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Aalto University
School of Arts, Design
and Architecture

Coding Virtual Worlds

Intro

Prof. Sebastian J. Schlecht

Today’s outline

- Administration
- Course Goals / Philosophy
- How to learn to code?
- Next Assignment


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Administration

Course Structure
AXM-E0403 - Coding Virtual Worlds

6 ECTS

Period I

Compulsory course in *Building Virtual Worlds* minor studies

Course may not be retaken

Grades are 0 - 5

6 Weeks

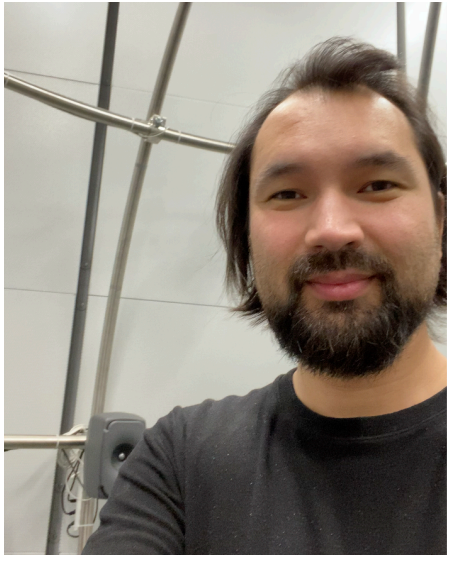
Mondays 13:15–15:00 (Q&A)

Thursdays 13:15–15:00 (Assignment Presentation)

Attendance on the Thursdays is compulsory (minimum 80%)

Round of Introductions

We are …



Sebastian J. Schlecht
Teacher

Ahmad Erfani
Assistant

Learning Outcomes

After the course, the students are able to …

- implement a VR scene with a game engine
- explain the infrastructure of VR software
- describe VR usage (UI) and experience (UX)
- perform basics of collaborative/pair coding
- implement basics of VR development concepts

Feedback / Communications

Weekly Questionnaires

- **Assignment Feedback**

Official questions

- **Email**
  - **Course related sebastian.schlecht@aalto.fi**

Assignment Communication

- **Slack group buildingvirtualworlds.slack.com**

Weekly Schedule

Monday (2h) - Workshop
- Q&A for assignments & coding practices

Wednesday - Assignment Submission

Thursday (2h) - Assignment Presentation
- Presentation of last assignment (30 min)
- Some Best Practices (30 min)
- Prepare for the next assignment (30 min)

Workload
Overview

Total 162 h for 6 ECTS

Contact session: 6 x (2 + 2) = 24h

Coding Assignment: 5 x 20 = 125h

Reflection: 13h

Technical Infrastructure

Oculus Quests (in total 30)

XR Studio Otakaari 7 (5 workstations)

Takeout laptops (16 Aalto Dell Latitude 7490 Core i5 16GB 512GB SSD 14” and 3 VR-ready laptops)

Oculus Quest
Device

- Loan for the duration of the course
- Be responsible to yourself and others
  - Hygiene
  - Device Maintenance
  - Comfort
  - Be a good VR advocate

Oculus Quest

Why?

