3D User Interfaces – Tutorial 1

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Summer Semester 2023

Topics Today

- Organizational Structure of the Tutorials

- Sneak Peak into the Topics

- Motivation for the Next Homework

- Q & A Tutorial 0

Tutorial Structure I

Until June, 12th

Homeworks & Sync Courses („Zentralübung")
- **Only chance for questions to Linda about last weeks homework**
  - Be prepared!
- Outlook & advanced topics
  - Incl. Plenum Discussions on ongoing research
- Presentation of the next weeks homework

No synchronous Courses on May, 1st (Tag der Arbeit) & May, 29th (Pfingsten)
- But homeworks & Video lectures in these weeks

Doing the homeworks and understanding their content is essential to pass the exam (~30% of the questions are about the homeworks)

Exam-Relevant

Tutorial Structure II (tentative, might change)

Starting with June, 12th

Asynchronous work in on advanced projects

Project Requirements:

- groups of 2-4 students
- A target group, the team does not belong to
  (e.g. chess players if none of the team members plays chess)
- HCD & Evaluations
- Other input devices then mouse and keyboard
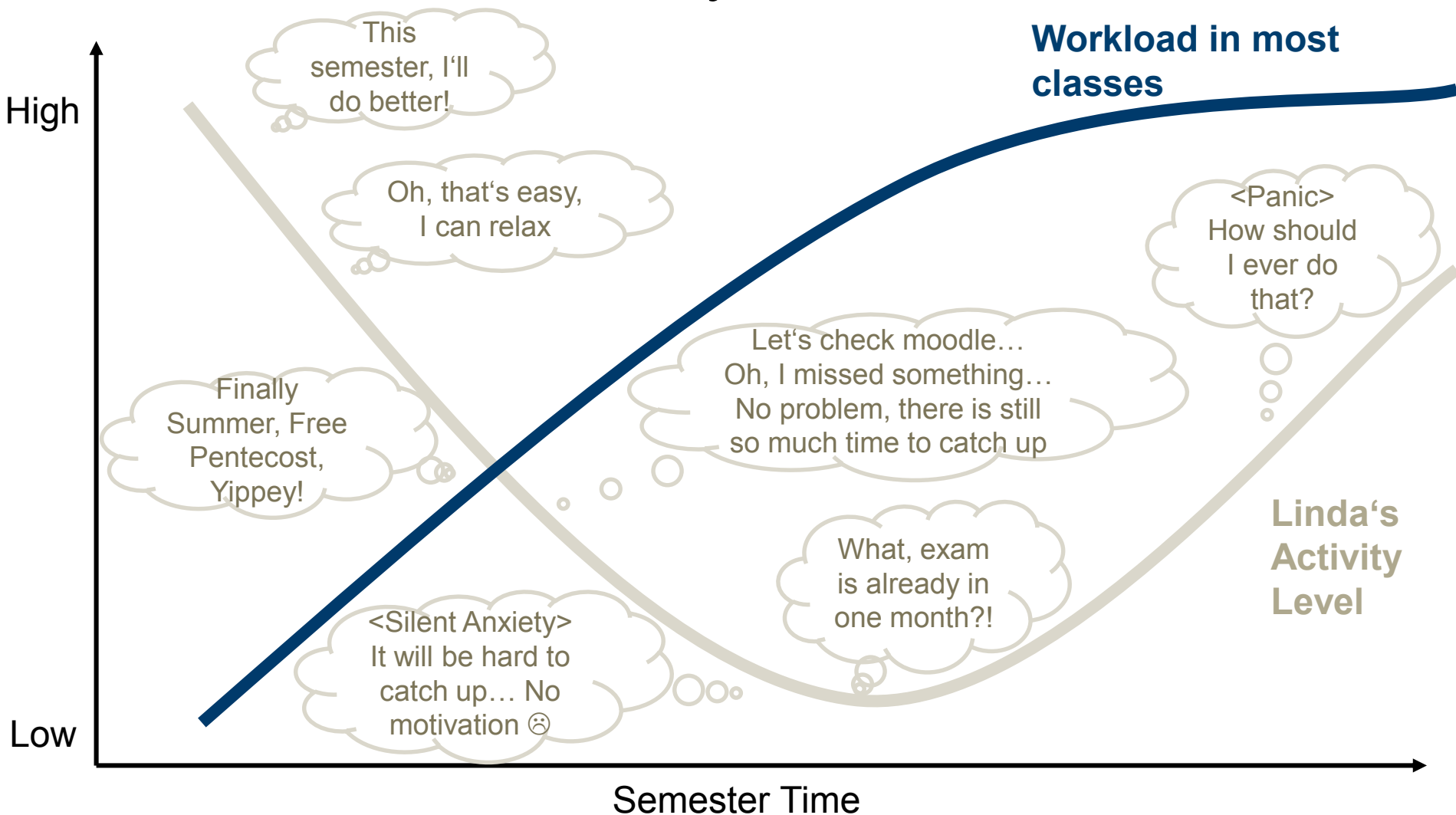- Good projects give a bonus for the exam

