



Introduction To Immersive Virtual Environments (aka Virtual Reality)

Scott Kuhl
Michigan Tech

Hobbies: Photography



Hobbies: Biking



Two summers ago: 120 miles over 5 days in rural NW Ireland

Last summer: Biking on Vancouver Island, BC



CS students may have also met my wife



Faculty advisor:

Husky Game Development Enterprise



Husky Game
Development

What is an Enterprise?

- It is a course; but also much like a student club
 - Students elect student-management.
 - I focus on managing the managers---not managing everybody
 - HGD has 60+ students
- You can take the course every semester
- We need: Programmers, 2D artists, 3D artists, sound designers, computer lab maintainers, webmasters, etc.
- Want more information?
 - <http://www.huskygames.com>

What happens if I join?

- You will fill out a survey so we know your interests/abilities
- We will assign you to a team of ~5 students
 - Your team will have a team-leader
- You will work with your team to develop a video game
 - Most projects start in fall semester & end in spring semester.
 - You will regularly talk about the progress your team has made in front of all HGD members

HGD Projects



HGD, WiCS and others
contribute to BonzAI Brawl
<http://bonzai.cs.mtu.edu>



Nov 19

- Skype with Lyle Hall (President and CEO of Heavy Iron Studios)

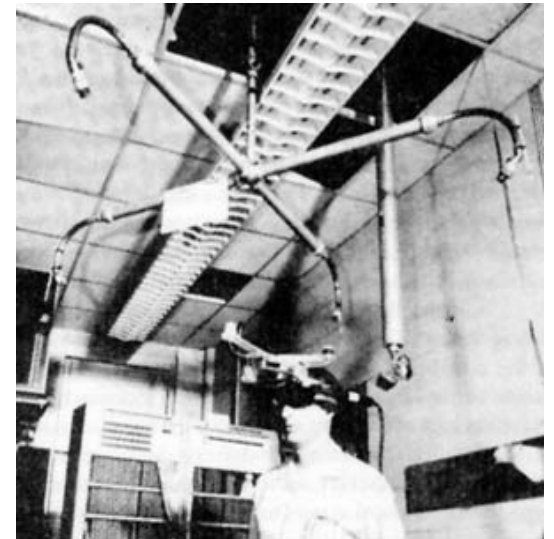


Sound interesting?

- If you are interested in joining, attend an HGD “general meeting”
 - Thursdays at 5pm in Fisher 139
- Upcoming schedule
 - This week: Student presentation
 - Next week: Guest speaker, Dr. Tina Ziemek
 - Game designer & experience research at Will Wright's Stupid Fun Club
 - Game designer & producer at Kidaptive (learning games)
 - Now: Started own game company, teaches, consulting

How did I get here?

- I've always had an interest in computers
 - But I didn't know what I wanted to do
- Worked hard; got noticed; was asked to work on a VR research project as an undergraduate
 - Published first paper as a senior
 - Summer internship at U of Utah
 - Went to grad school at U of Utah
 - HMDs invented there in the 60s



What do you think
"Virtual Reality"
is?

Virtual reality is inexpensive

- Oculus Rift: A \$350 HMD which is now available to developers



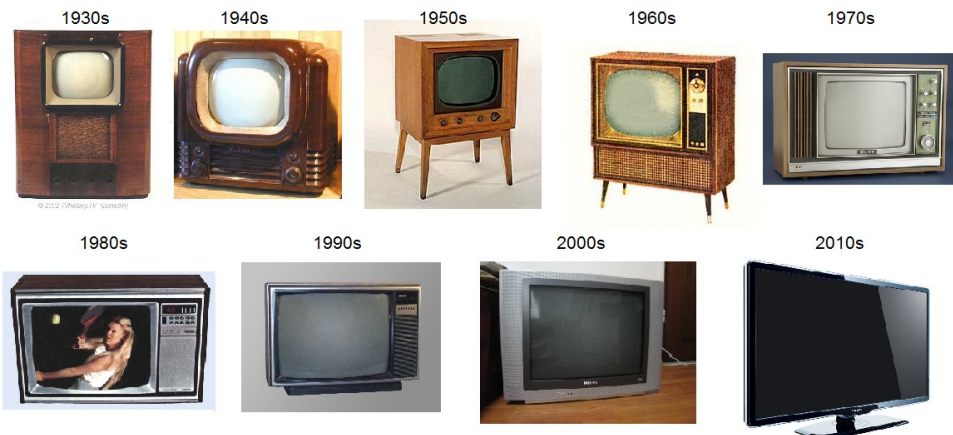
What does this technology rely on?

