CSE 190: Virtual Reality Technologies

LECTURE #1: COURSE OVERVIEW

Instructor

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Office: Atkinson Hall, Room 2125

Office hours: Tuesdays 3:30-4:30pm

Course Staff

TA:

- Sainan Liu

Tutor:

- Timothy Wang

See Piazza for office hour times. Location is always the VR lab, B210.

Class Goals

Provide in-depth knowledge of virtual reality technologies.

Gain experience with software development for VR systems, especially HMDs.

Give up to date overview of current technologies.

Course Topics

Introduction to course and VR

Human perception

VR display systems

Head mounted display components

Sensor processing

Spatial audio

Content creation:
- VR authoring tools
- 360 degree video

VR programming
- WebVR
- C++

Prerequisites

CSE167 (Introduction to Computer Graphics) or equivalent

- Experience programming in C++ and OpenGL
- Linear algebra, coordinate system transformations
- GLSL shader programming

You need to know how to debug C++ code.

Online Course Resources

Course web site:

- http://ivl.calit2.net/wiki/index.php/CSE190S2017

Ted:

- For grades and code/assignment submission
- Wiki for video presentation scheduling

Piazza:

- For any course related notifications and discussions
- TA, tutor office hours

Lectures/Discussion

Tue/Thu 2-3:20pm at PCYNH 122

Homework Discussion:

- Tuesdays 3:30-4:30pm, starting April 11th
- Location: CSB 002

Homework presentations:

- Fridays on due dates at 2pm in CSE basement lab B210 (VR lab)

Assignment Submission on Ted

Submissions are required for each homework project:

- all source code you wrote
- 3D model assets you use
- Don’t upload code binaries or project files

Books

No required books.

Recommended books: see course web site

Class Structure

- 2 lectures/week
- 3 structured homework assignments
  - Teams of two
- Final Project
  - Teams of two
- Midterm
  - No teams
- App/Video presentation
  - No teams

Grading

Project 1	15%
Project 2	15%
Project 3	15%
Final Project	25%
Midterm	25%
In-class Presentation	5%

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.

These rules expire after finals week.

Programming Assignments

- All to be done in teams of two
- ~2 weeks per project, more for final
- Operating system: Windows 7
- Programming language: C++
- APIs: OpenGL, Oculus SDK, and others
- Grading in CSE lab B210
- Demonstrated to course staff on the due dates after 2pm
- Late submissions are not accepted - all assignments must be turned in on time

Presentation

- Each student needs to present a **VR or AR app,** or a **VR video** in class
- App/video must run on the student's smart phone with a VR viewer (eg, Merge VR, Gear VR, Daydream) in 3D stereo with head (orientation) tracking
- You must bring the VR viewer and be able to demo the app/video
- Video must be on Youtube and have a VR mode (indicated by the Google Cardboard icon) 
- App must be from an app store (eg, Google Play, Apple Itunes, Oculus store, Samsung Gear VR store)
- Enter app/video URL on scheduling wiki on TritonEd
  - Deadline: Monday, April 10th
  - You must at least pick a date by then
- In-class presentation should take around 5 minutes
- After presentation: short Q&A

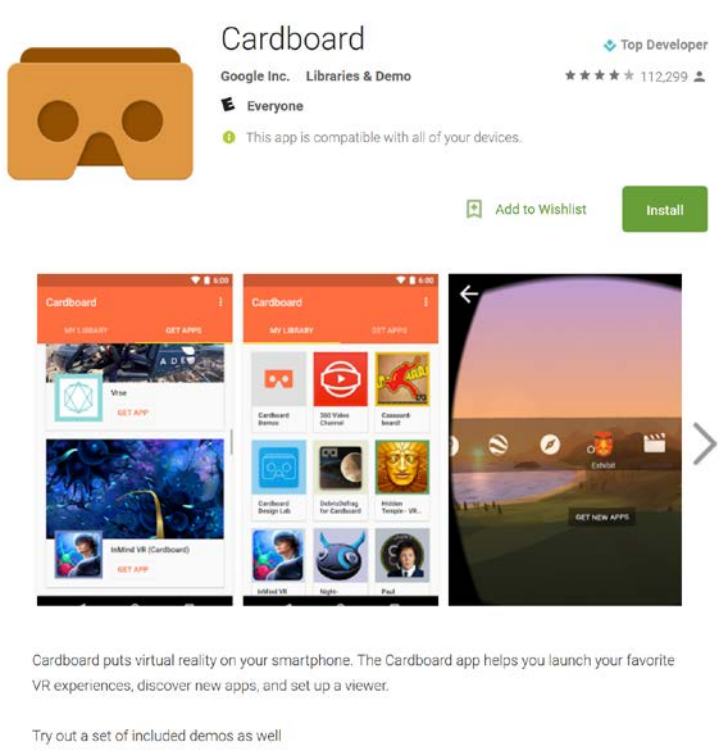
Example for VR App

App: Google Cardboard

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

Comments:

- App is portal to a large number of Google vetted VR apps
- Tested on Android, should run on IOS
- Pros: Very polished, great tutorial mode, large variety of apps to choose from within VR mode
- Cons: requires Cardboard compatible viewer



Example for VR Video

Found on Youtube's VR channel:

- https://www.youtube.com/channel/UCzuqhhs6NWbgTzMuM09WKDQ

Video: 360° Underwater National Park by National Geographic:

- https://www.youtube.com/watch?v=v64KOxKVLVg

Midterm Exam

In-Class written examination.

Closed book.

Date: May 25th

Counts 25% of grade.

Tests content covered in class.

Format similar to midterm exams in CSE 167 and CSE 165.

Final Project

For teams of two.

Open project similar to final projects in CSE 167 and CSE 165.

Based on C++ and OpenGL.

You write an application to run on the Oculus Rift.

25% of grade.

Note on Slides

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

Some of the material was inspired by the three recommended books.

Some of the slides were inspired by Professor Gordon Wetzstein (Stanford), from his course EE 267 – Virtual Reality.

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