On mondays
- Talks about advanced 3DUI topics by PhD candidates of TUM FAR
  - Also essential for the exam (~20% of the exams questions)

Exam-Relevant

Why that structure?

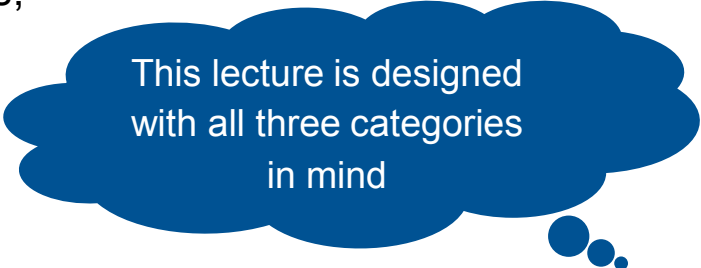# Linda as a student, every summer semester…

3 Types of Students

The beginners
- No previous knowledge about the topics, but curious and motivated
- Often extremely organized and hard-working

The experts
- Highly motivated in the beginning, able to work on their own and develop cool applications
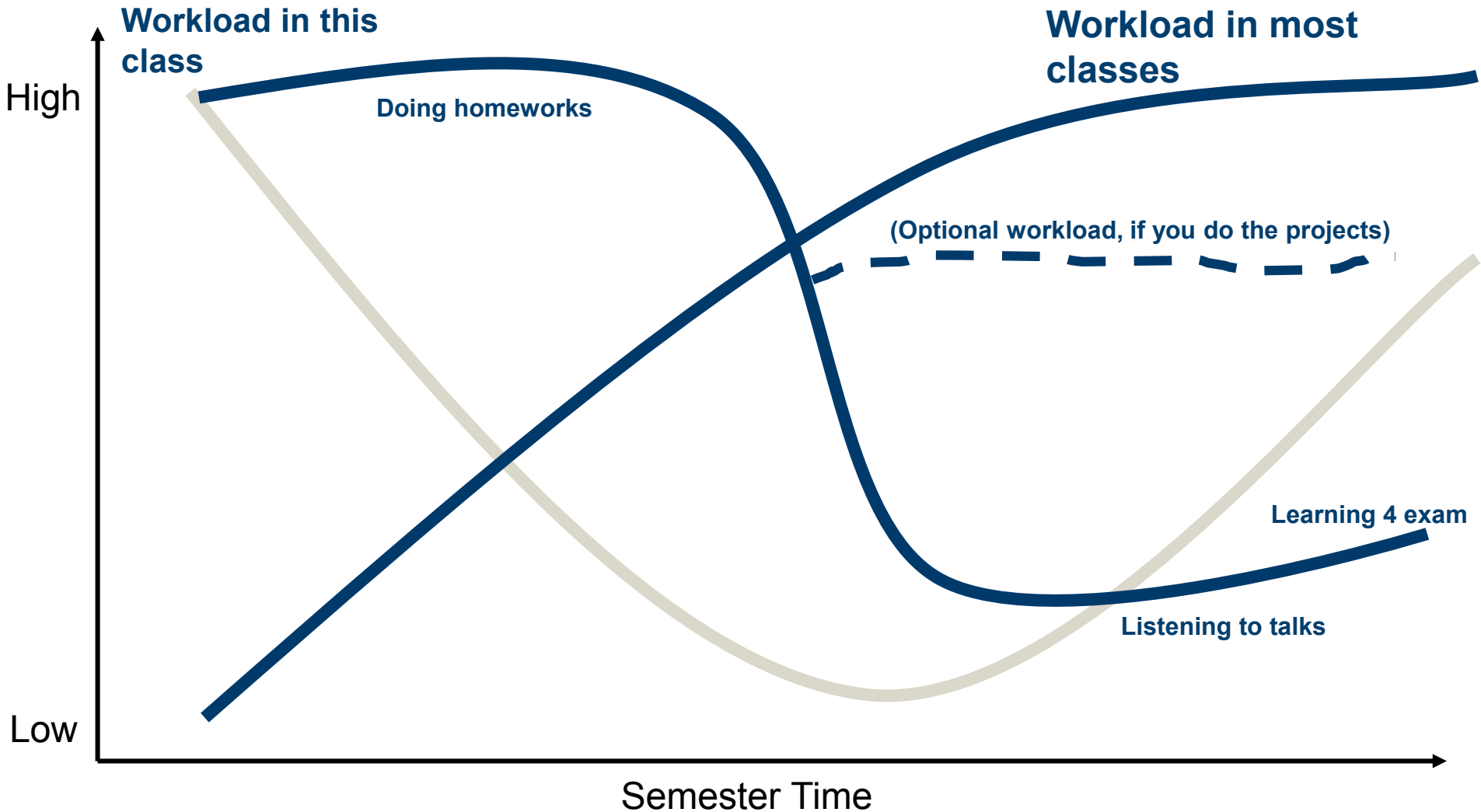- mostly a bit unstructured

The optimizer
- The course is not their main priority (mostly for good reasons like other specializations, family @ home, need to earn money)
- They just try to get the ECTS / pass the exam

This lecture is designed with all three categories in mind

Our attempt to be more student friendly

Workload in this class

Doing homeworks

Workload in most classes

(Optional workload, if you do the projects)

Learning 4 exam

Listening to talks
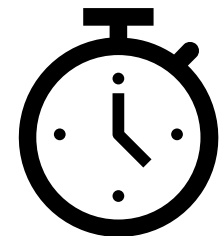
High

Low

Semester Time

Discuss with your neighbour

What student category do you belong to with respect to 3DUI?

- Do you feel represented by the scheme?

- What is your experience with other lectures workload?

5 - Minutes

And what are the homeworks and talks about?

