

# Better than Reality

Augmented Reality workshop



# Why we are here...

- *Better than Reality*

- Funded by Mondriaan Foundation & city of Rotterdam
- 3 artist-in-residencies, artistic research
- Workshop to share the knowhow
- Test\_Lab December 11<sup>th</sup> + 12<sup>th</sup> to present

- Predecessor: *Exercise in Immersion 4*, with Marnix de Nijs & V2\_Lab, part of MultimediaN



Gemeente Rotterdam  
Kunst en Cultuur



# Exercise in Immersion 4



# Who is who?

- Workshop leaders
  - Boris Debackere
  - Jonas Hielscher
  - Marnix de Nijs
- V2\_ staff
  - Jelle van der Ster
  - Artm Baguinski
  - Stock
  - Chiel Vaessen
  - Jan Misker
- Participants
  - ...

# Workshop schedule

- Monday
  - 10:30 general introduction
  - 11:15 technical demonstrations
  - 12:00 introduction workshop leaders
  - 13:00 lunch
  - 13:30 split up in groups
  - 14:00 concept, decide what to make
  - 18:00 close



# Workshop schedule

- Tuesday
  - 10:00 – 17:30 work, 13:00 lunch
  - 17:30 reflection with entire group
- Wednesday
  - 10:00 – 17:00 work, 13:00 lunch
  - 17:00 semi-public presentation of results
- Thursday
  - Free space

# Overview of Augmented Reality

- Definitions:
  - Augmenting the real world with virtual content
  - Content can be informational overlay or an alternative reality
  - Projection on HMD or screen
- Science and technology
- Applications
- Artistic uses



# Technological challenges

1. Perfectly align the virtual content with the real world, i.e. align coordinate systems.
2. Believable virtual content.

Two major tracking approaches:

- A. Camera based
- B. Sensor based



# Camera tracking

- Markers or natural features tracked by camera, image overlaid on a screen



# Camera Tracking – pros & cons

- + Stable image
- + Real world can change
- + Easy of use, e.g. AR Toolkit
- Less immersive (opinion)
- Vision based
- Difficult to get an absolute position of viewer
- Marker or features must be visible to camera



# Sensor based tracking

- Position:
  - GPS
  - Optic (laser, infrared)
  - Ultrasound
- Low frequency
  - Predict intermediate measures using Kalman filters
- Orientation:
  - Magnetic (compass)
  - Accelerometer (gravity)
  - Gyroscopes (relative)
  - Sensor fusion

# Sensor tracking – pros & cons

- + Absolute coordinates
- + Fast
- + Multiple persons can be tracked
- + GPS is available all over the world
  
- GPS is not available indoors
- Difficult to install indoors
- More technical knowhow required

