

Welcome to Virtual Reality, CS 498 SL

Prof: Anna Yershova

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About me:

- BS, applied mathematics, Kharkiv, Ukraine, 1999
- MS, Computer Science, Iowa State University, 2003
- PhD, Computer Science, UIUC, 2008
- Postdoc, Duke University, 2008-2010
- Lecturer, UIUC, 2010-present
- Oculus VR, Research Scientist, 2012-2014

A Bit About Oculus

- 2012, Palmer Luckey made a prototype headset (ducktaped!)
- Aug 2012, John Carmack improved it and showed at E3.
- Aug 2012, game industry leaders showed strong support, Oculus is founded (Brendan Iribe, Michael Antonov, Nate Mitchell, and Jack McCauley)
- Sep 2012, kickstarter very successfull.
- 2012-2014, over 60,000 headsets sold.
- March 2014, Facebook aquires Oculus for \$2 billion.



A Bit About Oculus



What to Expect

Coursework:

- Two midterm exams, no final
- 5 machine problems (work in groups of 2 people)
- Final project (topics on the webpage)

Programming:

- VR Lab: 4240 Siebel Center
- 12 PCs with TitanBlack graphics cards 6Gb, 2 monitors 27", Oculus Rifts DK2s
- Windows 8
- Visual Studio / Unity, free game engine
- Unity scripts in C# or Java / C++ with raw Oculus SDK

Where to Get Help

Website: <https://courses.engr.illinois.edu/cs498sl/>

Not in CS? Meet people outside.

Textbooks:

- Mather, Foundations of Sensation and Perception, 2nd ed, 2009.
- Shirley et al., Fundamentals of Computer Graphics, 2009.

Class Forum: Piazza

What's This Course About

GOALS:

- Learn how to build a *good* VR experience (comfortable + adequate for task)
- Understand how VR works (engineering + psychology)
- Learn how to criticize VR
- Learn fundamentals to shape future of VR

TASKS:

- Game
- Write code
- Maintain relationship
- Relax
- Watch film
- Travel to exciting of virtual places

Definition of VR

Inducing targeted behavior in an organism by using artificial sensory stimulation, while the organism has little or no awareness of the interference

Examples of VR

YouTube



Omni: Real Battlefield Place [Future of Gaming in the world]