Smartphone as interaction device

{ input : Smartphone
{ output : PC

Event handling

Sensors

Mobile Development

Network
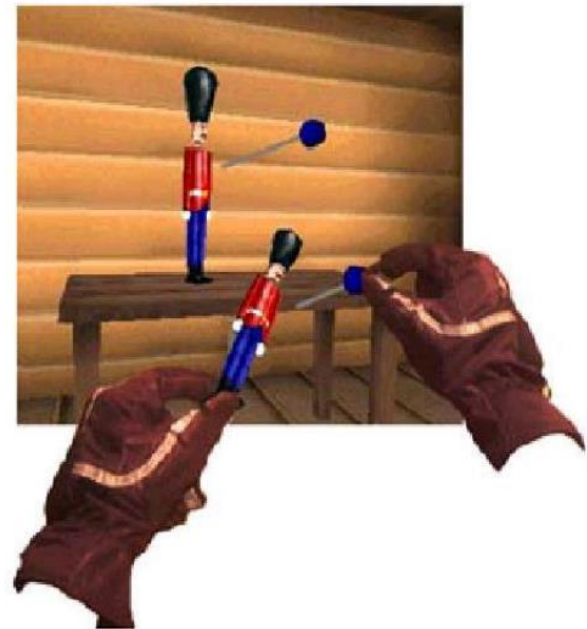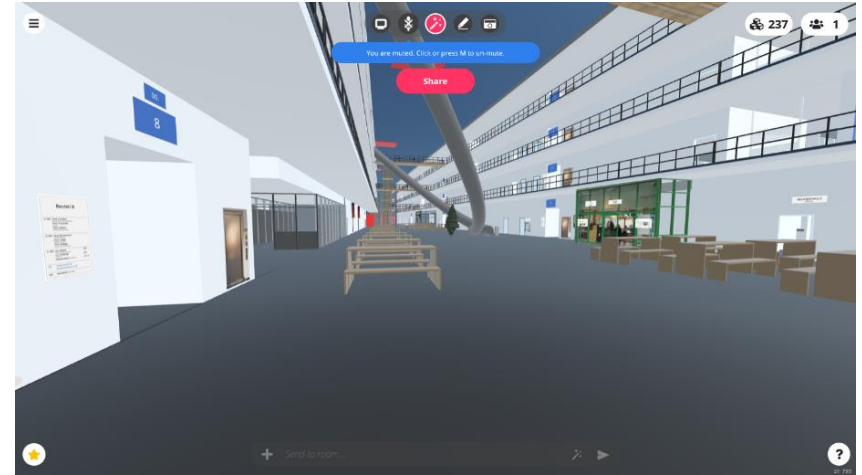
Selection / Manipulation metaphors

Image: Timur Nimaev
https://de.vecteezy.com/vektorkunst/4926658-virtual-reality-touch-hand-hintergrund
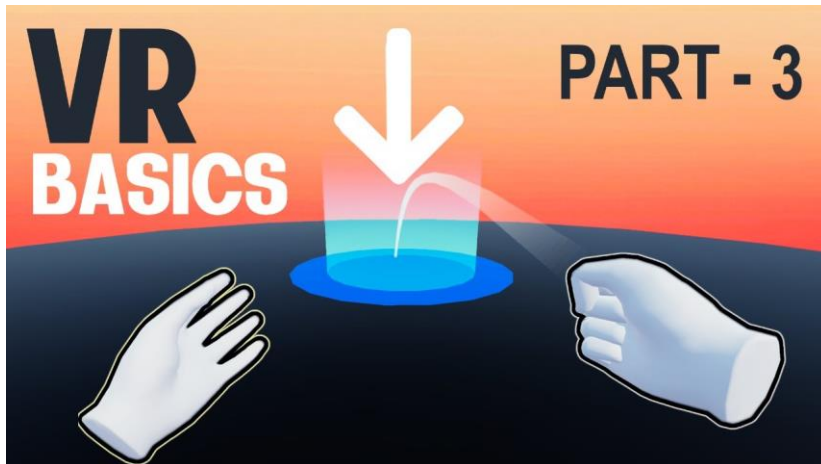

