

# Interaction Design & Computer Vision Techniques

Liwei chan 詹力韋  
Assistant Prof.

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# Interaction Design

## & Computer Vision Techniques

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# Interaction Design & Virtual Reality

Liwei chan 詹力韋  
Assistant Prof.

who I am

**2005**

**2010 phd., ntu**  
**on human computer interaction**  
**(acm chi, uist ... )**

**2011 postdoc, HPI, germany**

**2012 military service, taiwan**

**2013 postdoc, academia sinica**

**2014 assistant researcher, ntu intel**

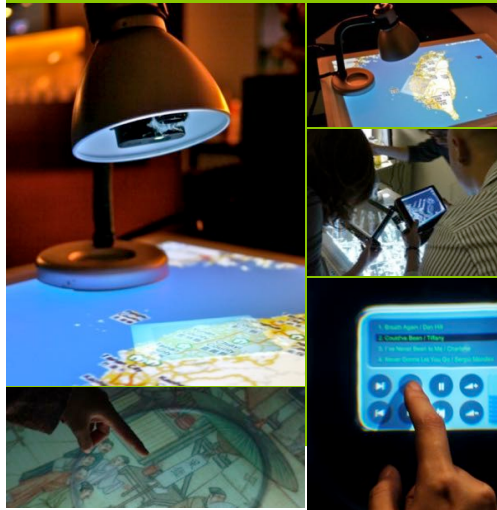
**2015 assistant prof, kmd., japan**

**2016 assistant prof., here**

**HCI**

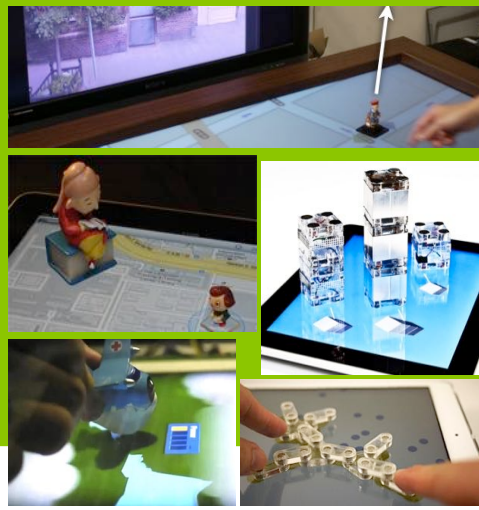


## Tabletop UI



(2008 – 2011)

## Tangible UI



(2011-2014)

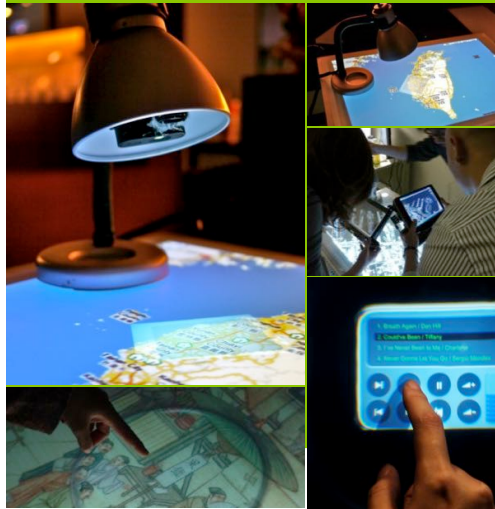
## BodyUI



(2013-2015)



## Tabletop UI



(2008 – 2011)

## Tangible UI



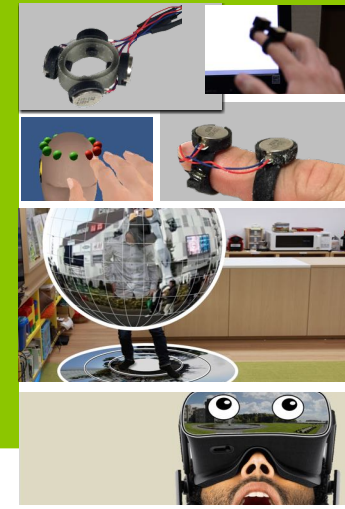
(2011-2014)

## BodyUI



(2013-2015)

## SpatialUI HapticUI



(2016 KMD)





# embodied interaction



# superhuman sport



who you are

**this  
course**

# **Interaction Design**

**& Computer Vision Techniques**

# **Interaction Design & Virtual Reality**



### **Interaction Design**

- Iterative Design Process
- Sketching / Visual Design
- Lo/Hi-Fi Prototyping
- Ramesh's Invention Box

### **HCI Topics**

- Touch/Tangible/Body UI
- Muscle IO (invited speaker)
- Goods and Bads in Virtual Reality