Why is it becoming popular now?

What will this technology look like in 5 years?

Will everybody have one in their homes?

What will people use the technology for?



VR applications

- Entertainment
- Visualization & Prototyping
- Training applications
 - Especially expensive, dangerous, or difficult-to-produce-in-real-world situations
- Research
- Education
- Rehabilitation

Office of the future?

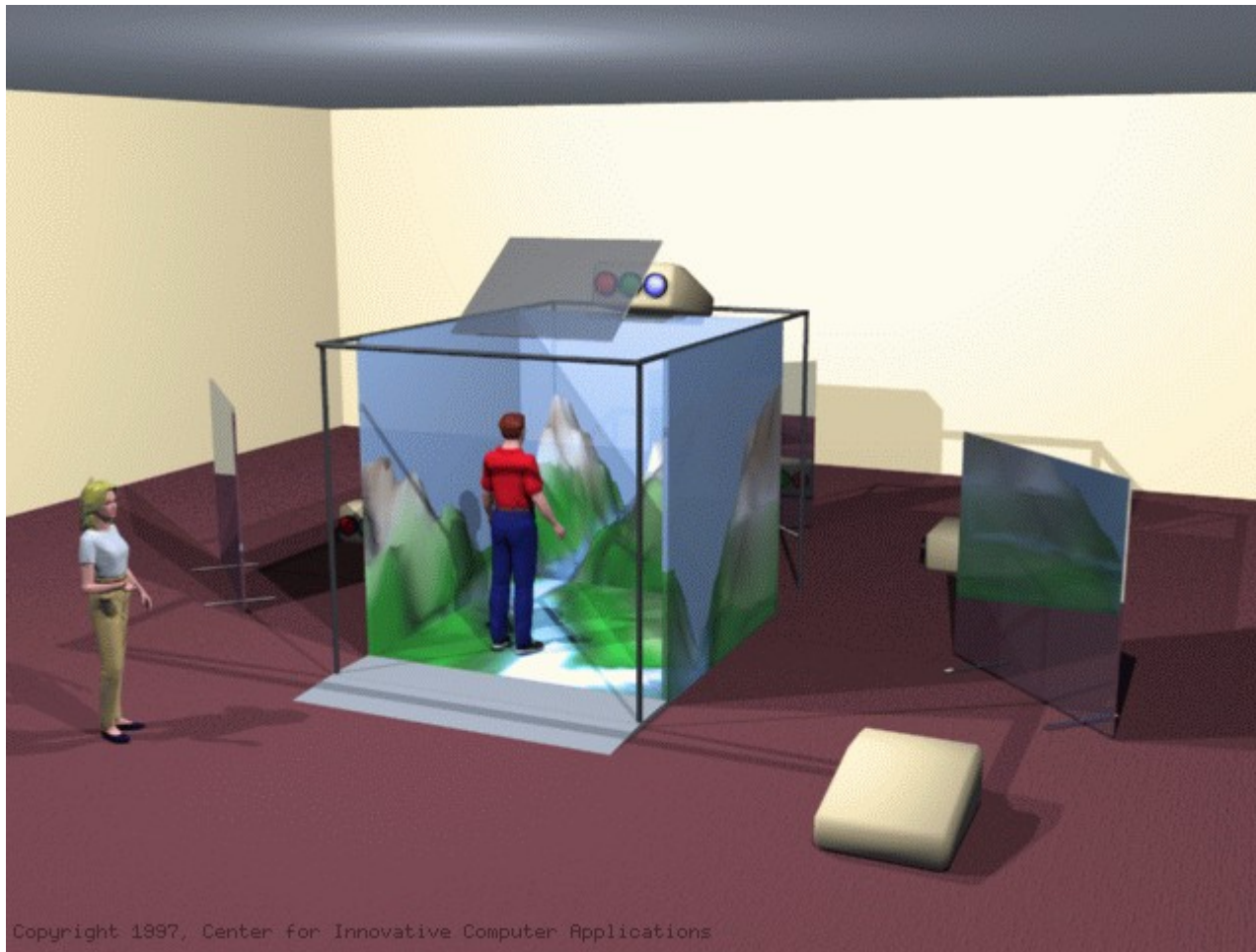
- The way that we use computers changes all of the time:
 - Mainframes, desktops, laptops, smartphones, tablets, etc.
- Are head-mounted displays next?
- Could plugging in an HMD into your cell phone be the way we use computers in the future?