All-in-one VR Headset

No need for VR ready PC

Simple deliverables

Oculus Link

Other HMDs not usable

Oculus Quest
Allocation

- **Devices are handed out on Thursday**

- **Return on the last session**

About Computers
Three Classes

Not ready

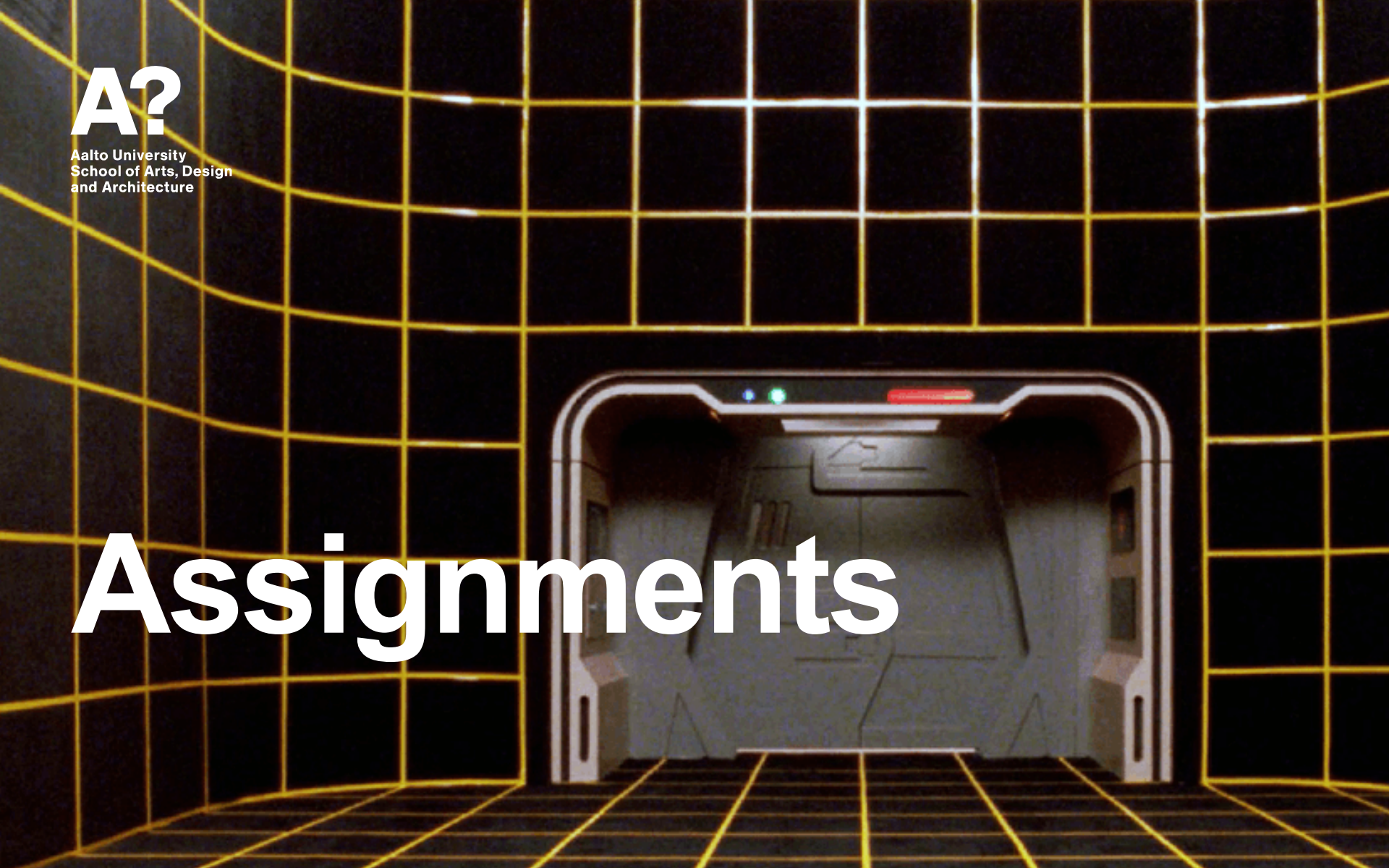
Old machine
Low-powered laptops

Development ready

Mac & Windows
High-powered laptops

Oculus Link ready

Windows Good Graphics Card



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Assignments

Assignment
Overview

No exam

All assignments are graded on 0-5 scale

Final grade weighted average of all assignments

On a scale of 0-5

Deliverable: .apk and .txt and video

Assignment submission Wednesday, 18:00

Please don’t be late!

