

VIRTUAL REALITY : OLDER THAN YOU THINK



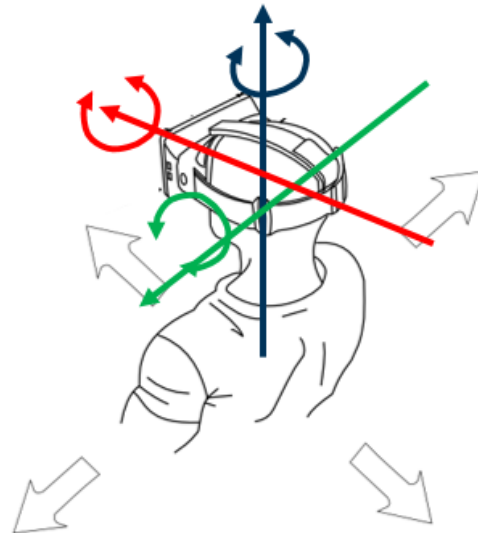
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Outline

- Introduction of 360° videos
- History of VR
- VR Research @ AVT

Introduction

- 360-degree = Omnidirectional = Virtual Reality videos
- Interactive
 - Allows viewers to change viewing direction
 - 3 Degrees of Freedom (DoF)
 - Future Applications : Gaming 6 DoF
- Immersive and Presence
 - “Transports” viewers from Physical World into Virtual World



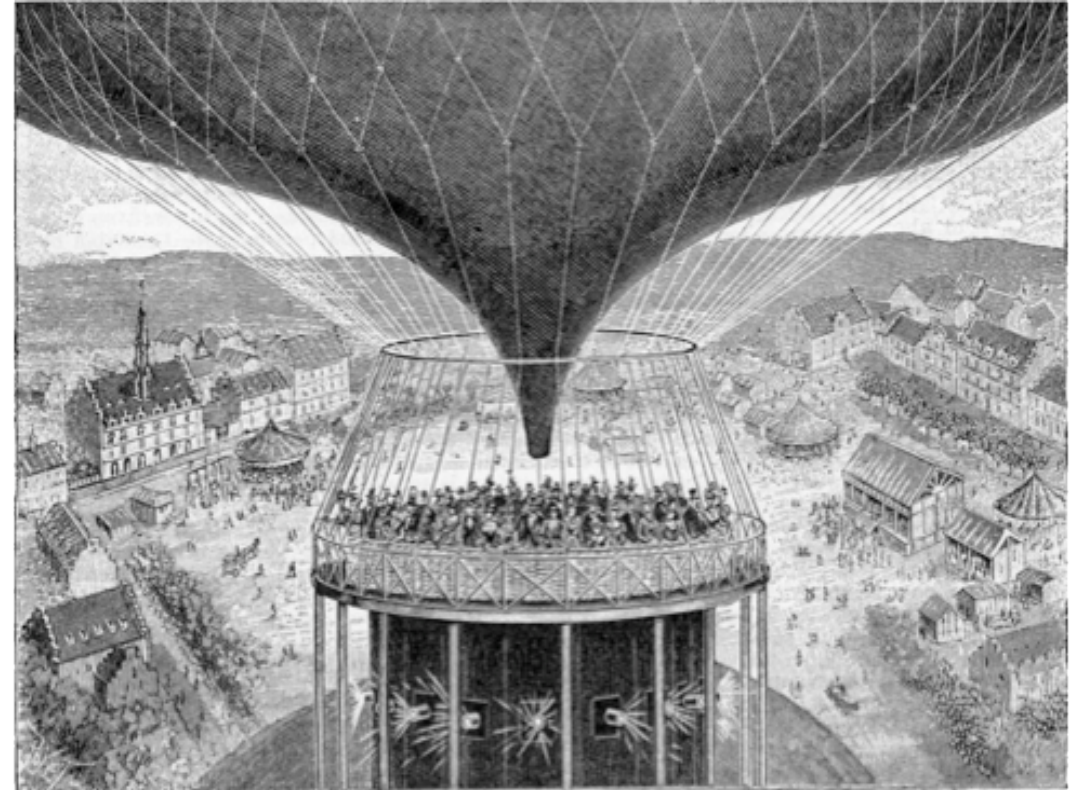
History of VR

- 1935 – Science fiction story “Pygmalion’s Spectacles” predicted VR
 - experience a fictional world along with touch, taste and smell
- 1960 Telesphere Mask – The first VR HMD
 - No motion tracking
- 1961 Headsight – First motion tracking HMD
- 1987 – VR was coined by Jaron Lanier
- 1995 – The Virtual Boy
- 21st Century VR – Vive, Rift