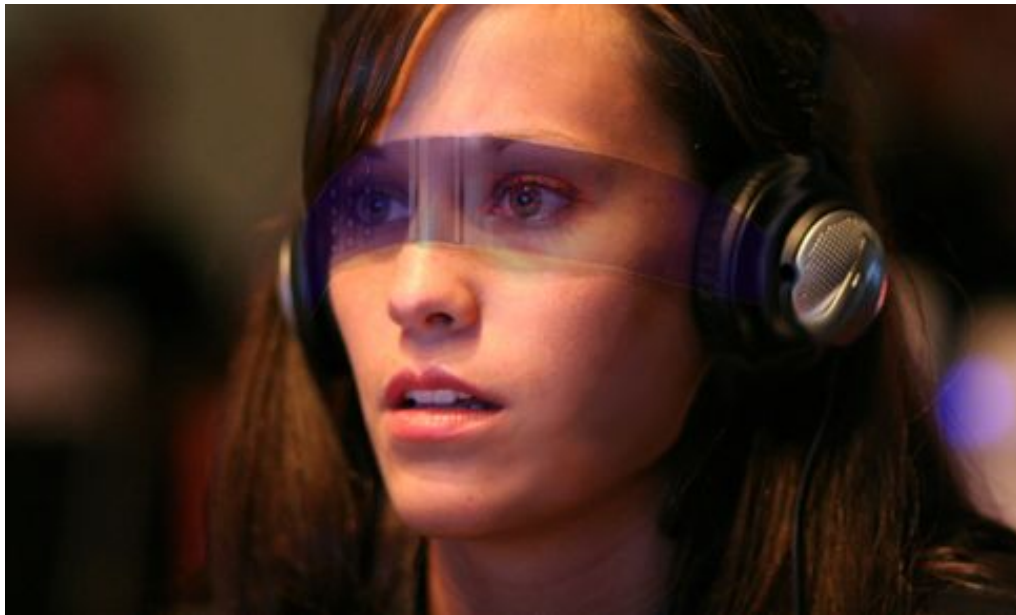
# Display Technologies

- Screens
- Head Mounted Displays
- Head-Up Display
- See through or opaque



# Futuristic + Warning

These visions require  
an insane level of  
accuracy



# The early days of HMD based AR



Columbia University Computer Graphics  
and User Interfaces Lab

- In the beginning a lot of focus on technology.
- Mainly academic demo's.



AR Quake, Wearable Computing Lab of  
the University of South Australia

# Commercial(?) applications



navigation  
repairs



games  
urban planning



# Artistic 'Ancestors' to AR

- Theatre and cinema have given spectators a strong sense of an 'alternative reality' for centuries, using illusion and special effects



Pepper's Ghost (1863)



Iron Man (2008)

# Sound as AR

- Sound = adding meaning to the world  
vs?
- AR = adding virtual content to the world
- Techniques to make sound spatial:
  - Wave field synthesis generates wave field as if the sound sources are somewhere else in space ([demo](#))
  - Change sound generation according to spatial parameters of listener



# Virtual Theatre

- Carla Mulder incorporates stereoscopic photographs in her theater plays.
- CREW/Eric Joris (BE) produce theatrical immersive experiences
  - Spectators are immersed in an alternative reality
  - Still very much in touch with their body and emotions



# Cinema and Games vs. AR

- Full Immersion: we would like our AR worlds to look, sound and feel as if you are *inside* a movie or game
- Real time is a problem, obviously
- Interactive Cinema?  
or
- New type of game?

**IRON STATS:** CGSociety.org

**ILM SHOT COUNT:** 410

**RENDERS TIMES:**  
Iron Man Mark Two render time per frame: four to five hours (this climbed to upwards of eight hours per frame in instances where the suit was in motion)  
Iron Man Mark Three render time per frame: Three to four hours  
Ironmonger render time per frame: Three to four hours

**GEOMETRY:**  
Total number of pieces of geometry, Iron Man Mark III: 1,933  
Total number of pieces of geometry, Iron Man Mark II: 3,009  
Total number of pieces of geometry, Ironmonger: 2,394

**MISC STATS:**  
Number of digital doubles created: Four  
Number of CG vehicles created: 12

# Artistic use of AR

- Highly interdisciplinary field (media art, architecture, game design, web design, game theory, interaction design, medical sciences, cognitive psychology, activism, serious gaming, and many more)
- Creating enormous diversity in types of mixed realities on a physical-virtual continuum
- Some examples from *Space Time Play*  
Edited by Friedrich von Borries, Steffen P. Walz and Matthias Böttger ->