Examples of VR

YouTube

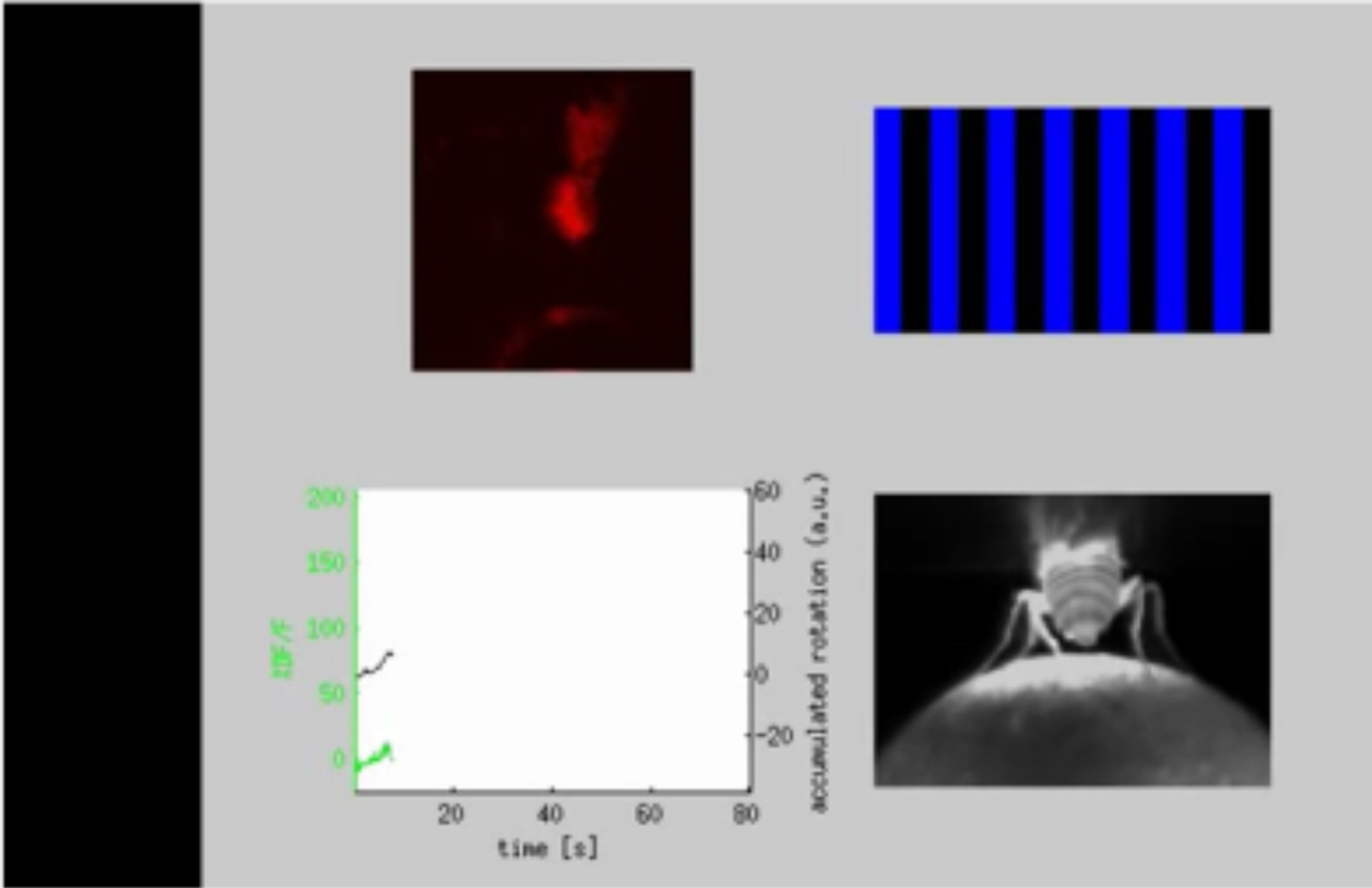


Mouse in VR Maze

2dforaging movie

The image shows a first-person view from inside a VR headset. The headset's lens is visible, showing a virtual environment with a maze-like structure. A mouse is positioned in the center of the field of view, appearing to be the player's avatar or a tool within the game. The scene is dimly lit, with some light reflecting off the headset's lens and the mouse's body. The overall atmosphere is dark and immersive.

Examples of VR



The image shows a YouTube video player interface. The video title is "Fruit Fly on Treadmill". The video content is divided into four panels:

- Top-left: A close-up of a fruit fly, appearing as a bright red shape against a dark background.
- Top-right: A series of vertical blue stripes on a black background, representing a visual stimulus.
- Bottom-left: A graph with two y-axes and one x-axis. The x-axis is labeled "time [s]" and ranges from 0 to 80. The left y-axis is labeled "IZF/F" and ranges from 0 to 200. The right y-axis is labeled "accumulated rotation (a.u.)" and ranges from -20 to 60. The graph shows a green line for IZF/F and a black line for accumulated rotation.
- Bottom-right: A fruit fly on a treadmill, shown in a grayscale, top-down view.

Fruit Fly on Treadmill

Who is the laboratory rat, and who is the scientist?

Definition of VR

Inducing targeted behavior in an organism by using artificial sensory stimulation, while the organism has little or no awareness of the interference

Who is the laboratory rat and who is the scientist?

Define *awareness*? (Play place cell video)

VR or not VR?

- playing second life (first person video game)
- watching a movie
- video conferencing
- listening to the music
- playing a third person video game
- AR
- talking on the phone
- reading a book
- looking at a painting
- being under the influence of a hallucinogenic drug
- wearing thermal clothes

Definitely VR

Socializing in Virtual Spaces



Open Sim, Second Life, ...

Definitely VR

Architecture and Real Estate



Do you wish your home were bigger?