### **Tools**

- Arduino
- Unity
- Unity and its friends
- HMD-related toys

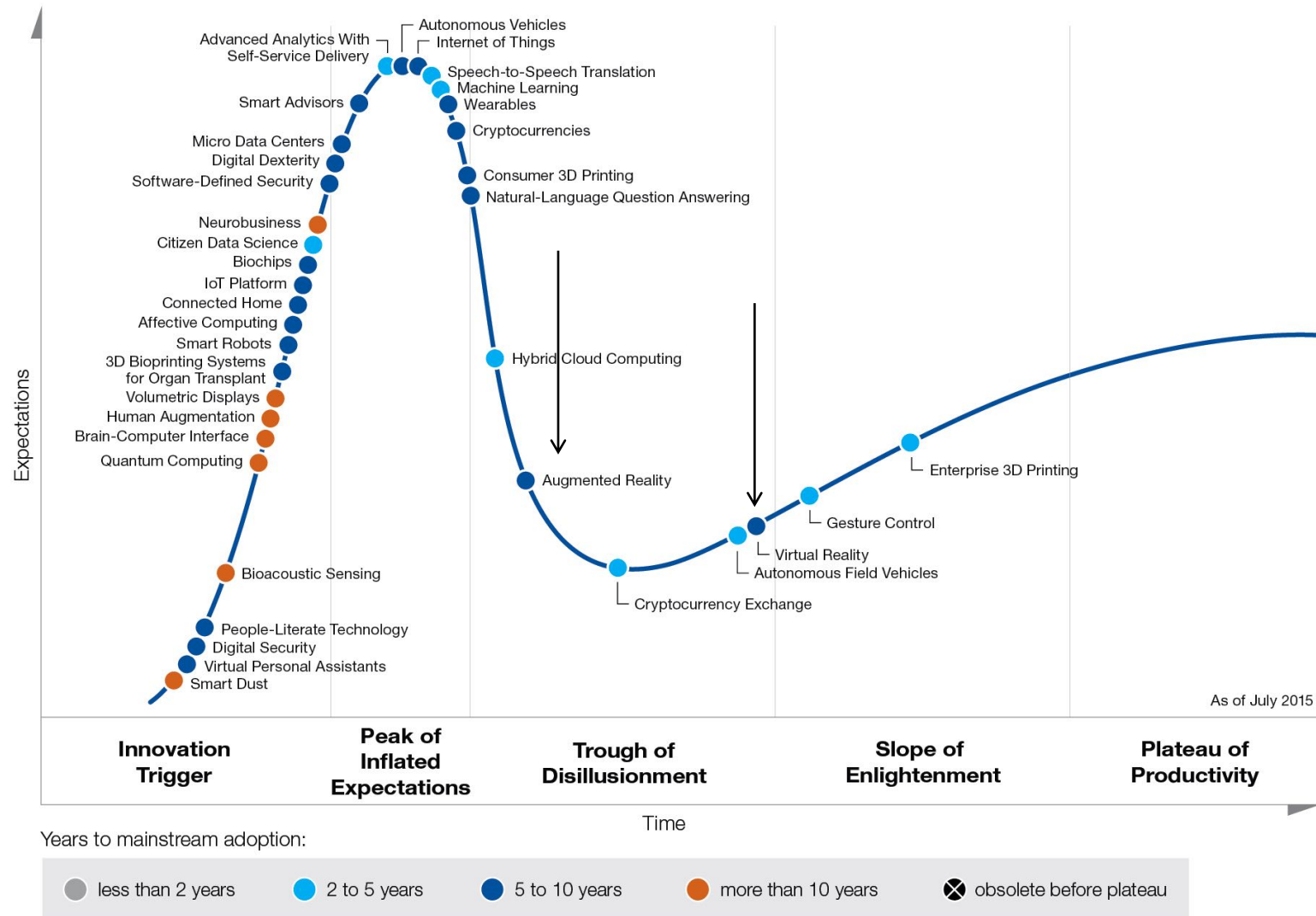
### **Term project**

- Proposal
- Proposal Revised
- Final w/ Demo

# grade on project

- No exam
- Team work (3-person team)
  - Personal proposal (**next lecture**)
  - Team Project proposal
  - Lo-Fi Prototype Presentation
  - Team project proposal Revised
  - Final demo (w/ poster design)