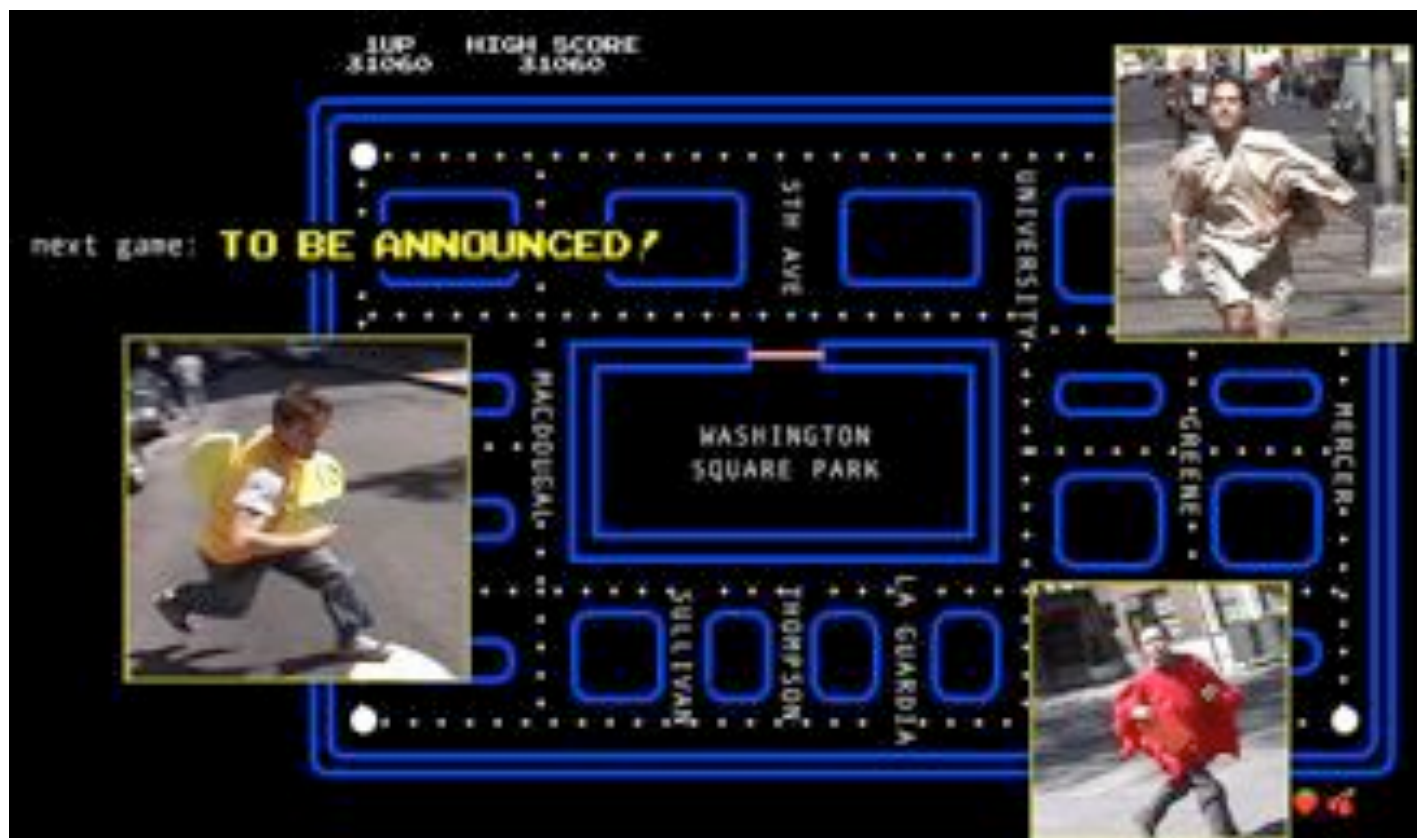
# First person shooter

(Everyday Counter-Strike) by Aram Bartholl



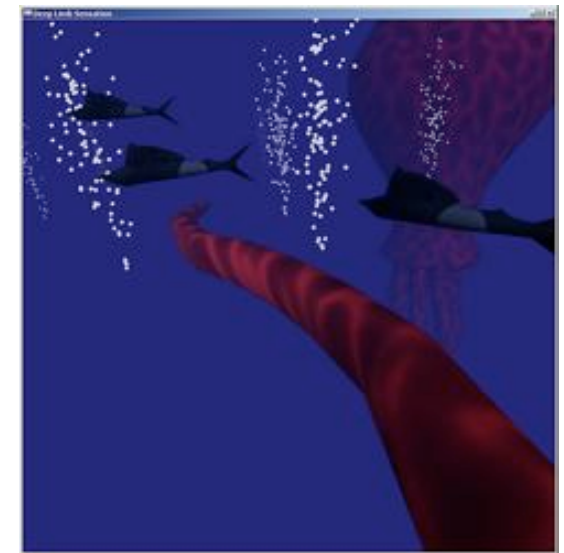
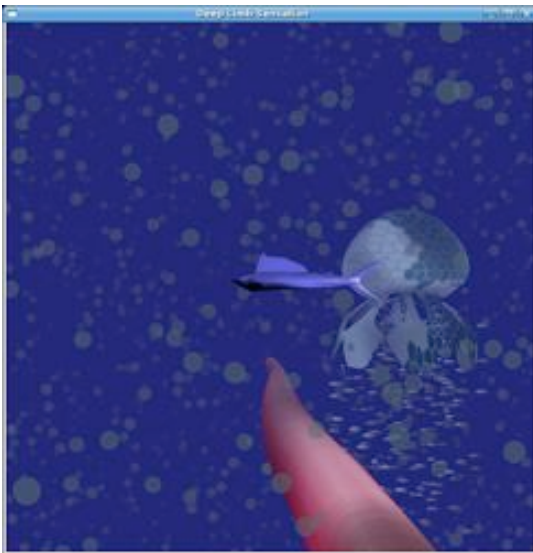
# Pacmanhattan

by Frank Lantz