Course Journey
Assignments

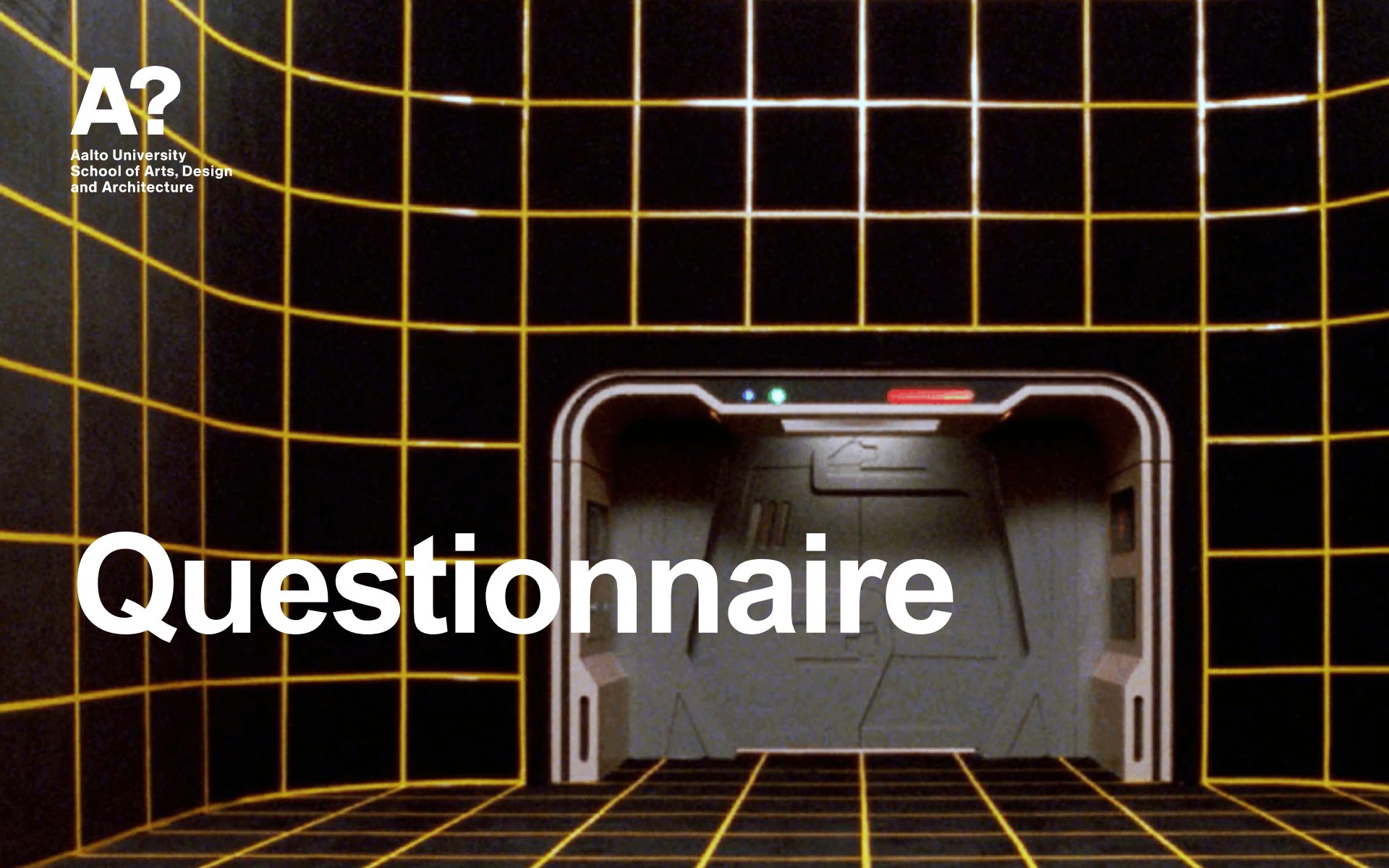
Path 1

Week	Content
1	Create with Code in Unity
2	Beat Saber Clone
3	Bowling VR
4	Avatars
5	Multiplayer

Path 2

Week	Content
1	Create with Code in Unity
2	Beat Saber Clone
3	Bowling VR
4	Own Project - Prototype
5	Own Project - Final

Group of 1-3 students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Questionnaire

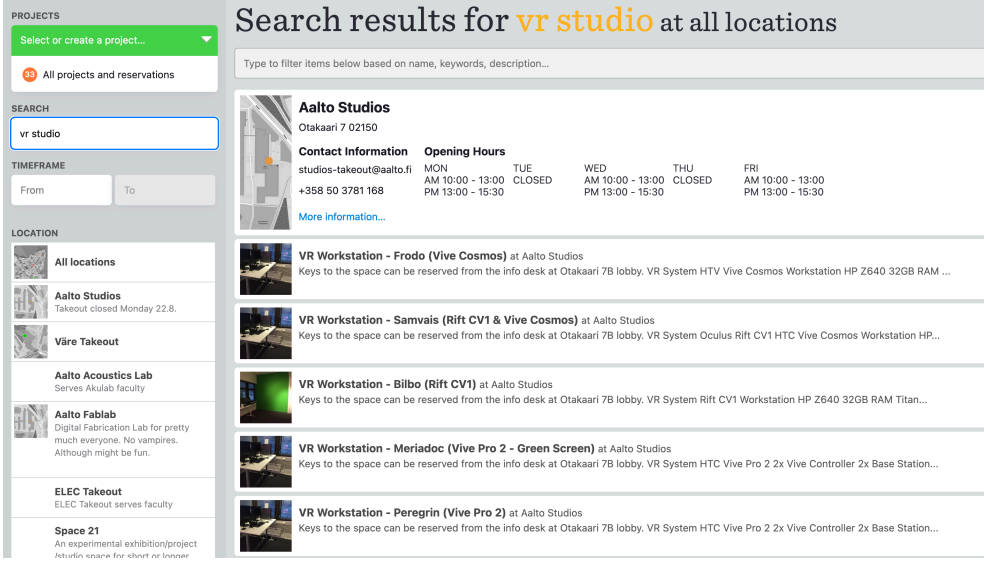
From the Questionnaire
Coding Experience

- **Many with some programming experience, C++, Python, …**
- **Some with C#**
- **Very few with Unity**

From the Questionnaire
Prior VR experience

- Many have tried some VR works and games
- Very few have contributed to a VR app
- Some have no prior experience

