

A?

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**

A?

Aalto University
School of Arts, Design
and Architecture

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: $6 \times (2 + 2) = 24\text{h}$

Coding Assignment: $5 \times 20 = 125\text{h}$

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**



A?

Aalto University
School of Arts, Design
and Architecture

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

A futuristic tunnel with a yellow grid pattern on the walls and floor. The tunnel leads to a white doorway with a red light above it. The overall atmosphere is dark and high-tech.

A?

Aalto University
School of Arts, Design
and Architecture

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

PROJECTS
Select or create a project...
All projects and reservations

SEARCH
vr studio

TIMEFRAME
From To

LOCATION

- All locations
- Aalto Studios
Takeout closed Monday 22.8.
- Väre Takeout
- Aalto Acoustics Lab
Serves Akulab faculty
- Aalto Fablab
Digital Fabrication Lab for pretty much everyone. No vampires. Although might be fun.
- ELEC Takeout
ELEC Takeout serves faculty
- Space 21
An experimental exhibition/project studio space for short or longer

Search results for vr studio at all locations

Type to filter items below based on name, keywords, description...

Aalto Studios
Otakaari 7 02150

Contact Information
studios-takeout@aalto.fi
+358 50 3781 168

Opening Hours

MON	TUE	WED	THU	FRI
AM 10:00 - 13:00	CLOSED	AM 10:00 - 13:00	CLOSED	AM 10:00 - 13:00
PM 13:00 - 15:30		PM 13:00 - 15:30		PM 13:00 - 15:30

[More information...](#)

VR Workstation - Frodo (Vive Cosmos) at Aalto Studios
Keys to the space can be reserved from the info desk at Otakaari 7B lobby, VR System HTV Vive Cosmos Workstation HP Z640 32GB RAM ...

VR Workstation - Samvais (Rift CV1 & Vive Cosmos) at Aalto Studios
Keys to the space can be reserved from the info desk at Otakaari 7B lobby, VR System Oculus Rift CV1 HTC Vive Cosmos Workstation HP...

VR Workstation - Bilbo (Rift CV1) at Aalto Studios
Keys to the space can be reserved from the info desk at Otakaari 7B lobby, VR System Rift CV1 Workstation HP Z640 32GB RAM Titan...

VR Workstation - Meriadoc (Vive Pro 2 - Green Screen) at Aalto Studios
Keys to the space can be reserved from the info desk at Otakaari 7B lobby, VR System HTC Vive Pro 2 2x Vive Controller 2x Base Station...

VR Workstation - Peregrin (Vive Pro 2) at Aalto Studios
Keys to the space can be reserved from the info desk at Otakaari 7B lobby, VR System HTC Vive Pro 2 2x Vive Controller 2x Base Station...

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



A?

Aalto University
School of Arts, Design
and Architecture

Philosophy

Why learn VR?

A new wave?

AR/VR Leaders*

* selected AR/VR companies that have raised funding or generated significant revenue, plus selected corporates (June 2019)

Advertising/marketing 			Art/design 		Books 	Business 	Distribution 		eCommerce 			
Education 				Enterprise 				Entertainment 		Games 		
Food/drink 	Health/fitness 		Kids 	Lifestyle 		Location based 						
Medical 			Peripherals 			Navigation 			Music 			
News 	Productivity 		Photo/video 			Smartglasses 			Solutions/services 			
Social 	Sports 		Tech 			Travel/transport 			Utilities 			
VR headset 	VR headset 			VR headset 			VR headset 			VR headset 		

Why VR and not AR?

... although AR might be more relevant

VR fundamentals are simpler to learn

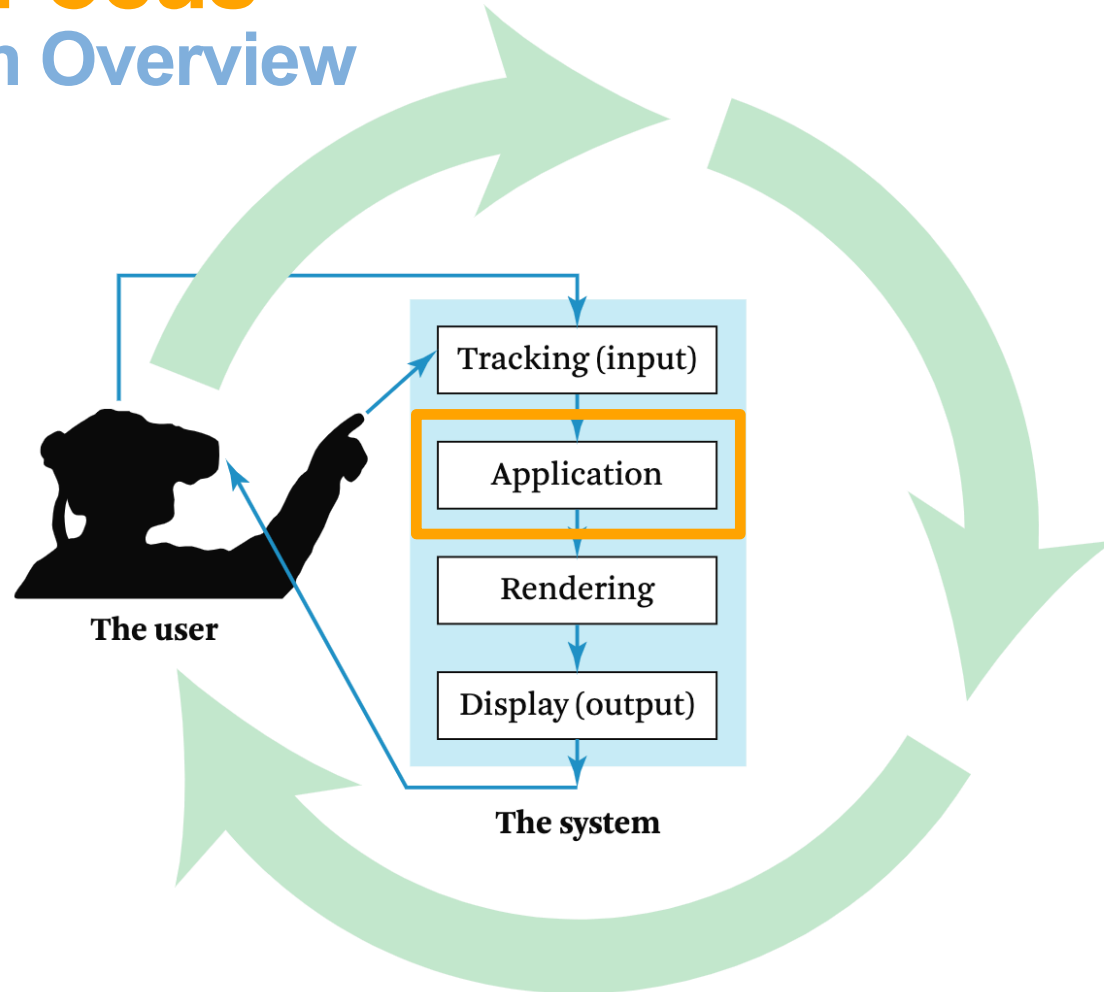
- in-box system
- Simpler design and more control
- VR design is more mature
- VR devices are more mature
- AR relies on high-level black boxes
 - spatial computing
 - Object recognition