# Emerging Technology Hype Cycle



## AR/VR市場が「爆増」、2020年には16兆円規模に



VR/AR機器の出荷台数の見通し

**VR/AR**

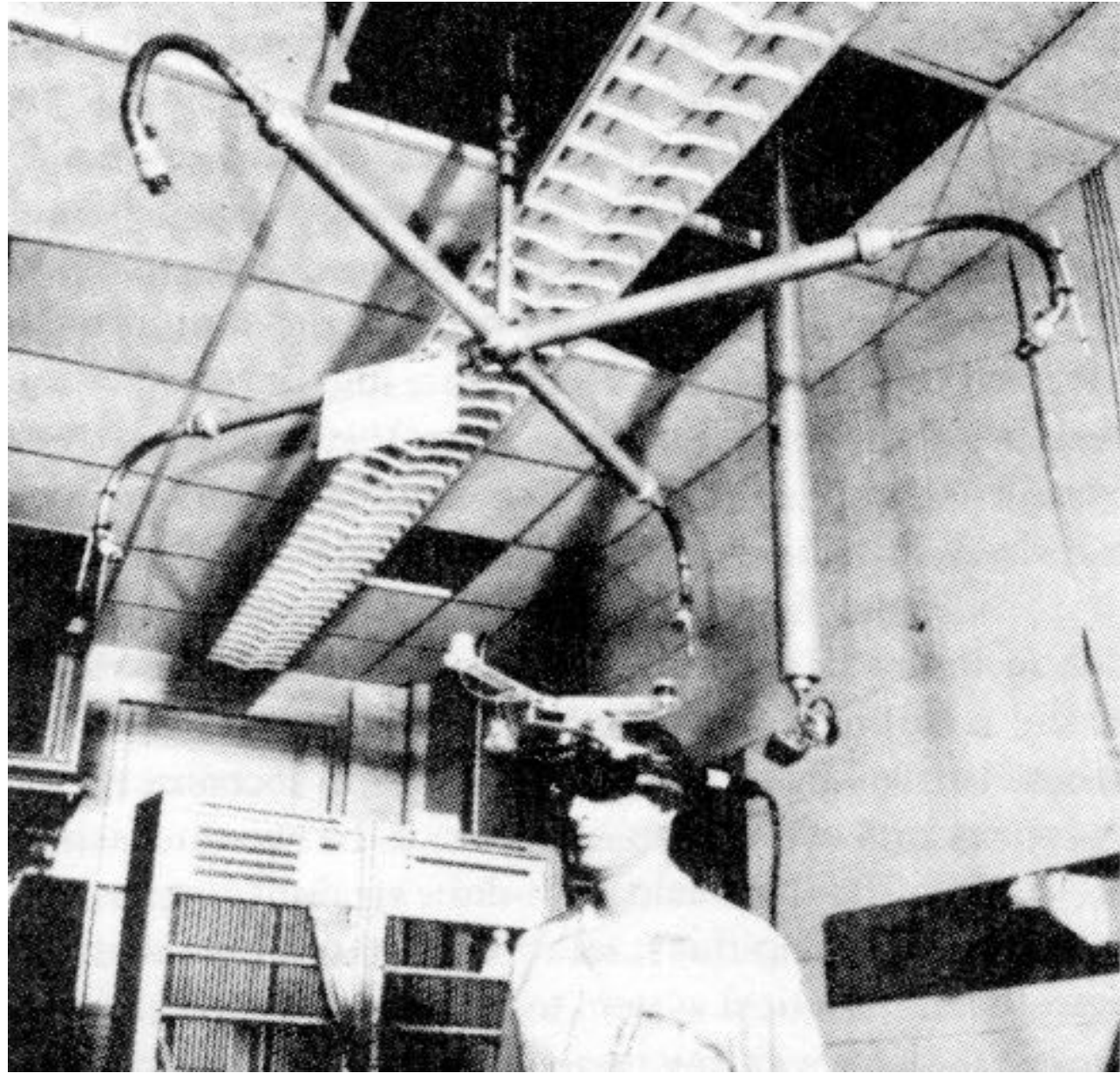
**in VR. You can do anything.**



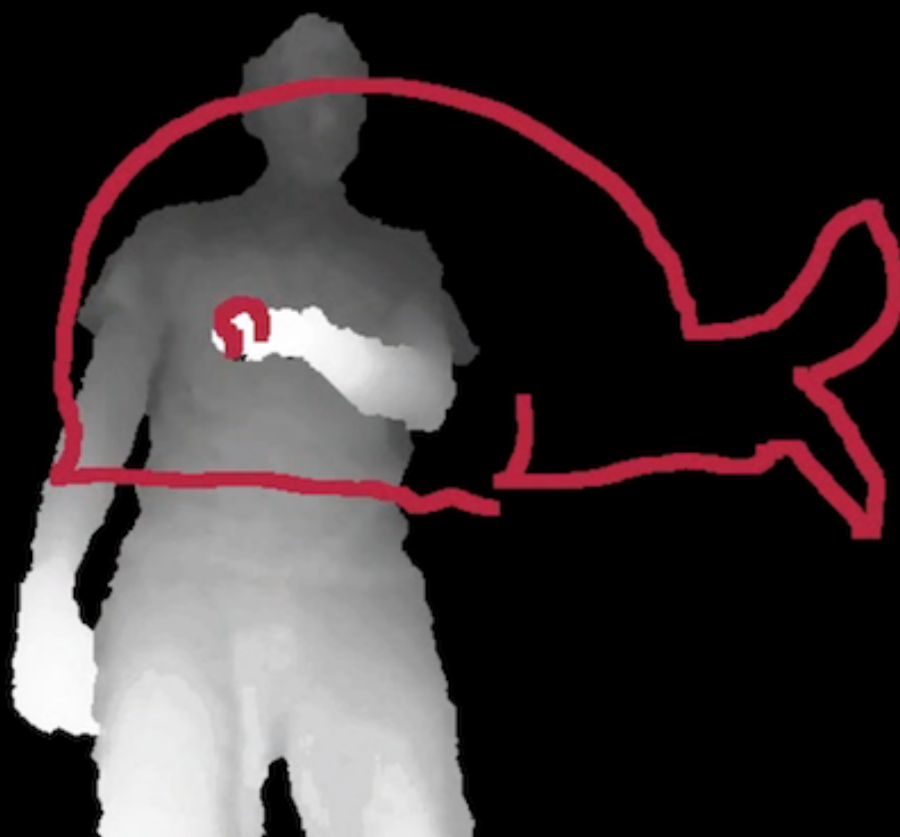
**in VR. You can be anyone.**

**VR = experience player**

# Ivan sutherland ultimate display 1965



**what VR applications exactly  
are we going to create ?**







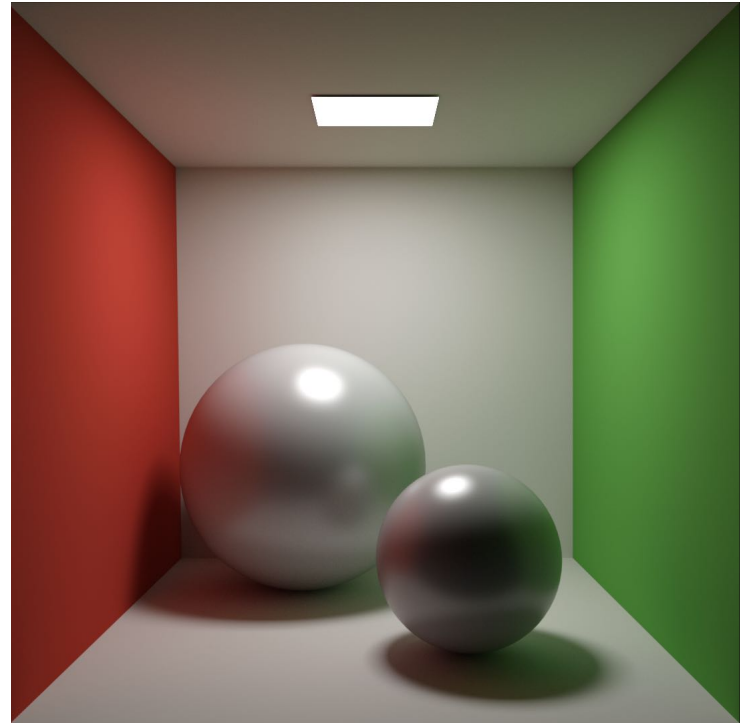


**1. Realistic  
Experience**

**2. Beyond  
Reality**

**3. New  
Utility**

# Realistic Experience





Po2

<https://www.disneyresearch.com/publication/po2-interactive-gameplay/>



# Level-Ups: Motorized Stilts that Simulate Stair Steps in Virtual Reality

**Level-Ups**

<https://www.youtube.com/watch?v=UhqYIMG6nWE>





# VibroSkate

You can even change the direction by moving your center of gravity.