From the Questionnaire
Personal Machines



From the Questionnaire

Hope to learn

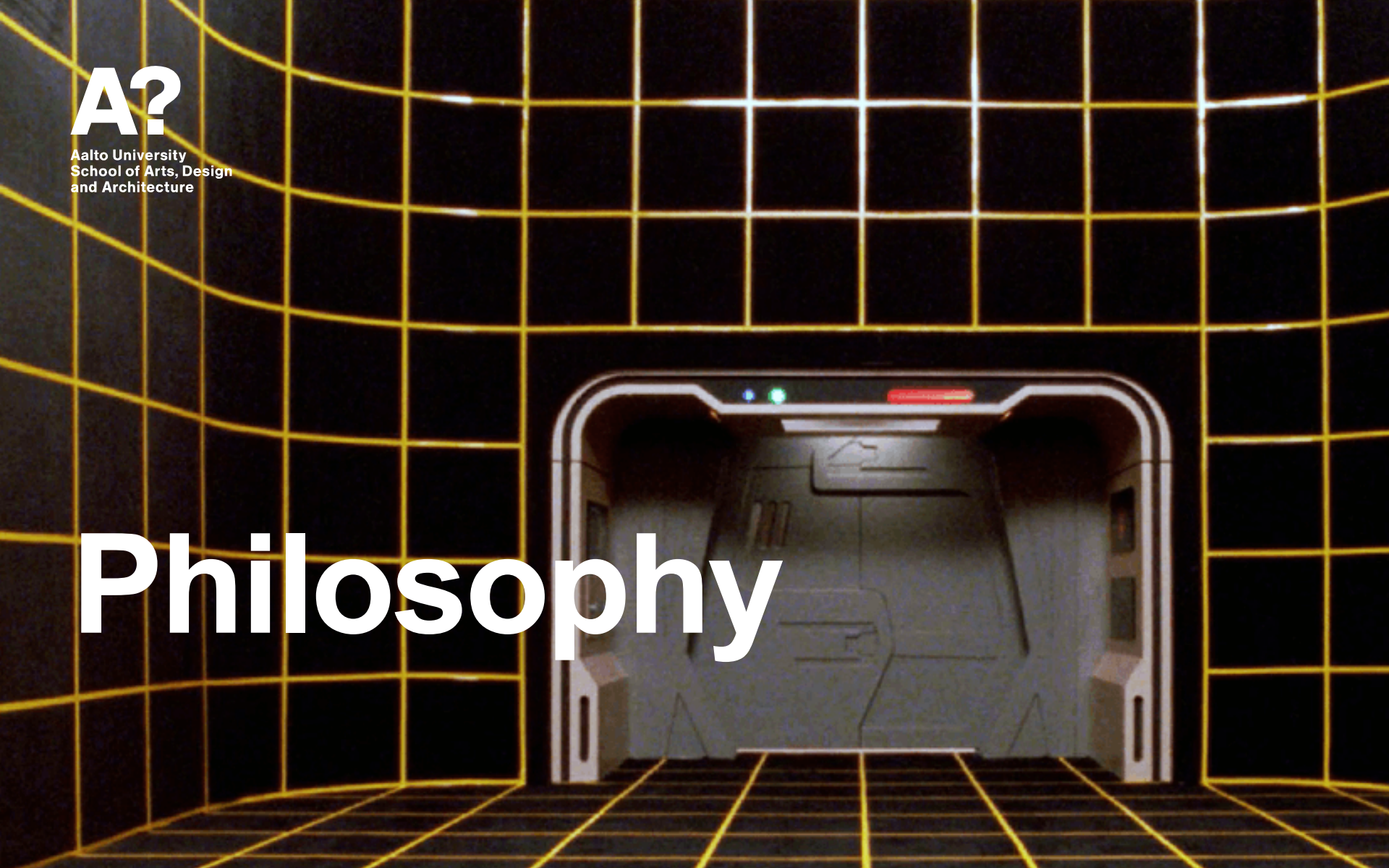
- Learning how to create basic VR interaction games and getting to know coding applications in Unity
- I hope to learn and understand a bit more about virtual worlds
- I’m hoping to understand the current development of VR better.

From the Questionnaire
Comments

- ***I hope it is okay to apply to the course with so little experience in VR.***
- ***I would like the course to be more specific so that students with no prior knowledge can get started and learn systematically.***

