack.**



# 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



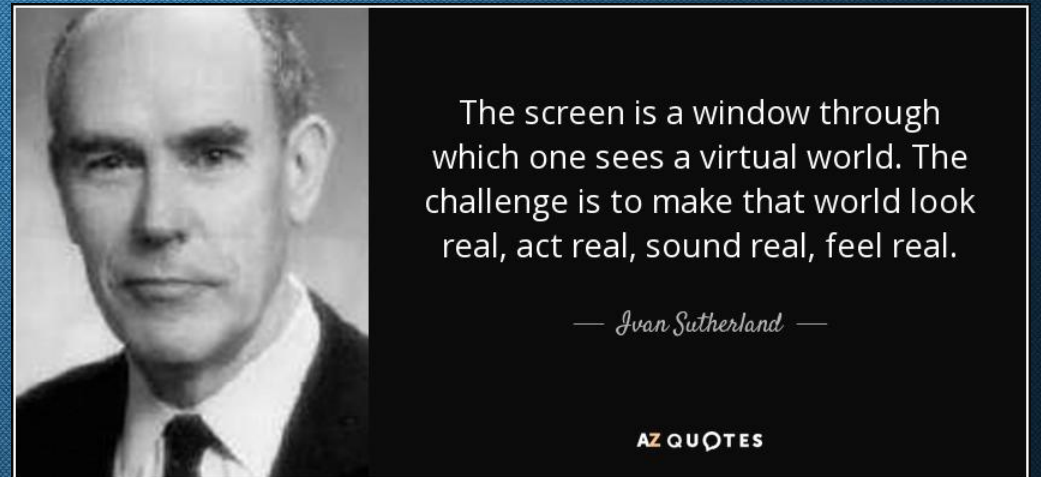
## Sensorama by Morton Heilig in 1962



- 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**



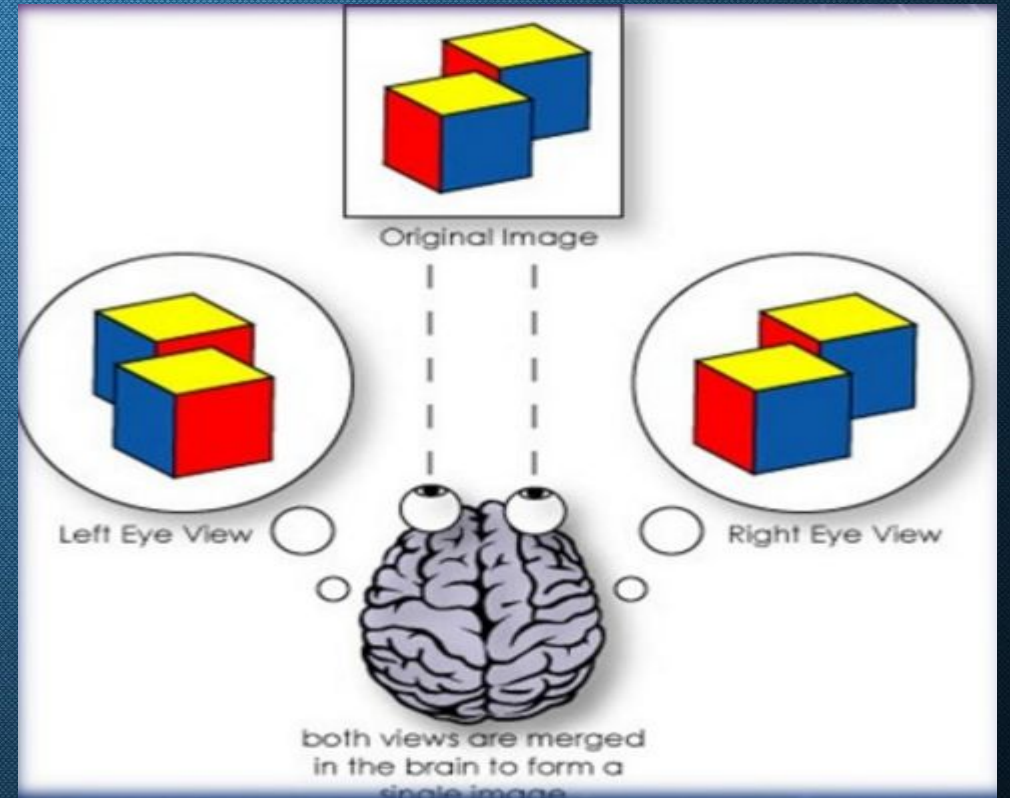


# HOW DOES IT WORK?



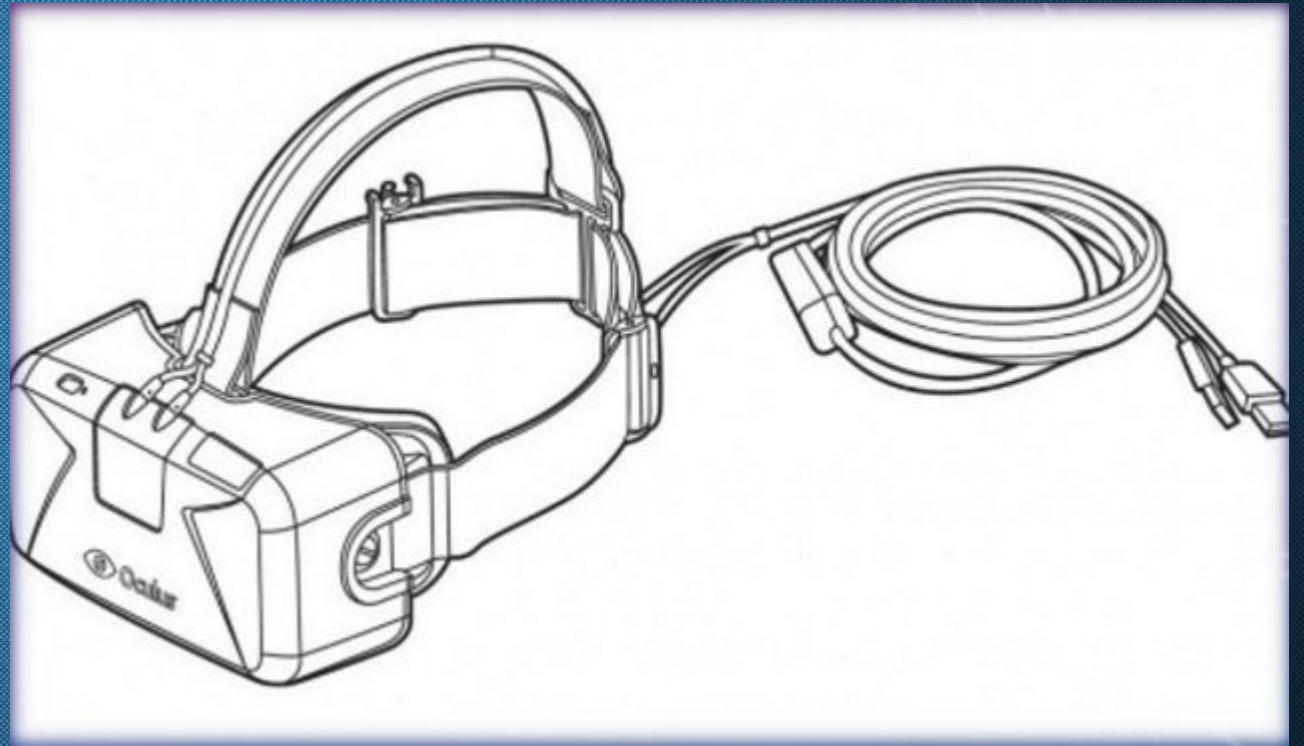


