CS 498
Sections VR3 & VR4
Welcome to CS 498 - Virtual Reality

- **Prof: Lawrence Angrave**
  - Office Location: 2217 Siebel Center
  - Office Hours: Tues 11:30 - 12:30

- **Course Staff:** Yike Wang, Rui An, Katie Mimnaugh, Matthew Ong, Kai Fu, Mike Peretz, Shan Tulshi, Kewei Sui, Craig Santo, Gary Liu, Ke Lu, Nathaniel Myren, Sophia Lin, Edward Xue, Menglin Tian, Yinchen Xu, Victor Mouschovias
Craig Santo
Junior in CS
3rd semester on staff
NCSA AVL intern
Unity Student Ambassador
Edward Xue

Master in CS

3rd semester on staff

VR is awesome
Menglin Tian

Master in CS

2nd semester on staff

It is fun to see and play with all the cool projects students work on at the end of the semester.
Hi! I’m Mike! I’m a Senior in CS, and this is my 2nd semester on VR course staff. I’ve also CAd for CS225 for 5 semesters and CS242 for 2 semesters. My favourite thing in the world is Demi Lovato (my fiancé is a close second, oops). This is by far my favourite course, and I couldn’t be more excited for this semester!
Rui An

Senior in CS

Second semester on staff

NCSA Laboratory For Critical Technologies Research Programmer
Nate Myren

Junior in CS

3rd semester teaching

Blame me if MP1 is bad

My advice: Start projects early- The lab fills up quick
I’m a junior in CS, and this is my third semester on staff!

Also blame me if MP1 is bad (can’t let Nate take it all for himself)

My favorite thing about this course is just playing with the cool things people make with VR -- student or commercial projects. I can’t wait to see what you all come up with!
VR Lab - SC4107

20 workstations with Oculus Rift CV1s

6GB RAM

NVidia GeForce Titan Blacks

Dual 27 inch monitors

Windows. Unity3d.

Work in pairs on 4 assignments + final project
Course Materials

- Webpage: [https://courses.engr.illinois.edu/cs498vr3/](https://courses.engr.illinois.edu/cs498vr3/)
- Piazza
- Textbook: Virtual Reality, S.M. Lavalle, 2016 (free online)
- VR Lab: Siebel Center 4107
What this class is about:

VR, perception meets engineering and computer science
Second Wave of VR, will there be a third?

VR Sales Numbers Are Wet Blanket on Adoption Hopes

Jeff John Roberts
Feb 19, 2017

This time it’s different, right? Unlike the virtual-reality fad that fizzled 15 years ago, boosters say today’s version of VR tech—backed by the likes of Facebook (FB, -0.73%), Google (GOOGL, -0.86%), and Samsung—is going to be big.

Well, maybe not. Sales figures for 2016 are in, and they’re not exciting: The VR industry shipped 6.5 million devices and pulled in $1.8 billion in revenue, according to research firm Super Data. That’s below expectations, though analysts say it isn’t terrible for an emerging technology.

What’s more telling is who’s buying. Though VR has promise for business, most customers now are gamers. They love it—VR game users reportedly engage in 40 sessions a month on average. But such hard-core fans aside, most people lack a compelling reason to shell out for the gear. Research firm Nielsen says that...
What is the killer app??

(HINT: Don’t use locomotion in your projects!)
A BIT ABOUT YOU

Have you tried VR before?

Do you own a VR headset?

Do you like rollercoasters?

Do you get motion sickness?
A Bit About Oculus

- Early 2012, Palmer Luckey made a prototype headset (duct taped!!)
- Aug 2012, John Carmack improved it and showed at E3
- Aug 2012, game industry leaders showed strong support, Oculus was founded (Brendan Iribe, Michael Antonov, Nate Mitchell, and Jack McCauley)
- Sept 2012, Kickstarter very successful
- 2012 - 2014, over 60,000 headsets sold
- Mar 2014, Facebook acquires Oculus for $2 billion
A Bit About Oculus

https://youtube.com/watch?v=pAC5SeNH8jw
What is this course about?

- Learn how to build *good* VR experience (comfortable + adequate for the task)
- Learn how VR works (engineering + psychology)
- Learn how to criticize VR
- Learn fundamentals to shape future of VR

Lecture, 4/5 MP’s, 2 exams, project

TASK-DEPENDANT VR:

- Game, write code, maintain relationship, relax, watch film, travel to exciting virtual places
Definition of VR

Inducing targeted behavior in an organism by using artificial sensory stimulation, while the organism has little or no awareness of the interference
Awareness = place cells?

https://www.youtube.com/watch?v=l4fNVv0A8QvI
Examples of VR

https://www.youtube.com/watch?v=j1O8fZap3jM
Examples of VR

https://www.youtube.com/watch?v=1DJOTEDBA2c
Examples of VR

https://www.youtube.com/watch?v=1ezL8nGo--I
Definition of VR

Inducing targeted behavior in an organism by using artificial sensory stimulation, while the organism has little or no awareness of the interference

Who is the laboratory rat and who is the scientist?
VR or Not VR?

- Playing Second Life (first person video game)
- Watching a movie
- Video conferencing
- Listening to music
- Playing a third person video game
- Augmented Reality
VR or Not VR?

- Talking on the phone
- Reading a book
- Looking at a painting
- Being under the influence of a hallucinogenic drug
- Wearing thermal clothes
Definitely VR… Architecture and Real Estate

Do you wish your home were bigger?
Definitely VR... Movies
Definitely VR... Panoramas

Pick your favorite street views and have a look around.
Definitely VR… VR + Robots

https://www.facebook.com/makeyourfutures/videos/709112912563319/
Definitely VR… First-Person Shooter Games
Definitely VR… VR Game Jam

What could you do with an elephant trunk?
Definitely VR… Thrill Seekers

Virtual amusement park rides!
Definitely VR... Experiences

Ever wonder how Louis XVI must have felt?
Definitely VR… Body Swapping
Definitely VR… Flying Like in Your Dreams
When did VR start?
When did VR start? Paintings?
When did VR start?
When did VR start?
When did VR start?
When did VR start? Motion pictures?

https://www.youtube.com/watch?v=IEqccPhsqgA

1878 Muybridge
Realism vs Simplicity in Cartoons
Realism vs Lower Cost and Portability
How many FPS are enough?

https://www.youtube.com/watch?v=-Qk7ZSXujRo
Evolution of Computer Games
Realism vs Simplicity in Computer Games
History of VR
Headsets vs Cave
Birds-Eye View: Hardware

Displays (Rendering):
- Visual:
- Audio:
- Touch:
- Smell? Taste? Vestibular?

Tracking Hardware Components:
- IMU’s:
- Magnetometers:
- Cameras

Controllers:
- 

Lens:
- Computer:
  - CPU:
  - GPU:
A sensor is a transducer that transforms the physical world energy into a signal.
Review
Definition of VR?
Definition of VR

Inducing targeted behavior in an organism by using artificial sensory stimulation, while the organism has little or no awareness of the interference.
Review: Course Goals?
What is this course about?

- Learn how to build *good* VR experience (good = ? )
- Learn how VR works (engineering + psychology)
- Learn how to criticize VR
- Learn fundamentals to shape future of VR
Homework

- Chapter 1 of Steve Lavalle’s VR online book
  Definition of VR, modern experiences, historical perspective.

- Experiment on another student (not in this course):
  The Rubber Hand Illusion