From the Questionnaire
Lecture Type

Response	Average	Total
In-person	38%	6
Online	13%	2
Hybrid	50%	8
Total responses to question	100%	16/16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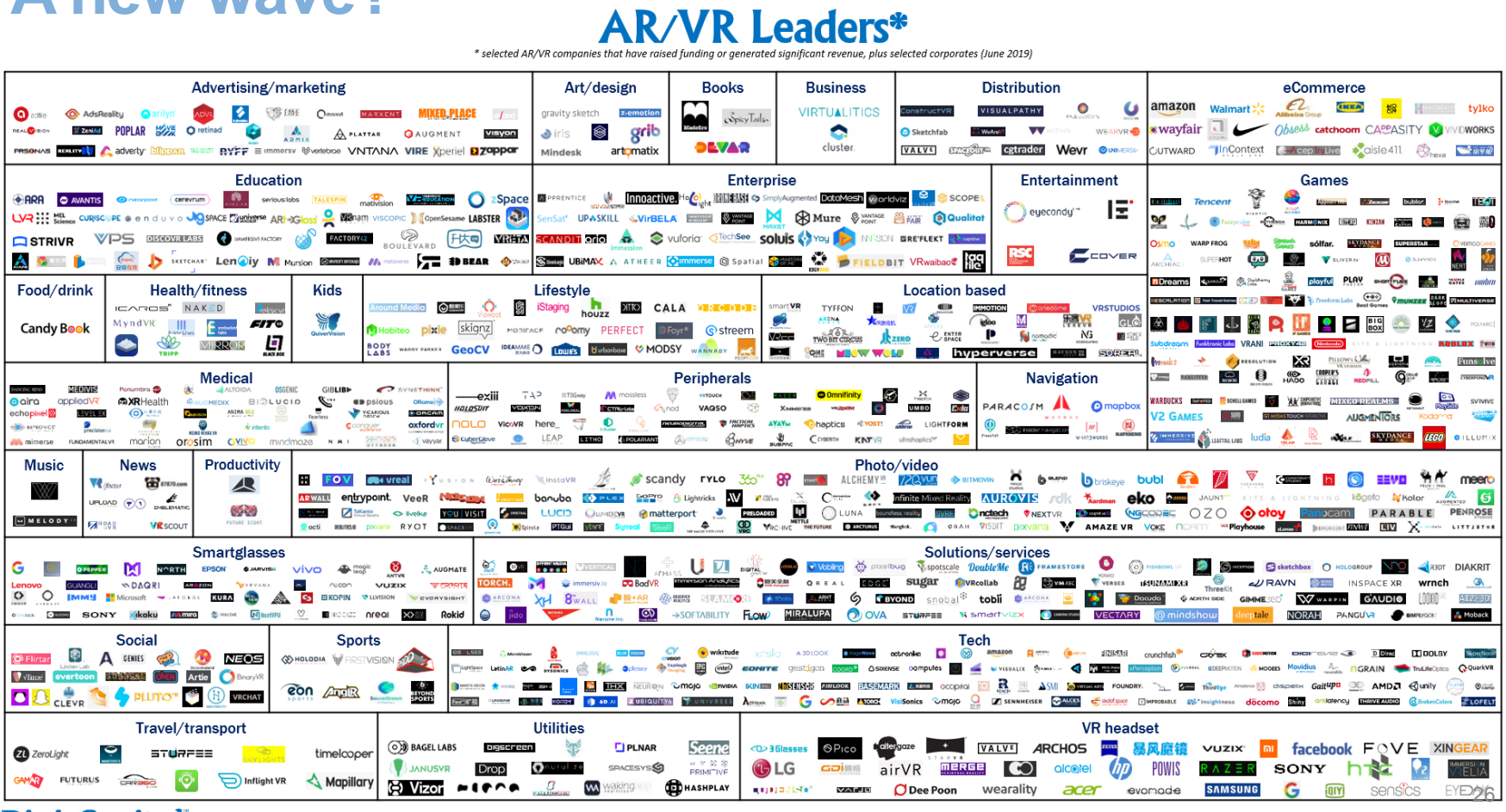
Philosophy

Why learn VR?

A new wave?



Digi-Capital

Why VR and not AR?