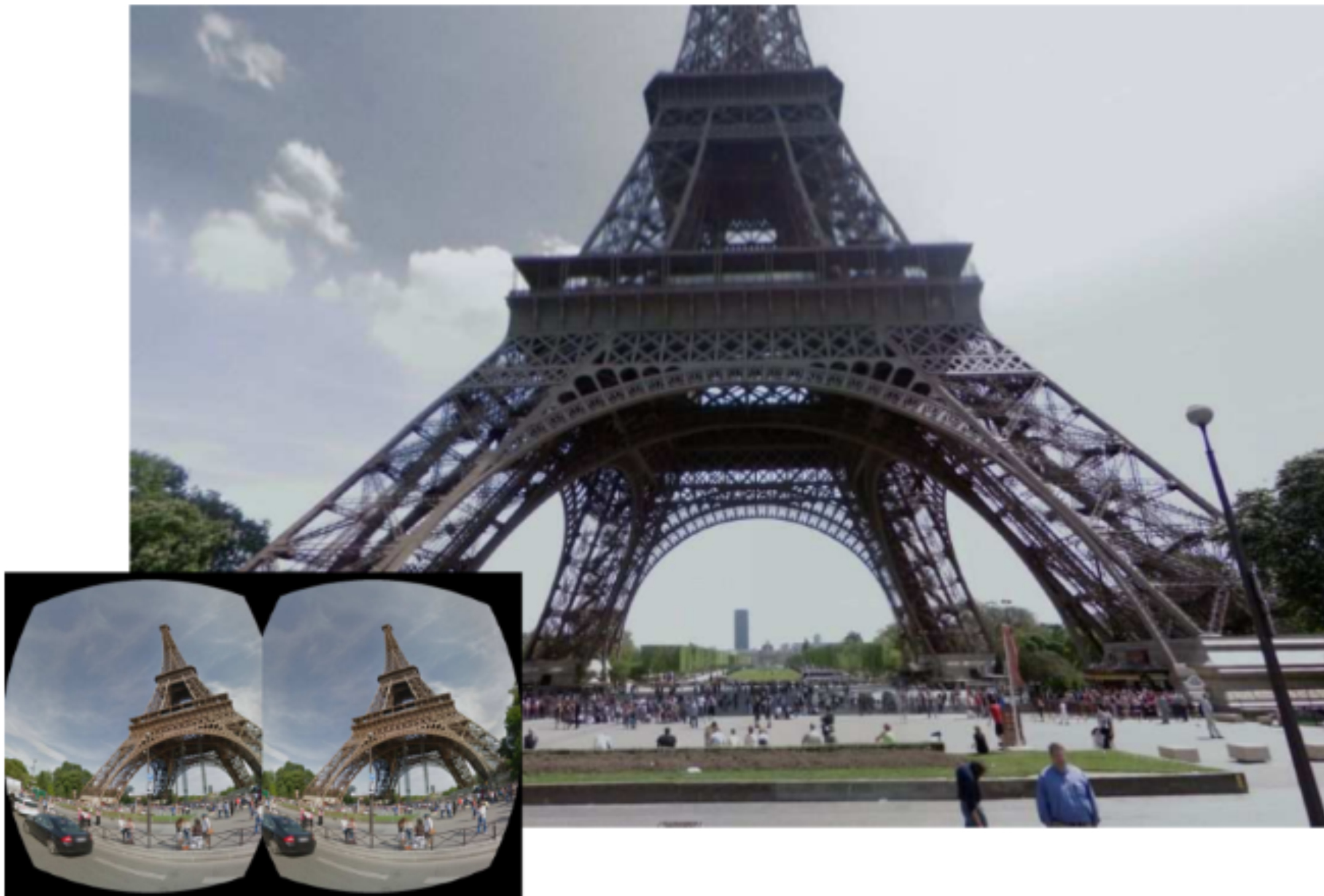
Definitely VR

Movies



Definitely VR

Panoramas



Pick your favorite street views and have a look around.