In 1897 - Cineorama Projection

- Premiered at the Paris Exposition
- Used 10 synchronized projectors to arrange in a full 360° circle
- A viewing platform dressed like a hot air balloon, large enough to hold 200 people, was in the center
- Closed after only three days due to the extreme heat from the projectors

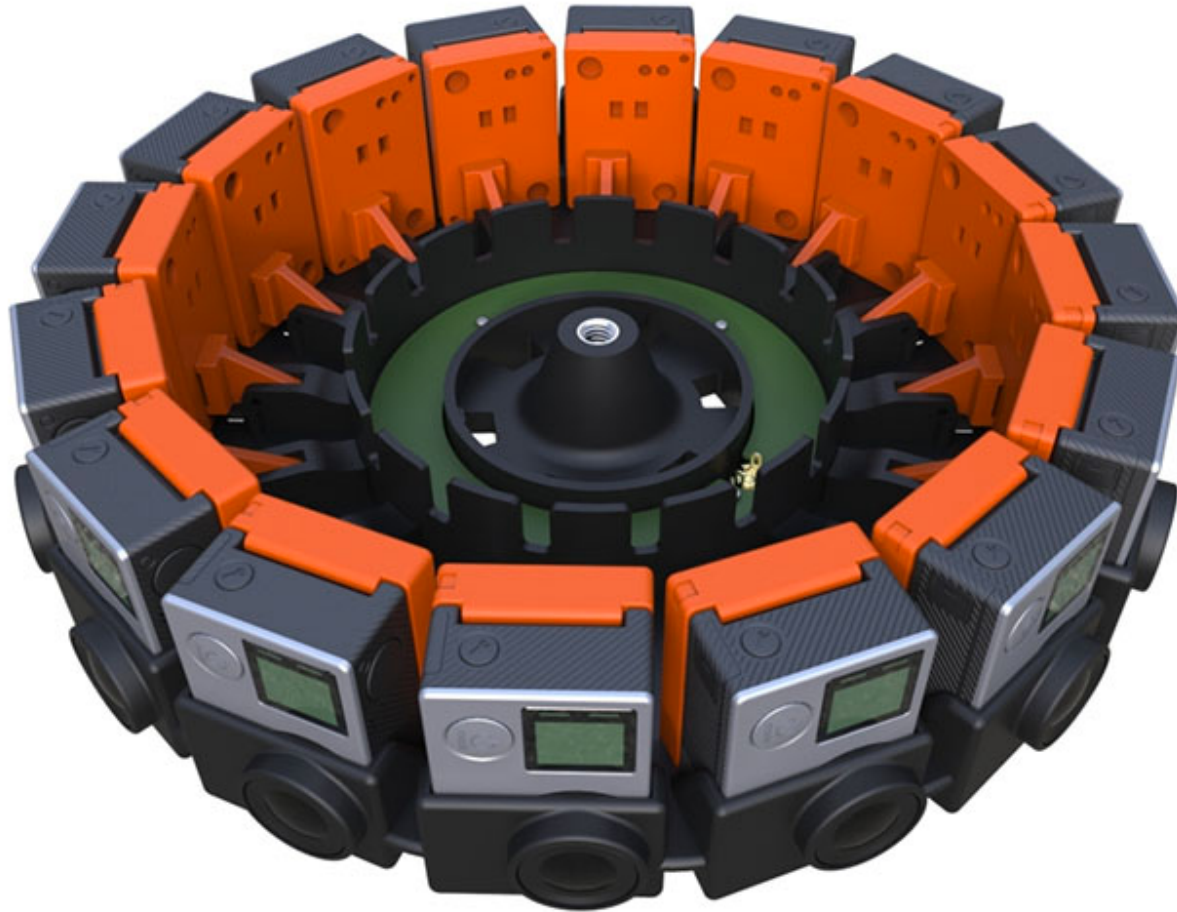


In 1957 - Sensorama Simulator

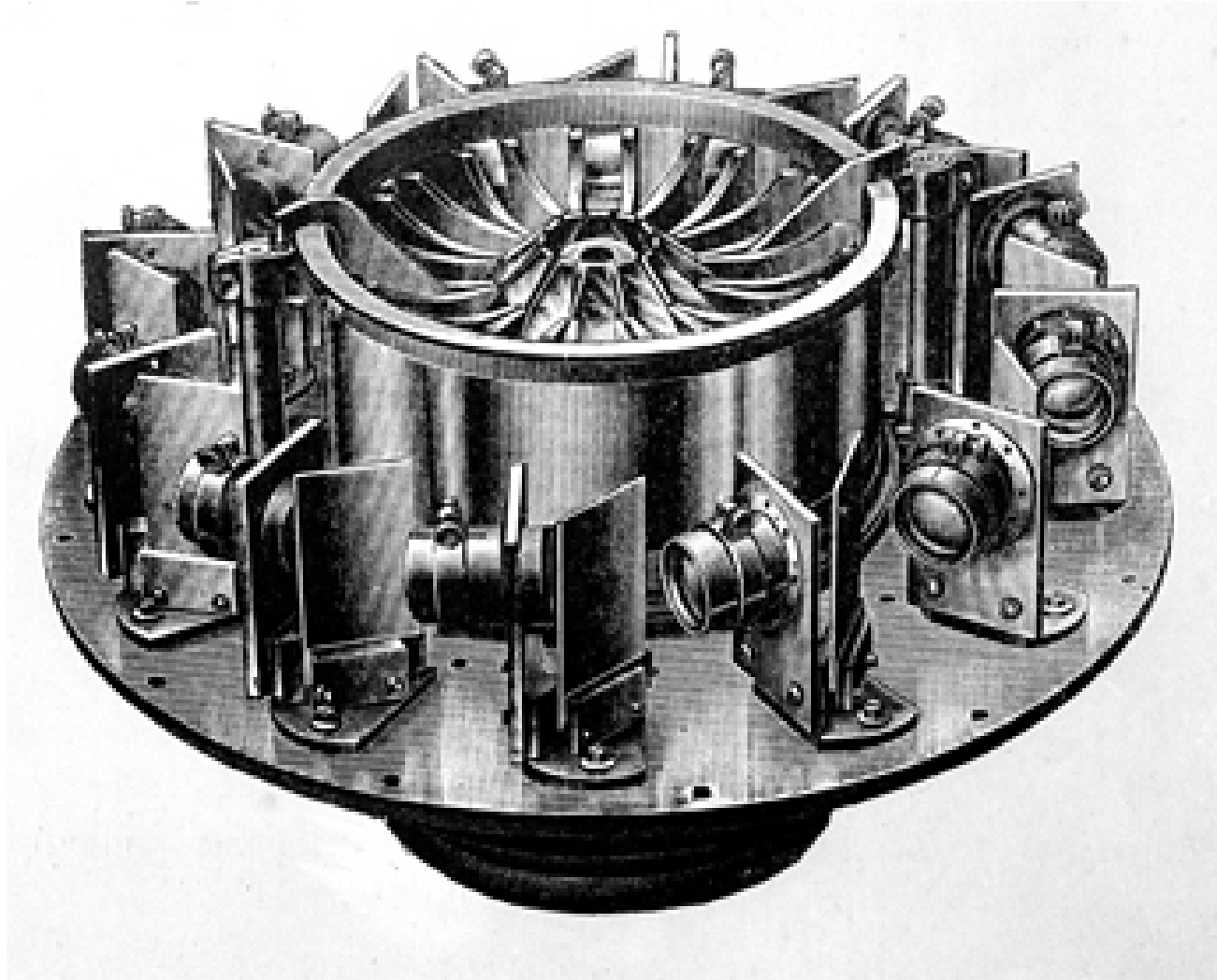
- Made by Morton Heilig
- Built a 3D Video Machine
 - Feels like riding a virtual motor bike
 - Sounds, winds, vibrations
 - Smells of being on the road