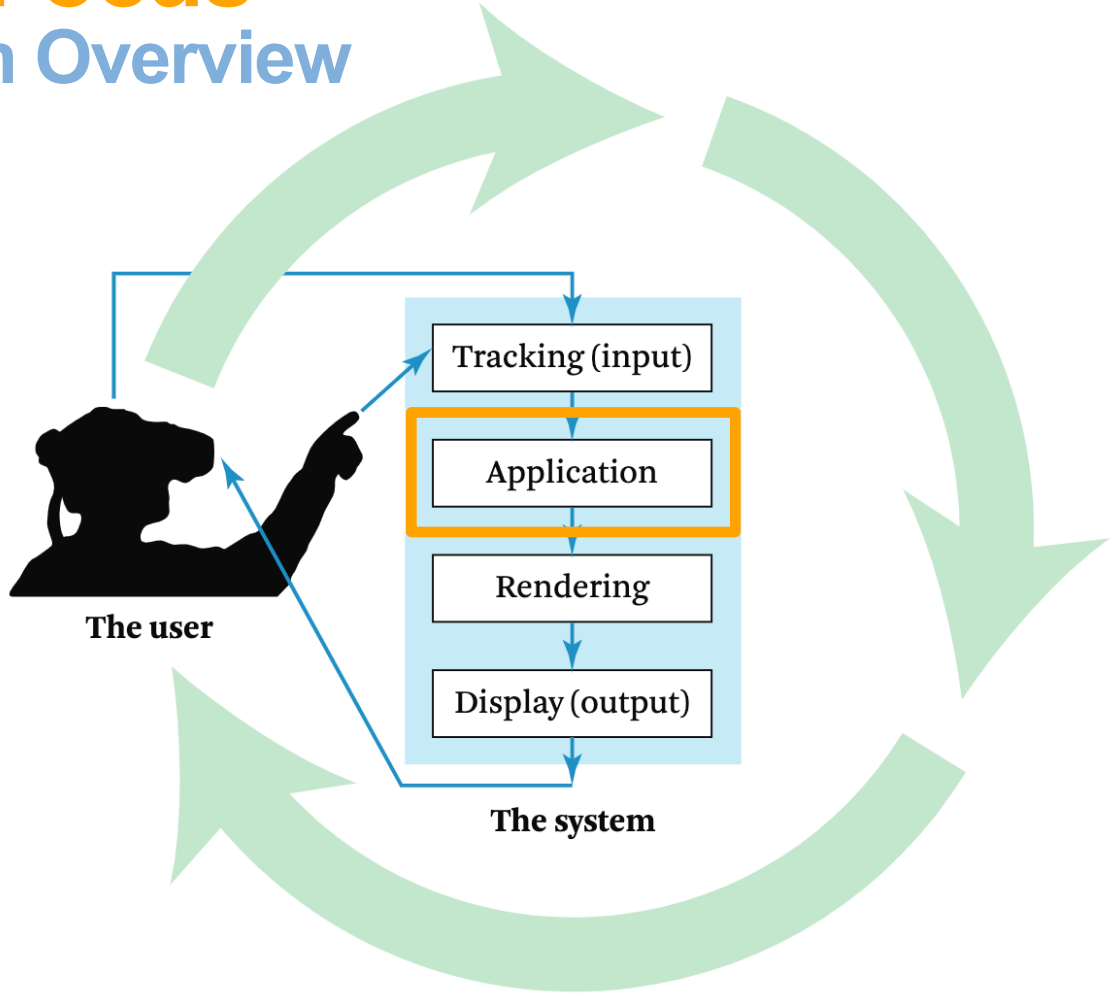
… although AR might be more relevant

VR fundamentals are simpler to learn

- **in-box system**
- **Simpler design and more control**
- **VR design is more mature**
- **VR devices are more mature**
- **AR relies on high-level black boxes**
    - **spatial computing**
    - **Object recognition**

… but many technical/design principles translate to AR

Course Focus
VR System Overview



Why Unity?

… there are plenty of alternatives

- Unreal Engine
- Web XR
- MaxMSP, Processing, etc.

Unity 3D offers

- Modern VR build-in integration
- Large developer community
- Fast iteration cycles

Course Philosophy
Introductory Course in Unity VR

Goal: Self-contained journey from start to first VR experience.

- **Unity + Oculus Quest**
- **Basic Coding**
- **Consistent set of tutorials**
- **Community of learners**

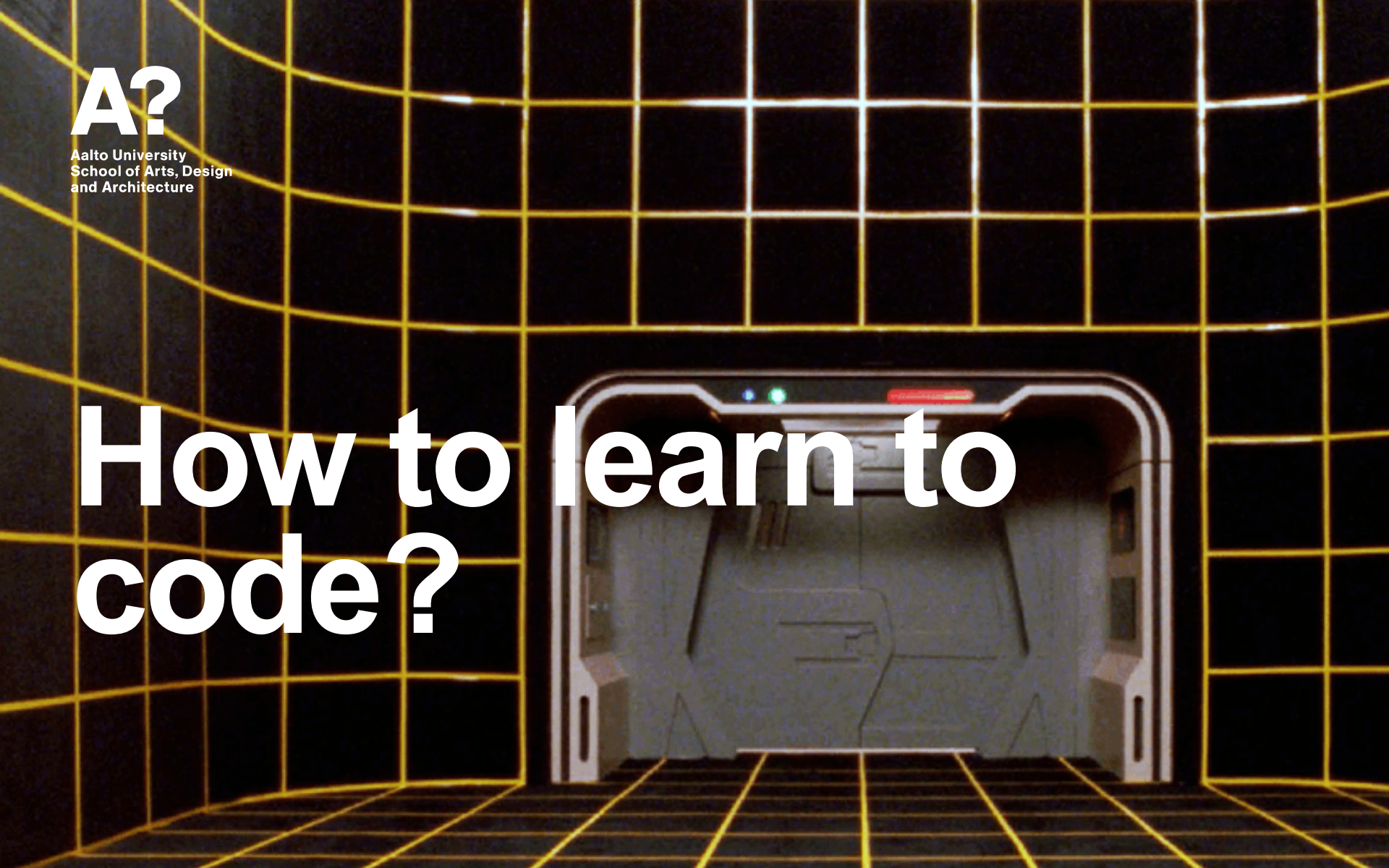
Why taking part in this course?
Make use of the community