Definitely VR

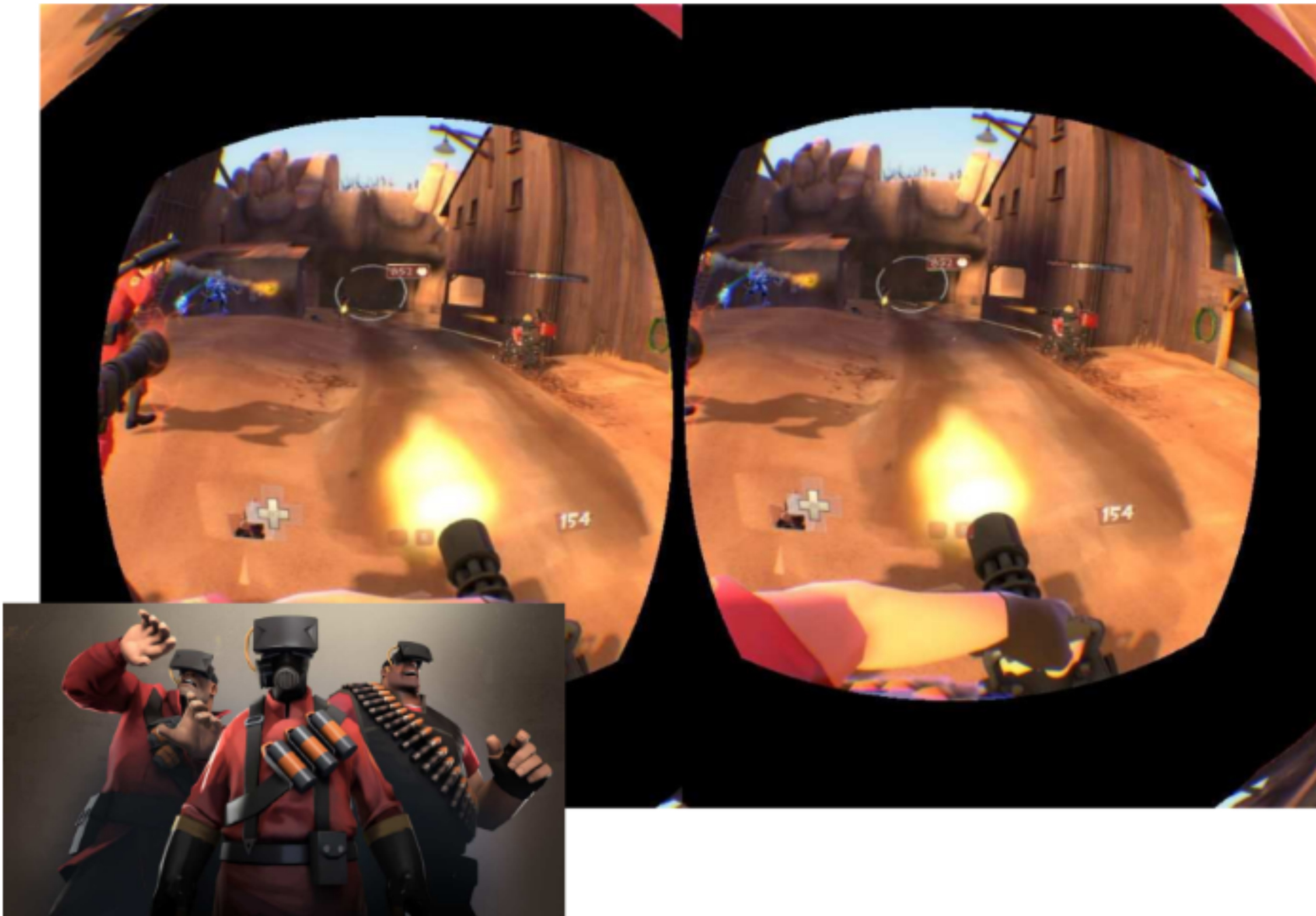
VR + Robots



Connect omnidirectional cameras to mobile robots, humanoids, quadrotors

Definitely VR

First-Person Shooter Games



Team Fortress 2, Valve Inc.

Definitely VR

VR Game Jam



What could you do with an elephant trunk?

