

CSE 190: Virtual Reality Technology

LECTURE #1: COURSE OVERVIEW

Video Recording

This and all lectures will be recorded (audio and video) and made available on Canvas. This includes all student interactions during the lecture.

Instructor

Jürgen Schulze, Ph.D.

Research Scientist at Qualcomm Institute

Adjunct Professor in CSE Department

Email: jschulze at ucsd.edu

Office hours:

Tuesdays 3:30-4:30pm (today at 4:30pm)

Zoom link: <https://ucsd.zoom.us/j/467805958>

Teaching Assistant

Andrew Huang

Best to reach on Discord - you should have received a link to a Google form to sign up.

Will offer:

- Zoom discussions on Mondays at 1pm
- Lab hours during the week, see Piazza for schedule

Course Goals

Provide in-depth knowledge of virtual reality technologies.

Gain experience with the software pipeline for rendering in VR systems, with a focus on HMDs.

Give up-to-date overview of current VR and AR technology developments.

Course Topics

Introduction to course and VR/AR

Human perception

VR and AR display systems

Head mounted display components

Sensor processing

Spatial audio

Content creation:

- VR authoring tools
- Panoramic video

VR programming in Unity for smartphones

Prerequisites

CSE167 (Introduction to Computer Graphics) or equivalent

- Microsoft Visual Studio
- Linear algebra, coordinate system transformations
- Shader programming

General knowledge about debugging code.

Online Course Resources

Course web site:

- <http://ivl.calit2.net/wiki/index.php/CSE190S2020>

Canvas:

- Grade management
- Submission of homework projects
- Scheduling of VR app presentations

Piazza:

- Course related notifications and discussions
- TA office hours
- <http://piazza.com/ucsd/spring2020/cse190>
- Occasional job offers etc.

Important Dates

Lectures:

- Tue/Thu 2-3:20pm live on Zoom
- Recordings will be available on Canvas

Homework Discussion:

- Mondays at 1pm live on Zoom, starting April 6th
- Recordings will be available on Canvas

Homework submission deadlines:

- Sundays at 11:59pm, see course schedule for due dates

VR app presentation scheduling due Monday, April 13th at 11:59pm

Final exam on Tuesday, June 9th 3-6pm

Homework Assignment Submission

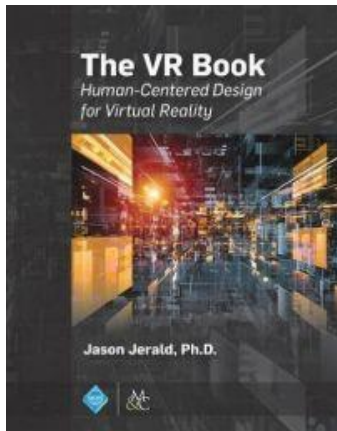
Submissions are required for each homework project

- Submit video of smartphone screen recording on Canvas
- Plus optionally additional documentation for partial credit

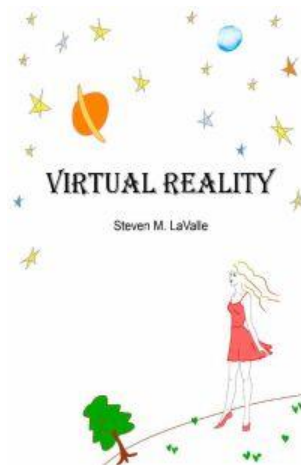
Books

No required books.

Recommended books:



[The VR Book](#) by Jason Jerald, 550 pages, Morgan & Claypool Publishers, October 16, 2015, ISBN-10: 1970001127, ISBN-13: 978-1970001129



[Virtual Reality](#) by Steven M. LaValle. To be published by Cambridge University Press. Available as PDF free of charge.

Class Structure

- Two lectures per week
- Three structured homework assignments
- VR content presentation
- Written final Exam

Grading

| | |
|-----------------------|-----|
| Programming Project 1 | 20% |
| Programming Project 2 | 20% |
| Programming Project 3 | 20% |
| Written Final Exam | 30% |
| VR App Presentation | 10% |

Cloud Storage

Unless otherwise explicitly authorized, each student is completely responsible to keep their code, homeworks, design files and other course work off of publicly accessible internet sites.

Example: it is **not allowed** to put code in a **public** Github repository.

However, you are **encouraged** to put your code in a **private** Github repository.

These rules expire after finals week.

Unity

All three homework projects will be using Unity.

Download free student license from:

<https://store.unity.com/academic/unity-student>

VR App Presentation

- Each student needs to present a **VR or AR app** in class
- Your app must run on your smart phone with your VR viewer (or any other VR or AR device)
- The app must be from one of the typical app stores (e.g., Google Play, Apple Itunes, Oculus store, Samsung Gear VR store)
- Enter your name, app title and app URL on scheduling wiki on Canvas
- Presentation should take 5-8 minutes
- After presentation: short Q&A

Example for VR App

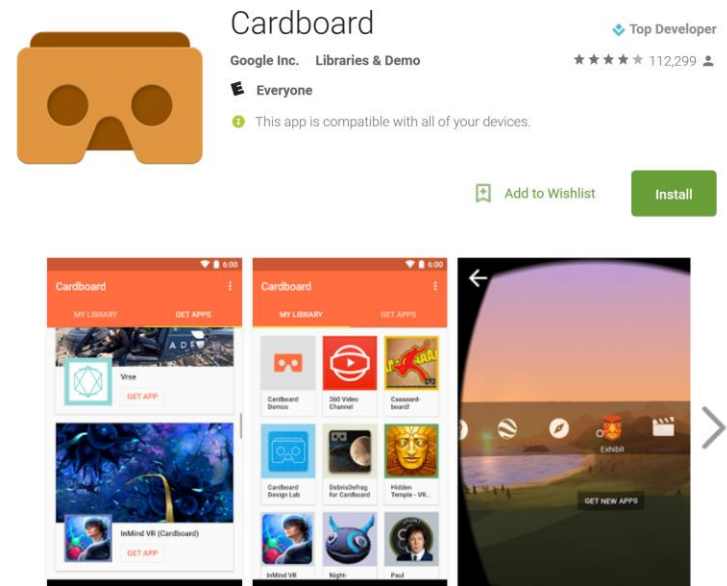
App: Google Cardboard

URL:

<https://play.google.com/store/apps/details?id=com.google.samples.apps.cardboarddemo&hl=en>

Comments:

- This app is a portal to a large number of Google vetted VR apps
- Pros: Very polished, great tutorial mode, large variety of apps to choose from within VR mode
- Cons: requires Cardboard compatible viewer



Cardboard puts virtual reality on your smartphone. The Cardboard app helps you launch your favorite VR experiences, discover new apps, and set up a viewer.

Try out a set of included demos as well

Acknowledgements

Most of the slides were created by the instructor for this course from scratch.

Some of the material was inspired by the recommended books.

Some of the slides were inspired by Professor Gordon Wetzstein's Stanford course EE 267 (Virtual Reality)

- <https://stanford.edu/class/ee267/>