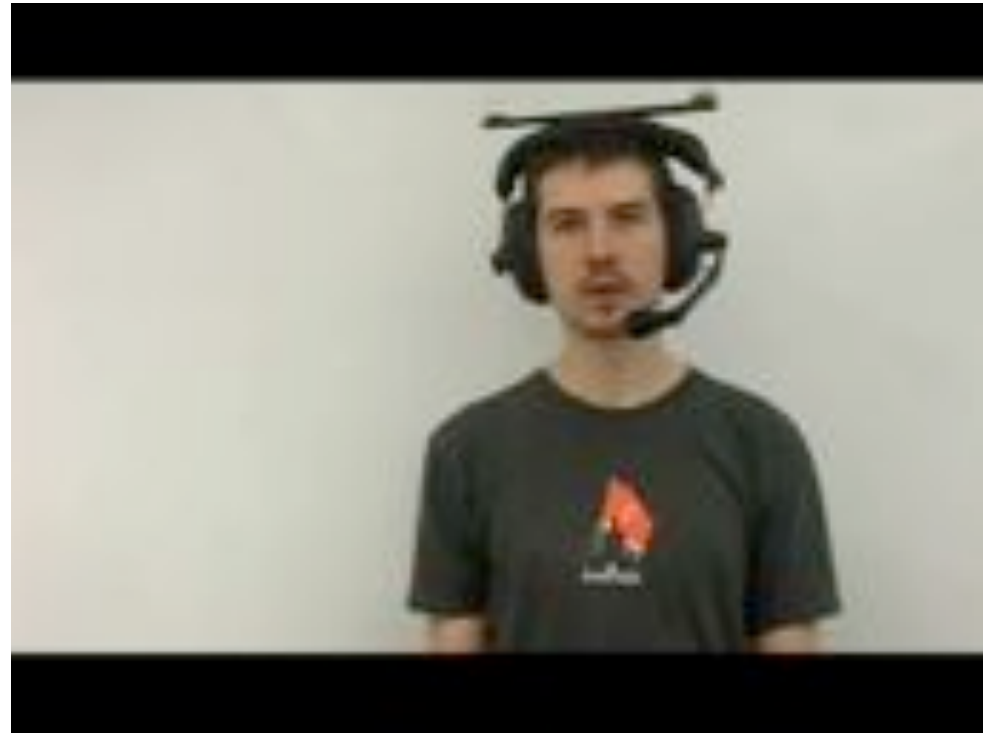
# Deep Limb Sensation

by Pierre Proske and V2\_Lab  
in collaboration with Erasmus MC



# Audio Space

by Theodore Watson



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