Pierce (1999) Voodoo Doll Technique
DOI: 10.1145/300523.300540

Travel & Wayfinding techniques

Virtual FMI Building Model by Prof. Klinker &
The Virtual Demo Day Team

By: Valem https://www.youtube.com/watch?v=fZXKGJYri1Y

Human Centered Development & Immersive System Engineering

Use - Case

Use Cases

System Engineering Procedures

Target Groups

System Modelling

Evaluation
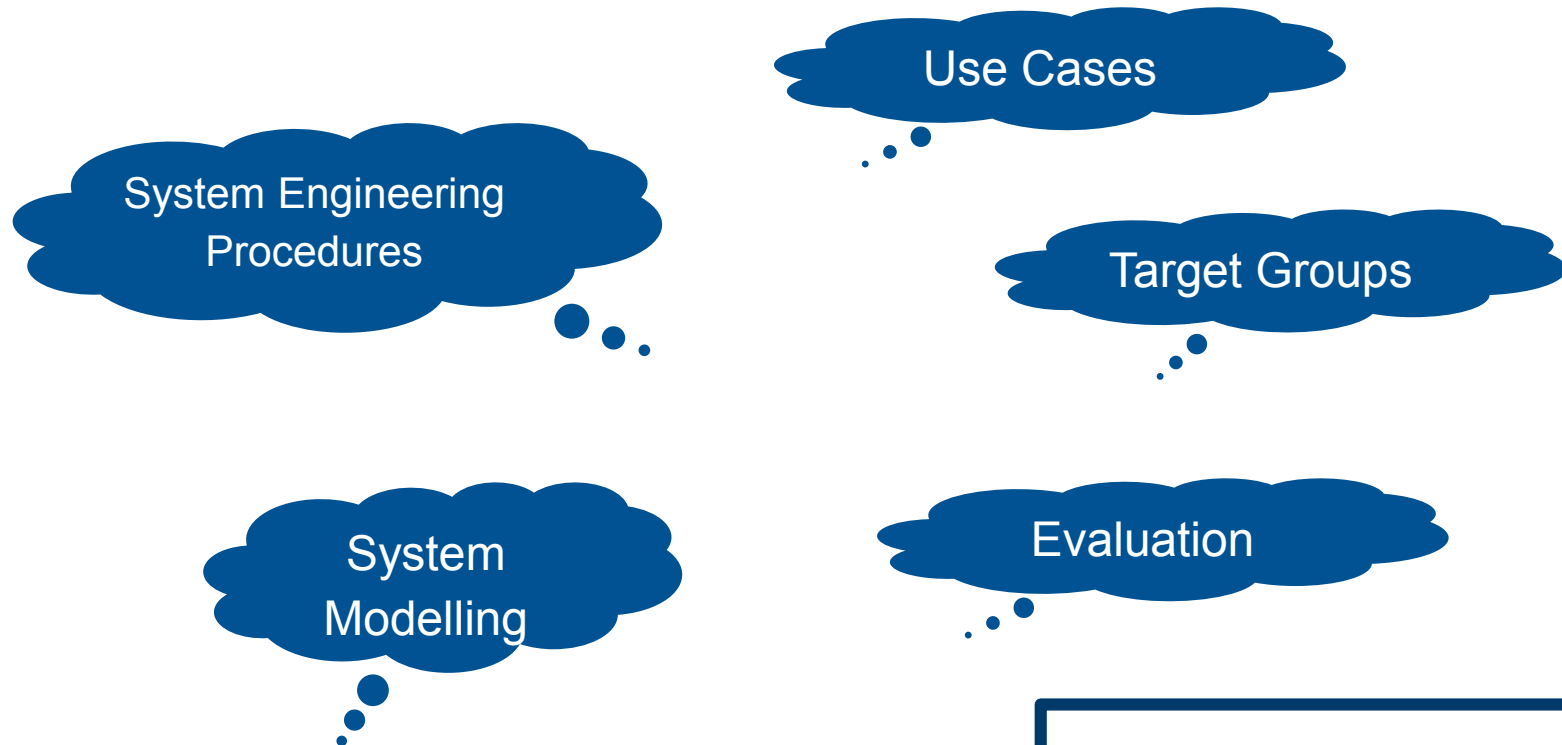
Yes: There will be homeworks about that!