<https://www.youtube.com/watch?v=tq2eVUBTJ7k>



# HapThimble: A Wearable Haptic Device towards Usable Virtual Touch Screen

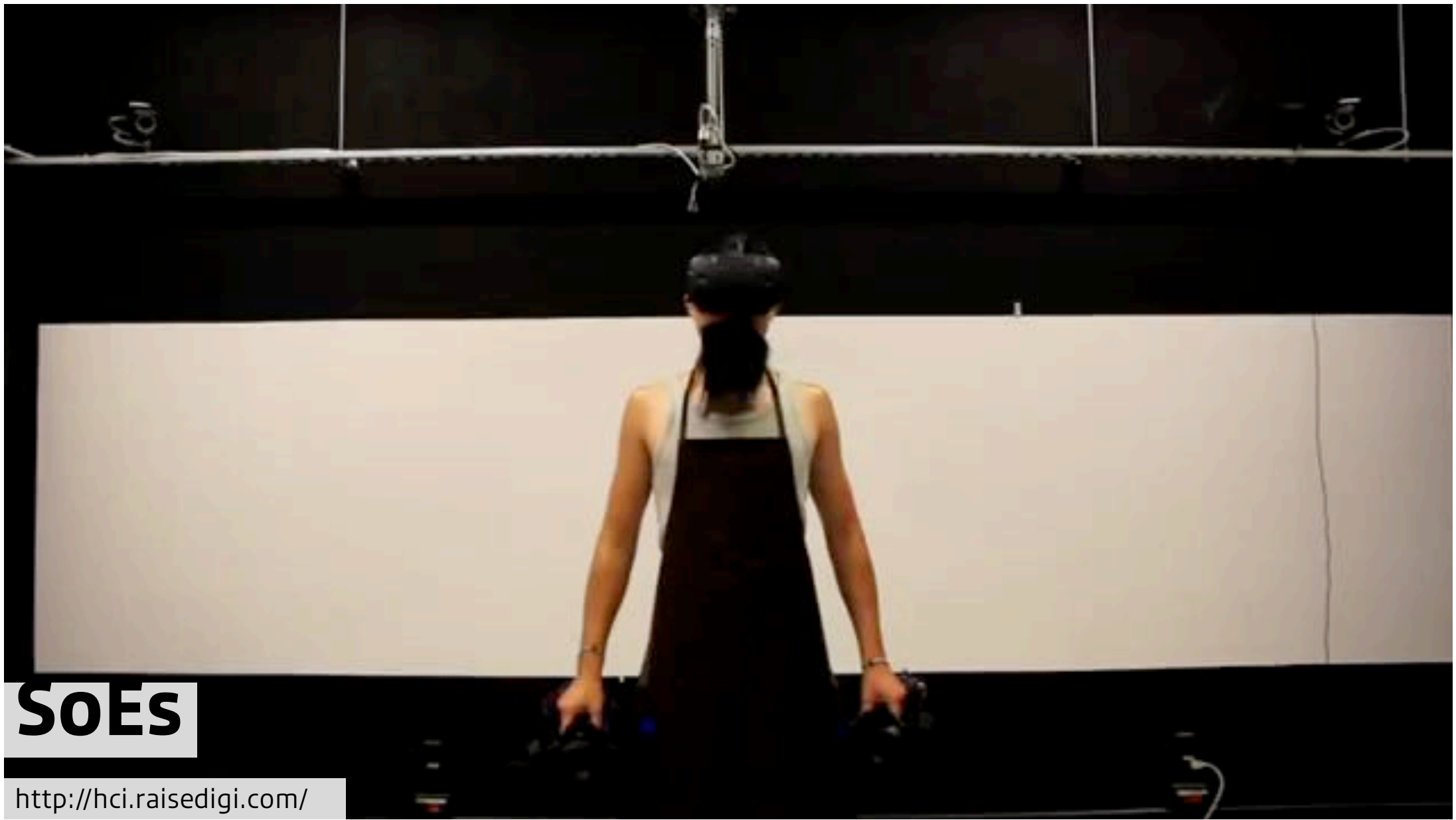
Hwan Kim, Minhwan Kim, and Woohun Lee  
{hwan.kim, minhwan.kim, woohun.lee}@kaist.ac.kr

WonderLab, Department of Industrial Design, KAIST  
<http://wonderlab.kaist.ac.kr>



## HapThimble

<https://www.youtube.com/watch?v=4MR3GDbVV4>



**SOES**

<http://hci.raisedigi.com/>

## Impacto

Simulating Physical Impact by Combining Tactile with Electrical Muscle Stimulation