VR Camera - Jump 360°



In 1900 - The Lumière Photorama



VR RESEARCH @ AVT

Motivation and Research Goals

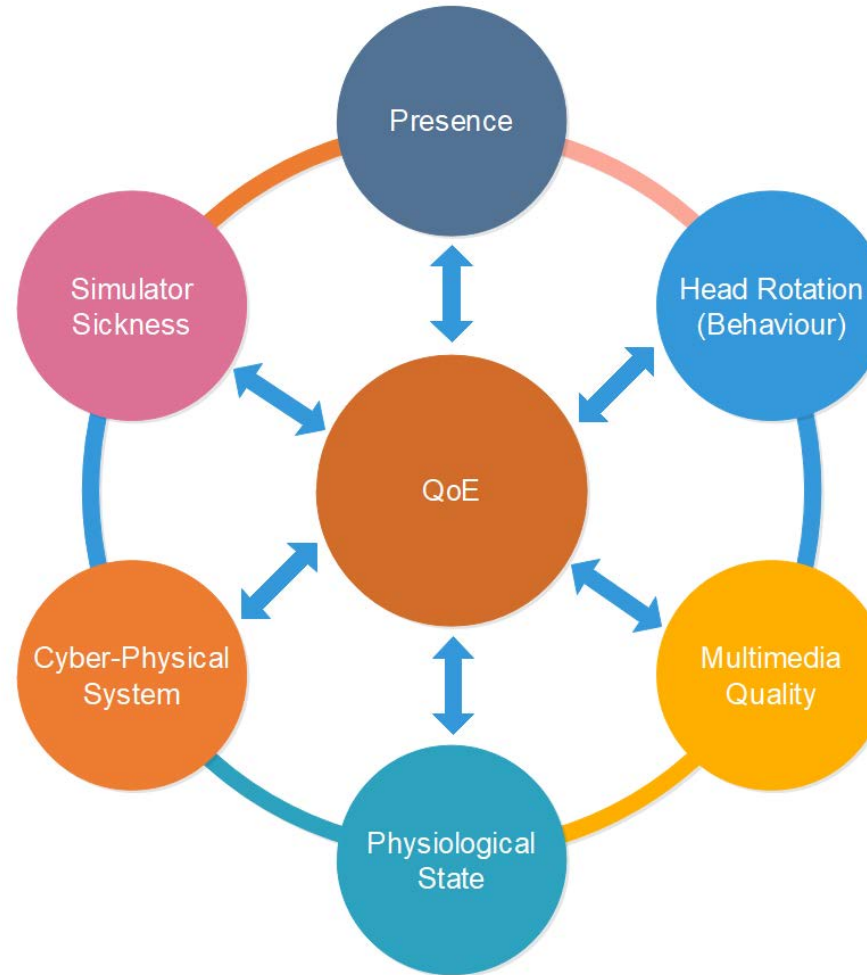
- Resolution limitation of HMD
 - Optimal Network Delivery
 - Provide insights into appropriate coding and resolution settings
- Simulator Sickness
 - Content
 - Resolution
 - Gender
- Behavioral Analysis
 - Favourable scene components (viewports) for the presented 360 videos



Components of 360-degree Videos QoE

Factors

- System
 - Resolution
 - Bit-rate
 - Encoding
 - Projection Format
 - Display Devices
 - Content
 - Lag
 - ...
- User
 - Gender, Age
 - "States and traits"
 - Head Rotation/ Behaviour
 - ...
- Physiological
 - Stress
 - Heart-rate
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Research

- Subjective test methods
- Identification of key system factors and setting
- Modelling
 - Saliency
 - Relation QoE, Simulator sickness, Behavior
- Recommendations for service operation

Assessment of QoE and Subjective Quality of 360-degree Videos with Head Mounted Displays



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