All material can be self-taught; fantastic online material.

- **Unity Tutorials**
- **Youtube videos**
- **Forums**

Here we give structure and community

- **VR is highly technical and requires well-functioning teams**
- **Learn by teaching others and being taught**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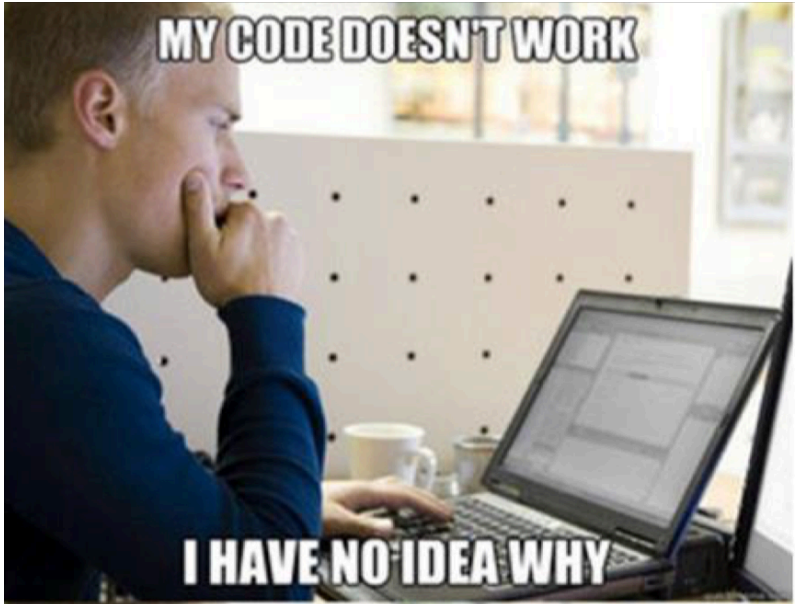
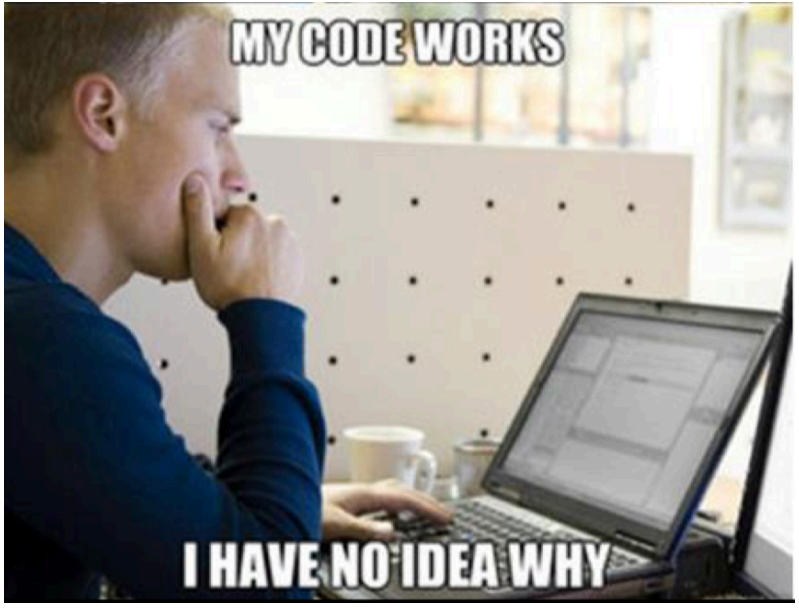
How to learn to
code?

How to learn code?

Programming can be frustrating.





How to learn code?
No pain, no gain

Growth only happens when you're outside your comfort zone.