pacto

Alexandra Ion, and Patrick Baudisch



<https://www.youtube.com/watch?v=CNEZguz1NEU>

# Surreal Experience





**Birdly**





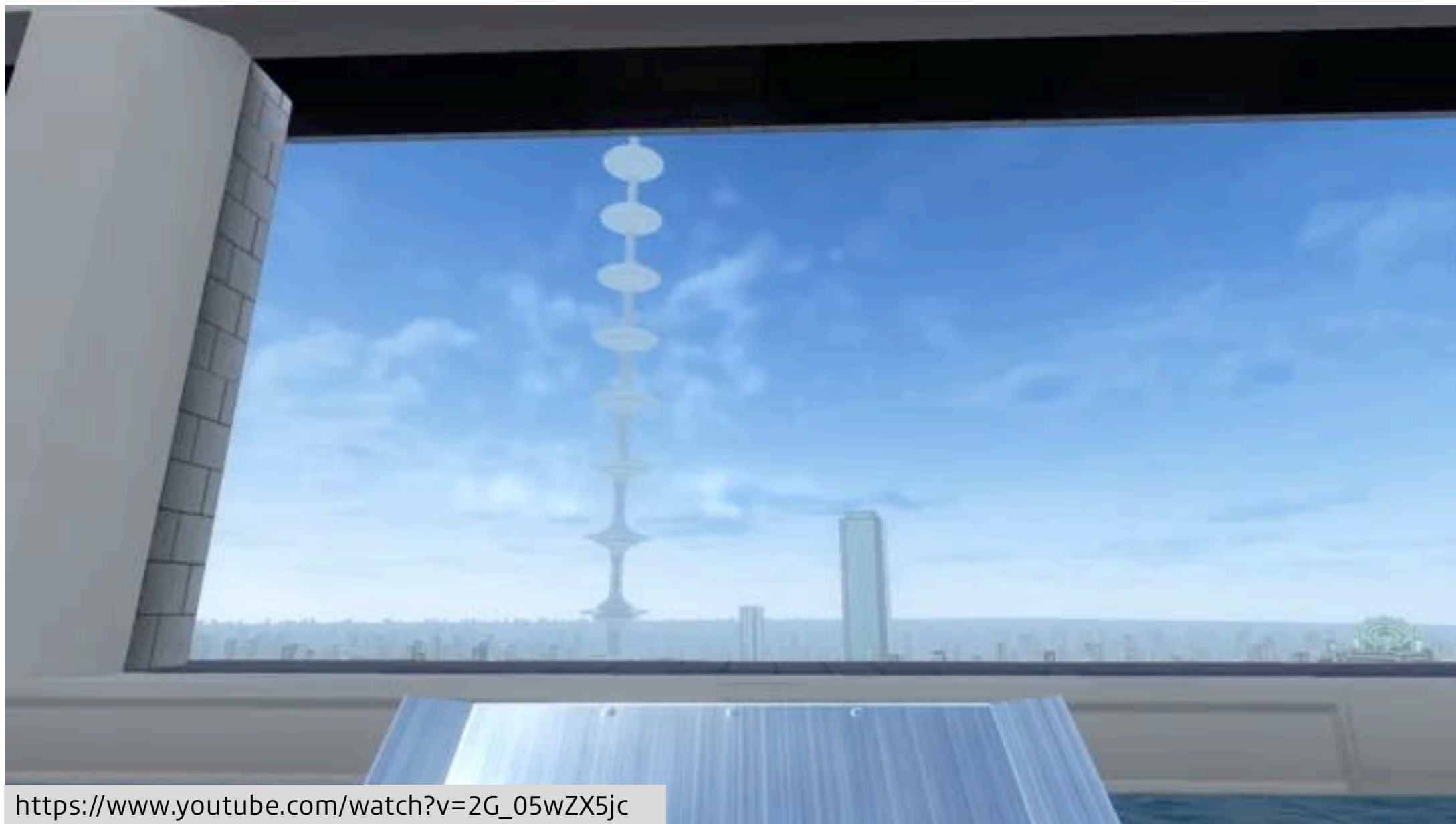
<https://www.youtube.com/watch?v=6pMUtVIXDM8>



# Tokyo Bullet Flight

[https://www.youtube.com/watch?v=2G\\_05wZX5jc](https://www.youtube.com/watch?v=2G_05wZX5jc)

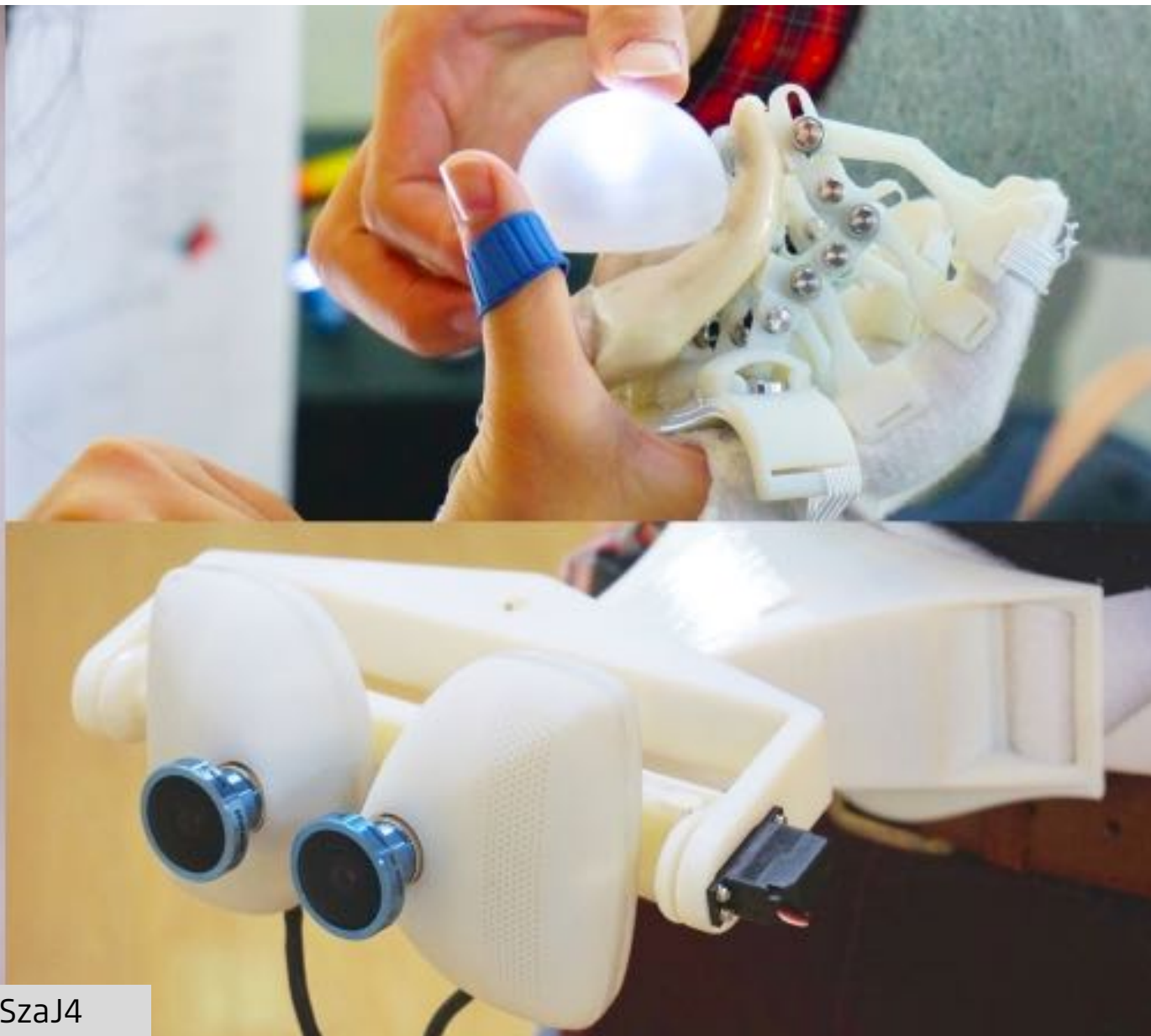




[https://www.youtube.com/watch?v=2G\\_05wZX5jc](https://www.youtube.com/watch?v=2G_05wZX5jc)