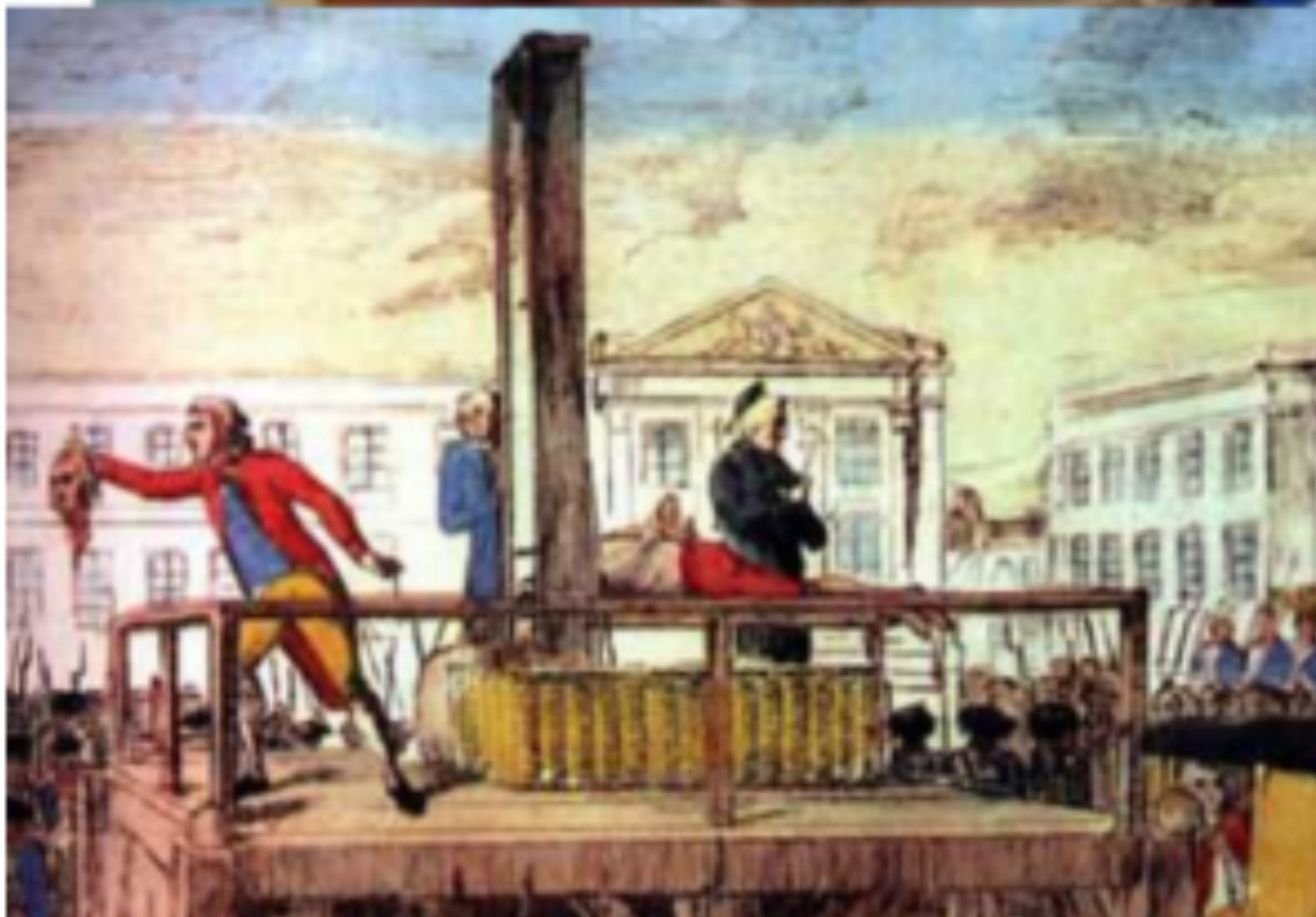
Definitely VR

Thrill Seekers



Virtual amusement park rides!

Definitely VR



Ever wonder how Louis XVI must have felt?

Definitely VR



Definitely VR

Flying Like in Your Dreams



Zurich University of the Arts