Talks: Advanced 3D UI Topics
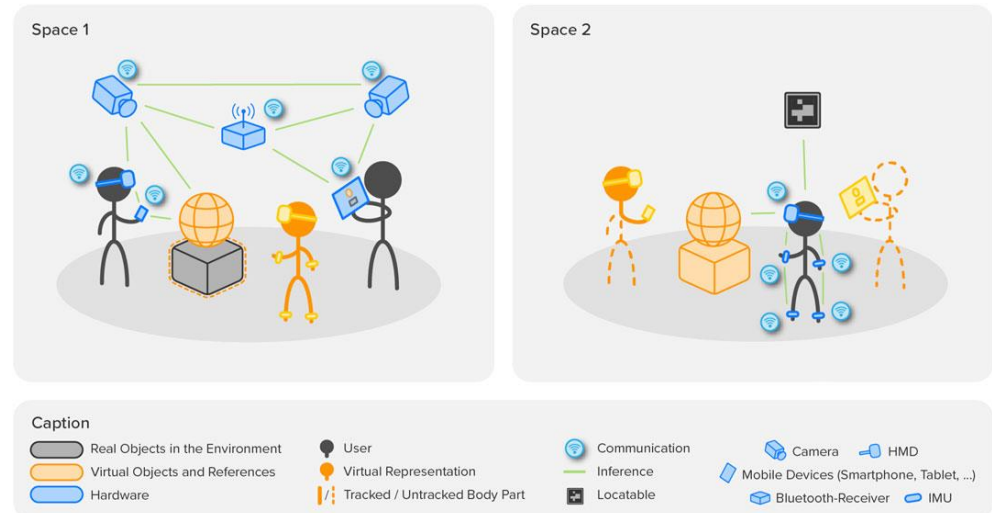

Tangibles