**Childhood**



<https://www.youtube.com/watch?v=4KrztJSzaJ4>







**OoEs:**

Playing in the Immersive Game  
with Augmented Haptics

**OoEs**

<https://www.youtube.com/watch?v=3ckHhrwdJGA>

# Enabling New Utility

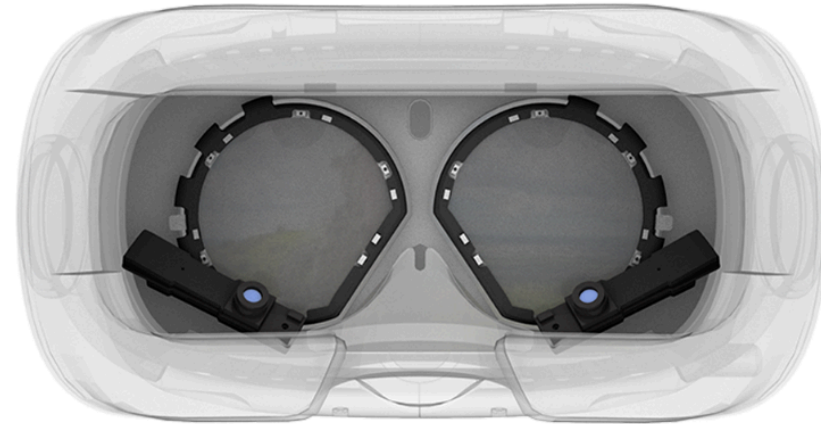
Problem solving

- Input modality
- Output modality
- Information access
- Rapid prototyping

# FOVE: The World's First Eye Tracking Virtual Reality Headset



# Pupil-Lab



## HTC Vive Binocular Add-on

Add binocular eye tracking to your HTC Vive VR Headset. Includes binocular 120hz eye tracking cameras, clip-on attachment rings with IR illuminators and USB connector clip. No tools required!