# STEREOSCOPIC 3D IMAGES





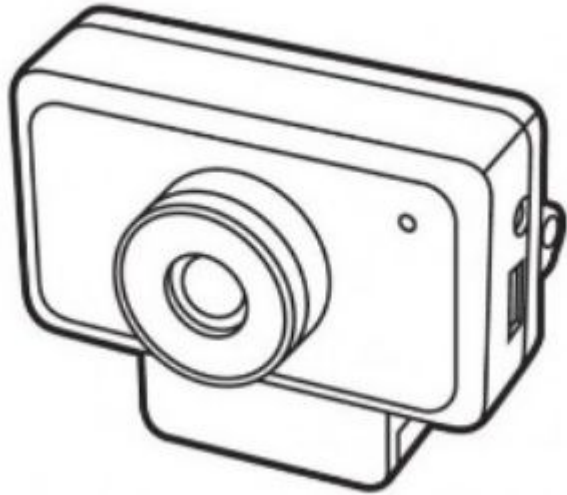
# THE CABLE



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



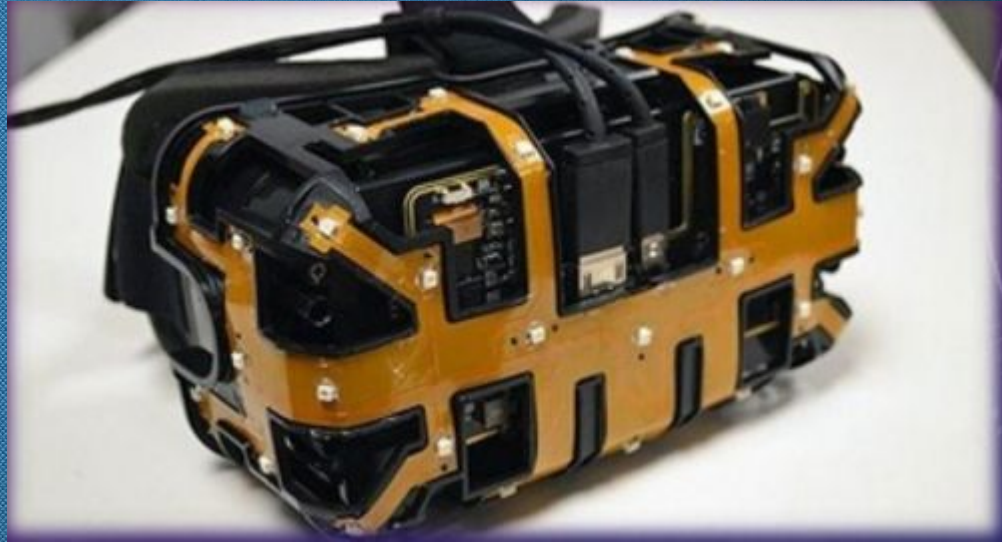
# THE POSITIONAL TRACKER



- **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!