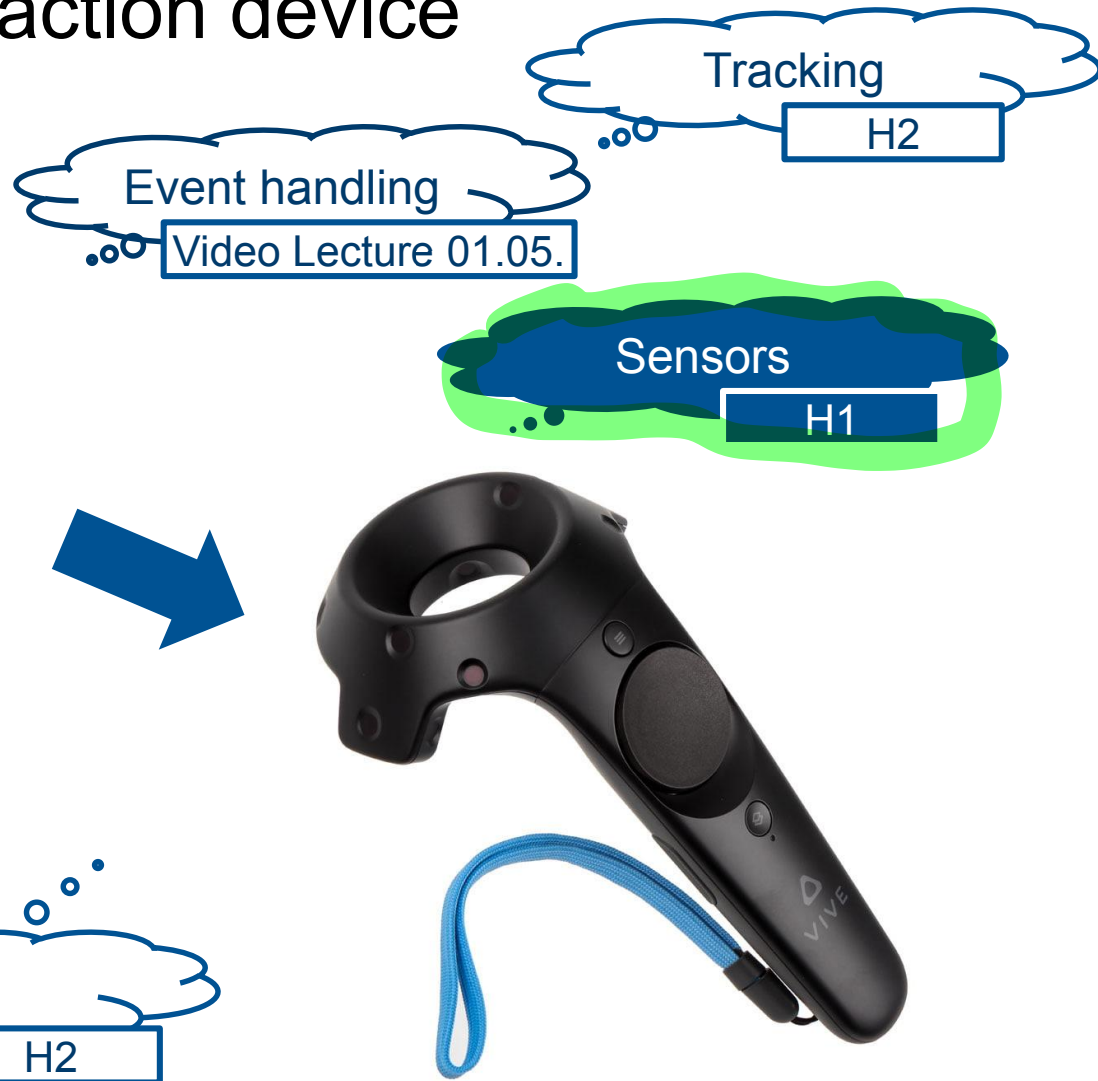
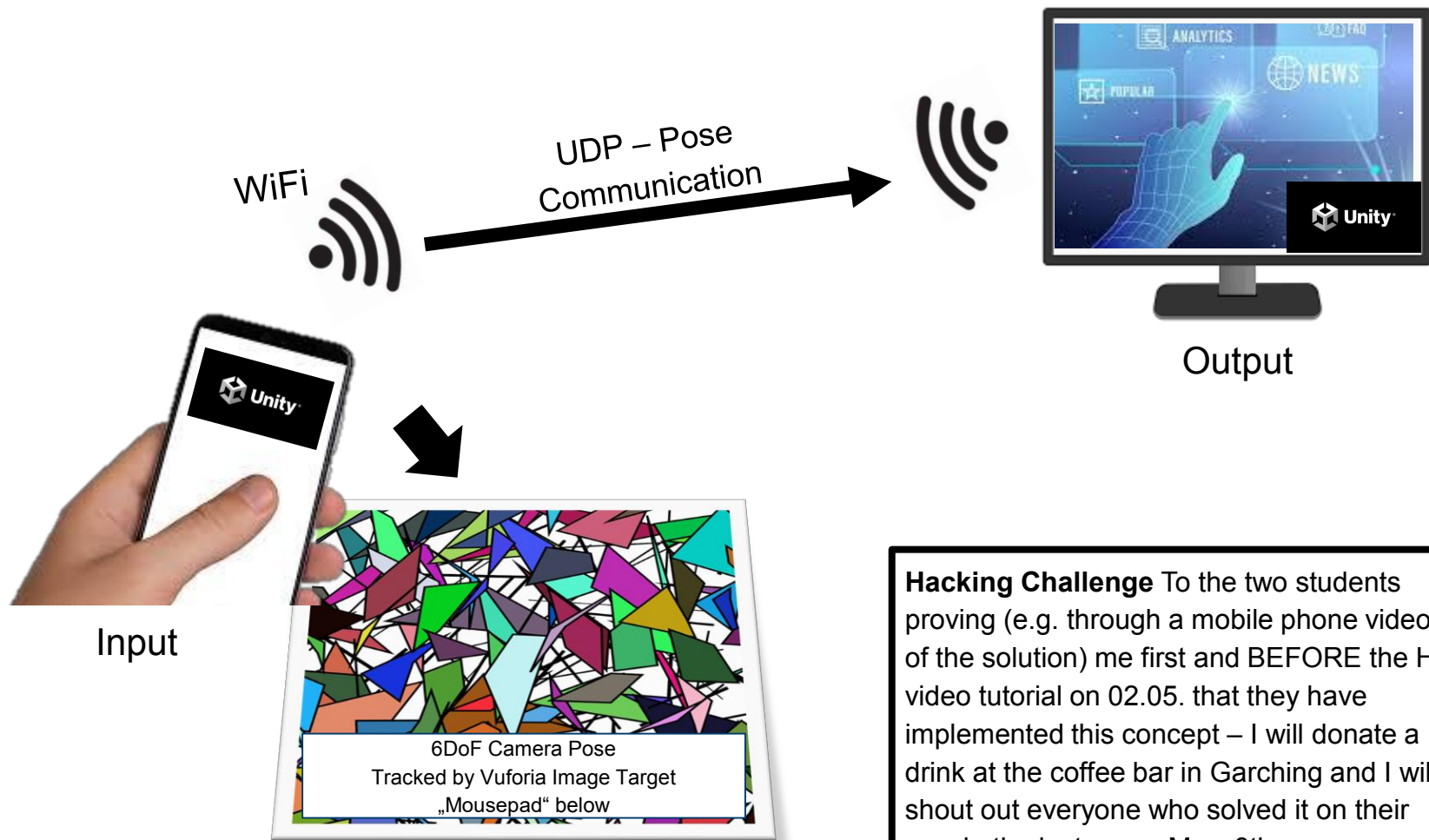Virtualized Environments (V*R)