€ 1400

<https://pupil-labs.com/>



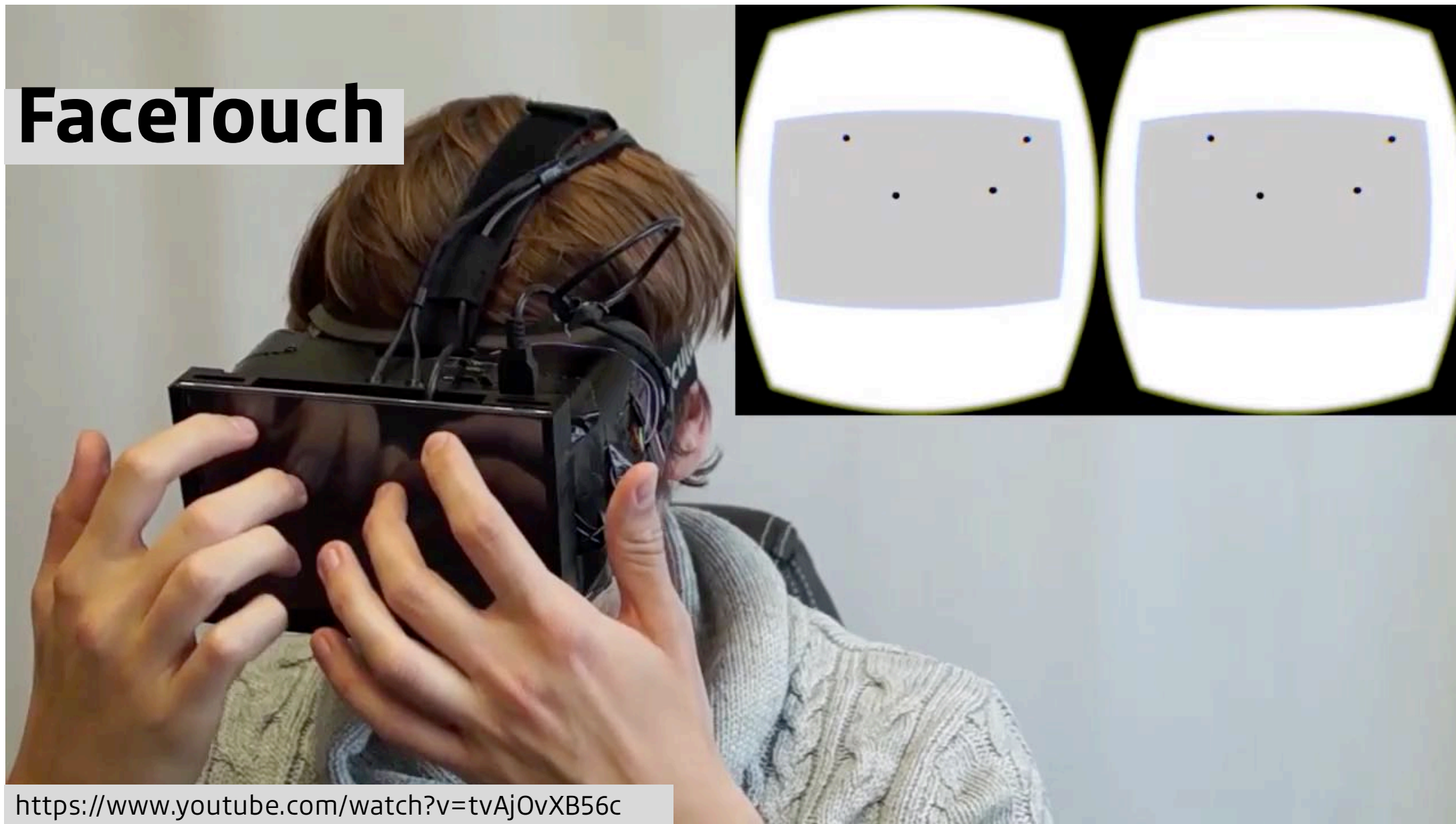
# Virtuix Omni



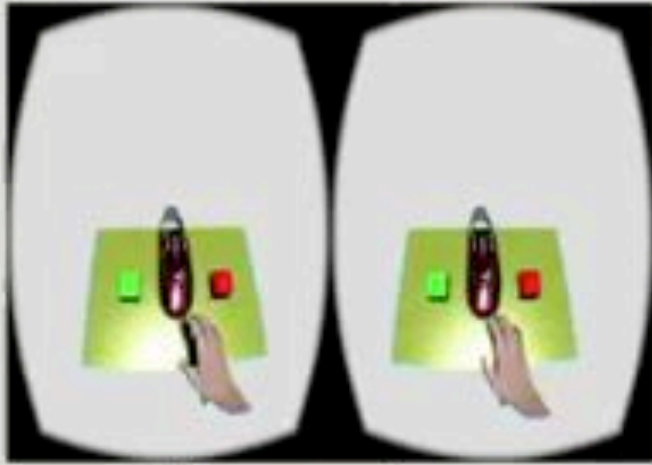
<http://www.virtuix.com/>

The Virtuix Omni is now available for Pre-Order at [Virtuix.com](http://www.virtuix.com)

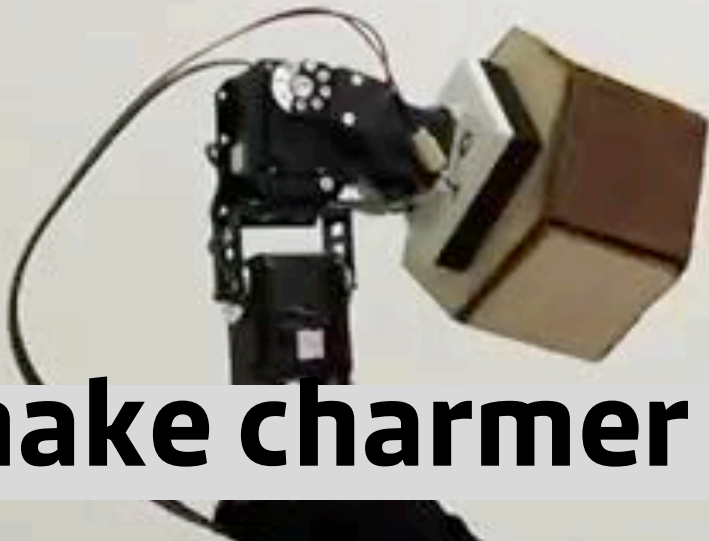
# FaceTouch



<https://www.youtube.com/watch?v=tvAjOvXB56c>



User view



# Snake charmer

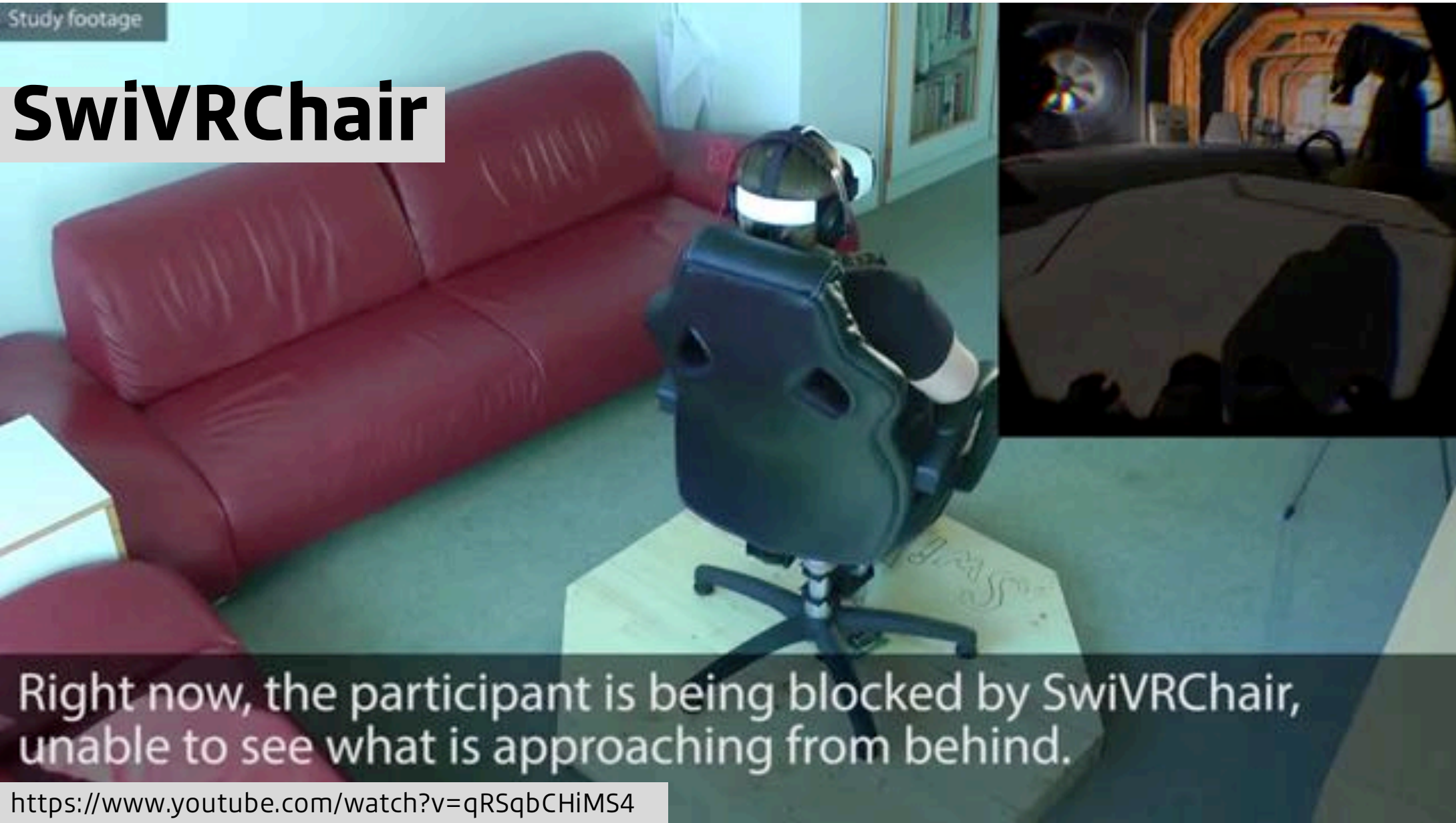
<https://www.youtube.com/watch?v=I3ue35F3CSg>