How to learn code?

Code is not the solution to everything

Unity offers powerful GUI and additional packages

Choose the right tool for the right job

Code often very useful for *glueing* components.

Pair Programming
Possible Constellation

Driver:

develops code, has control of mouse and keyboard

Navigator:

watches for defects, thinks of alternatives, asks questions

Thinking and doing instead of just doing!

Programming pedagogy research shows clear benefits.

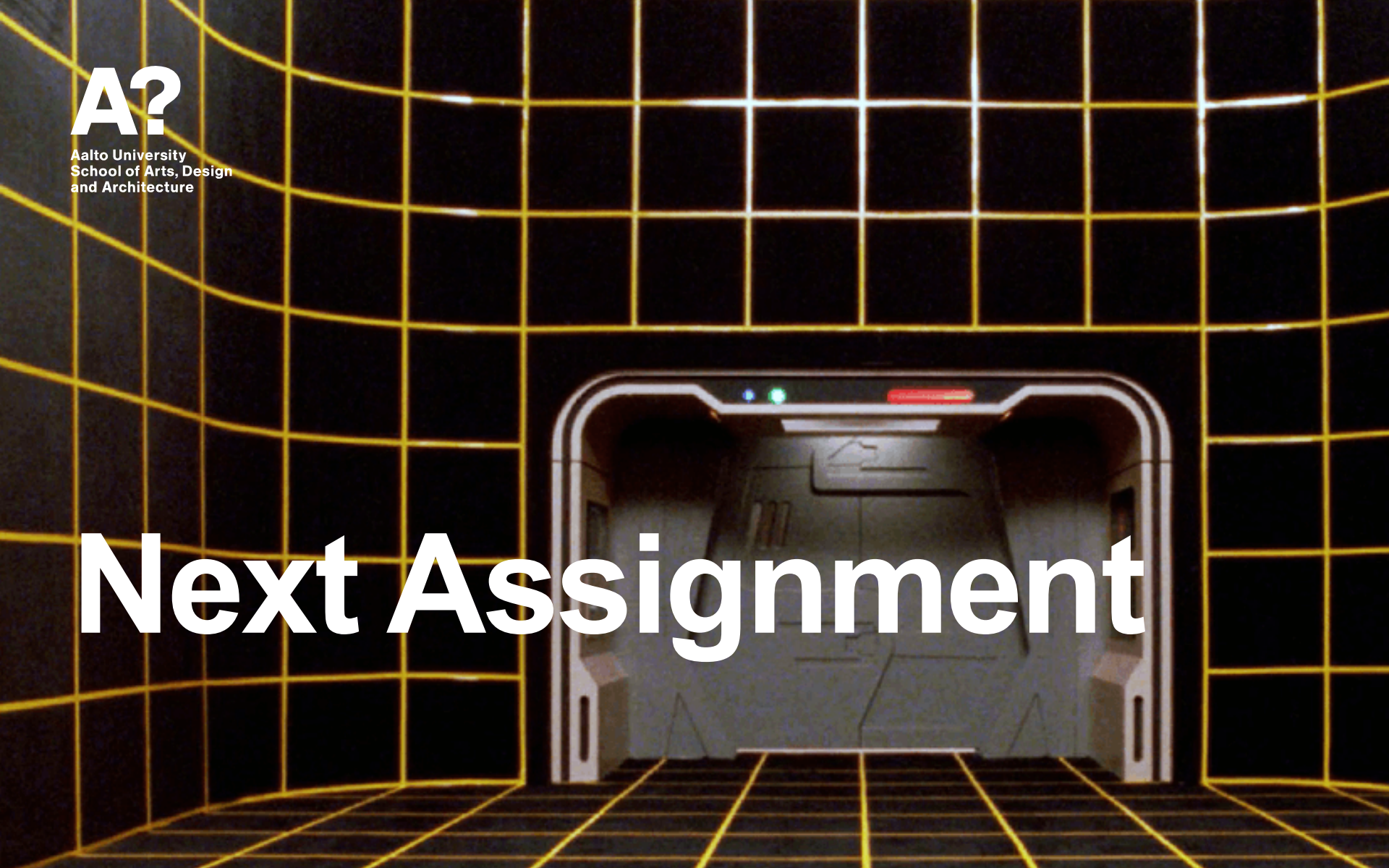
Pair Programming
Examples

Positive

- **Why are you using an integer type for that variable?**
- **Wouldn't a *for* loop be better for this than a *while* loop?**
- **I don't understand how that expression calculates the values that we are supposed to use.**

Negative

- **If you think that it is right, then it is OK with me.**
- **That is not going to work; you don't know what you're doing.**
- **I am completely lost.**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Next Assignment

VR Assignment
(not graded)

Explore the Oculus and SideQuest store

Try few VR applications (many are free)

Post a brief review about it in Slack

First Assignment
Learning Goals

Learn the basics of coding in Unity

Find more details on the webpage …