... 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

A?

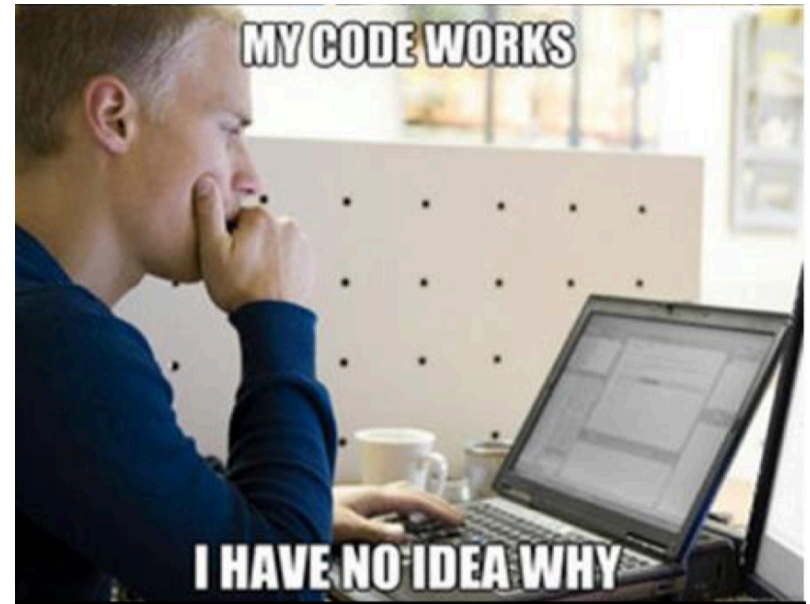
Aalto University
School of Arts, Design
and Architecture

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.**



A?

Aalto University
School of Arts, Design
and Architecture

Next Assignment

VR Assignment

(not graded)

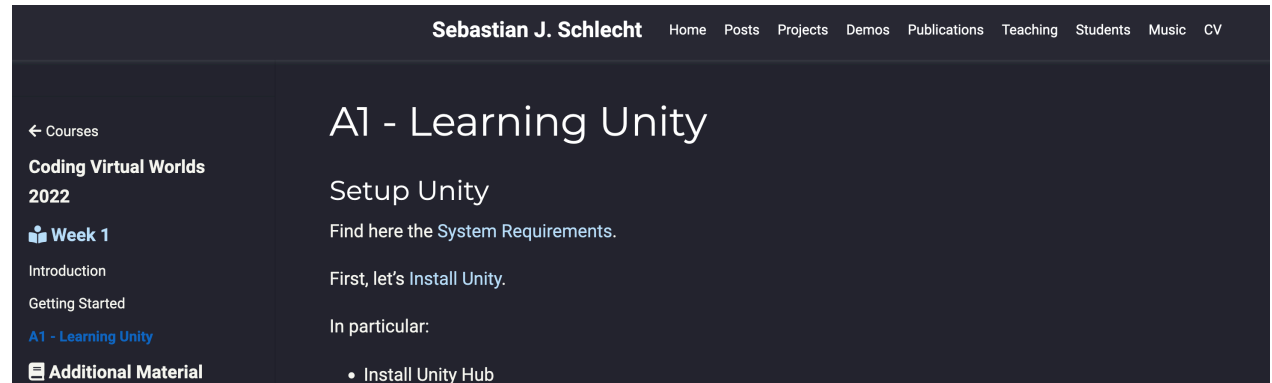
Explore the Oculus and SideQuest store
Try few VR applications (many are free)
Post a brief review about it in Slack

First Assignment

Learning Goals

Learn the basics of coding in Unity

Find more details on the webpage ...



Sebastian J. Schlecht Home Posts Projects Demos Publications Teaching Students Music CV

← Courses

Coding Virtual Worlds
2022

📁 Week 1

Introduction

Getting Started

A1 - Learning Unity

📖 Additional Material

A1 - Learning Unity

Setup Unity

Find here the System Requirements.

First, let's Install Unity.

In particular:

- Install Unity Hub