Study footage

# SwiVRChair



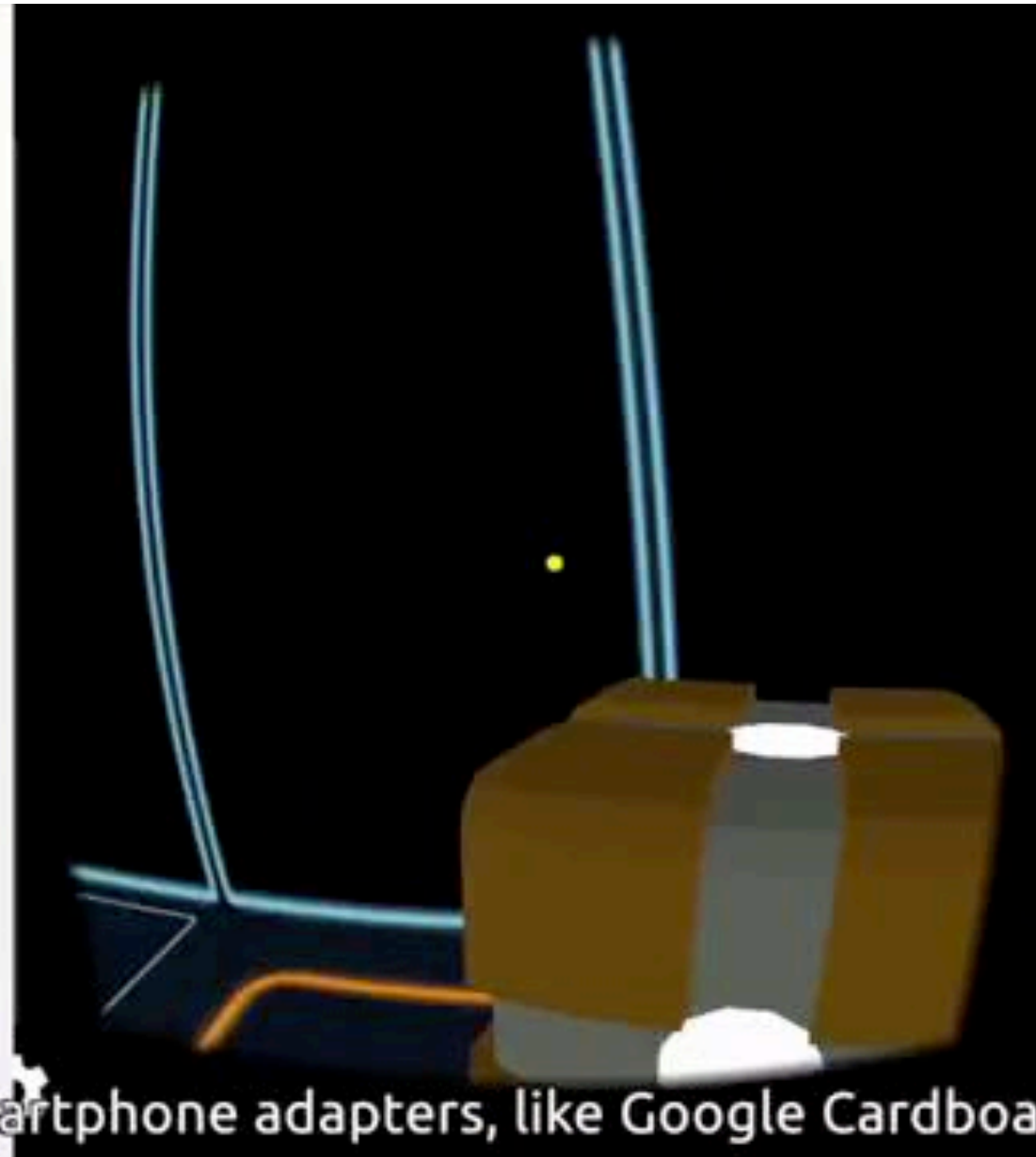
Right now, the participant is being blocked by SwiVRChair, unable to see what is approaching from behind.

<https://www.youtube.com/watch?v=qRSqbCHiMS4>



## VR-Step

<https://www.youtube.com/watch?v=kCl8P1tdMX0>



smartphone adapters, like Google Cardboa

To build up new VR experience,  
sometimes (advanced) skills that  
this course will not cover  
are required.

Tip:

find an idea that drives you hard  
to learn on your own



If you decide to take this course,  
here is the assignment due next Monday for you.

# assignment

1. Create an idea from 1 of the 3 categories.
2. Prepare a slide (2 pages) to visualize your idea with sketches or images.
  - Page 1: who you are. what you are good at. hobby. anything you want to share.
  - Page 2: your crazy idea
3. Add your slide to google slide page **by 12 pm on Sep. 19th.**
  - [Google presentation](#)
4. Present your idea on Sep. 20<sup>th</sup> in the lecture.
5. Team-build in the lecture.

- [Google presentation](https://docs.google.com/presentation/d/1j5m-Ggczoc59JVTujj6lbl3t2-ARNrlen5_Bk12GQe8/edit)

[https://docs.google.com/presentation/d/1j5m-Ggczoc59JVTujj6lbl3t2-ARNrlen5\\_Bk12GQe8/edit](https://docs.google.com/presentation/d/1j5m-Ggczoc59JVTujj6lbl3t2-ARNrlen5_Bk12GQe8/edit)

Novelty – no one did before. (70 %)  
Feasibility – can it be implemented? (30 %)