Ubitquitous Systems

Topics Today

✓ Organizational Structure of the Tutorials

✓ Sneak Peak into the Tutorials

➢ Motivation for the upcoming homework(s)

• Q & A Tutorial 0

• Unity3D Scene Graphs / Event System

Smartphone as interaction device

Tracking
H2

Event handling
Video Lecture 01.05.

Sensors
H1

Mobile Development
H1

Network
H2

Concept (Homework 1 & 2)

WiFi

UDP – Pose Communication

Output

Input

6DoF Camera Pose
Tracked by Vuforia Image Target
„Mousepad" below

Hacking Challenge To the two students proving (e.g. through a mobile phone video of the solution) me first and BEFORE the H2 video tutorial on 02.05. that they have implemented this concept – I will donate a drink at the coffee bar in Garching and I will shout out everyone who solved it on their own in the lecture on May, 8th.

Homework 1

- Build a mobile unity scene that uses the IMU-Data or attitude of the smartphone
- Use the sensor-data to manipulate the virtual unity-scene Main Camera
  - so that you can look around in the unity scene by moving your smartphone

Hint
https://blog.logrocket.com/making-mobile-game-motion-sensors-unity/
Screencast for Unity Beginners in Moodle

Doable with
- Linux/ Windows/Mac PC and an Android smartphone > Android 6
- or MAC PC and a iOS device

If you have neither nor, please send me an email, our team has some devices, we can lend (but not many)

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✓ Sneak Peak into the Tutorials

✓ Motivation for the next Homework(s)

➢ Q & A Tutorial 0 & Everything, I have said so far

I am sure, there are unclear points

- Think about Homework 0 (Unity3D, Game Objects, Materials, Colliders, Physics, Animation) – Many topics, anything that has not worked or is unclear?

- Scroll through todays slides (organization, topics of the upcoming homeworks, projects, talks, Homework 1 & 2)

- Try to formulate your questions
  - if you have a student next to you, talk about the questions with your neighbor
  - or write them down in https://bbb.in.tum.de/lin-wad-8o1-6wx
    and I will answer them in …

15 - Minutes

Inertial Measurement Units

Accelerometer
- Measures linear acceleration
- And gravitational acceleration
  - Can be used to find the gravity vector

Gyroscope 角速度
- Measures angular velocity
- Triggers orientation changes (portrait/landscape) of the smartphone

Magnetometer
- Measures earth magnetic field
- Can determine north
- Effected by magnetic fields and metallic environments

Attention! IMUs tend to drift if used without other sensors

IMU
- Acceleromenter
- Gyroscope
- Magnetometer

↓

Sensorfusion

↓

Unity "Attitude" Device

[handwritten annotations: 如重力加速度 放在桌子之大显示g; 测角速度; 角速度 ∵ u. 速度; 磁的 work outside room 习指南针App; 传感器融合]