How many senses could VR cover?

- Visual
- Auditory
- Gustation (taste)
- Olfactory (smell)
- Tactition (touch)
- Vestibular (balance, inner ear)
- Proprioception (touch your finger to your nose with your eyes closed)

Besides HMDs, what other kinds of VR technologies are there?

CAVE



Driving simulator



Bicycle simulator



Treadport



Omni-directional treadmill



Parachute simulator



Virtusphere (aka hamster ball)

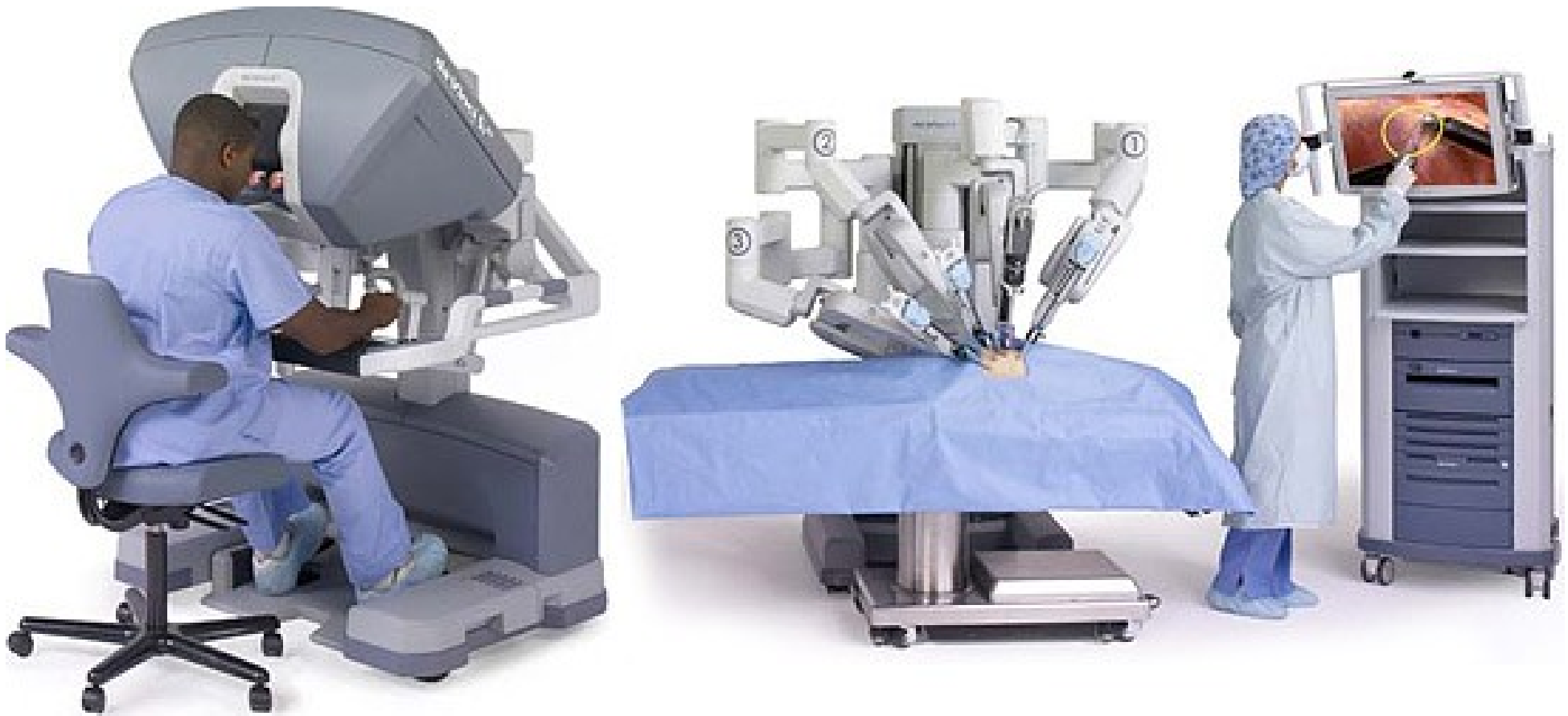


Flight simulator

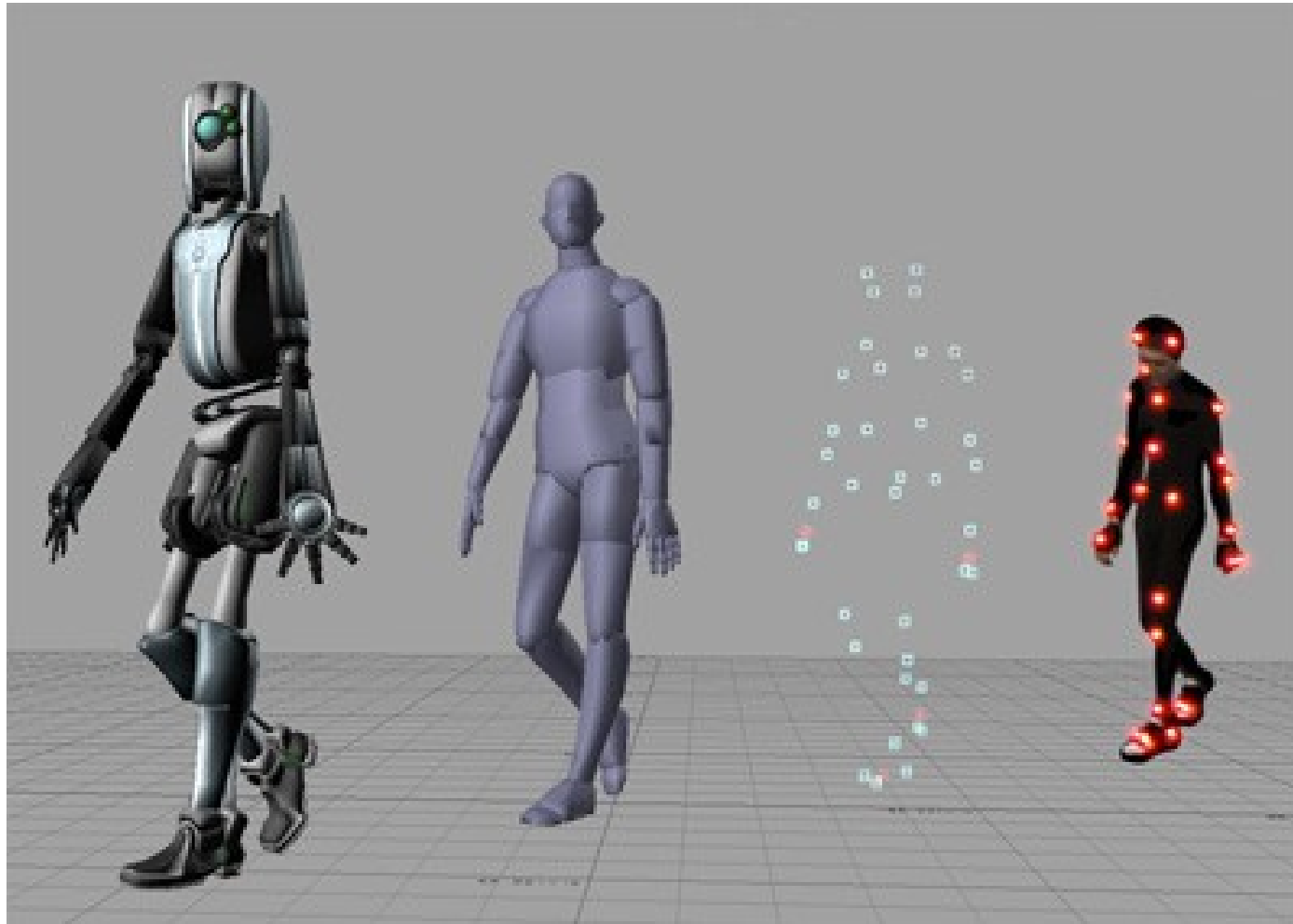


Telepresence

- Remote surgery



Motion capture



Force feedback devices



Samsung Gear VR

- Requires a compatible Samsung Galaxy device
- Wireless!



HTC/Valve Vive



Xbox Kinect



Google glass (RIP)

GLASS



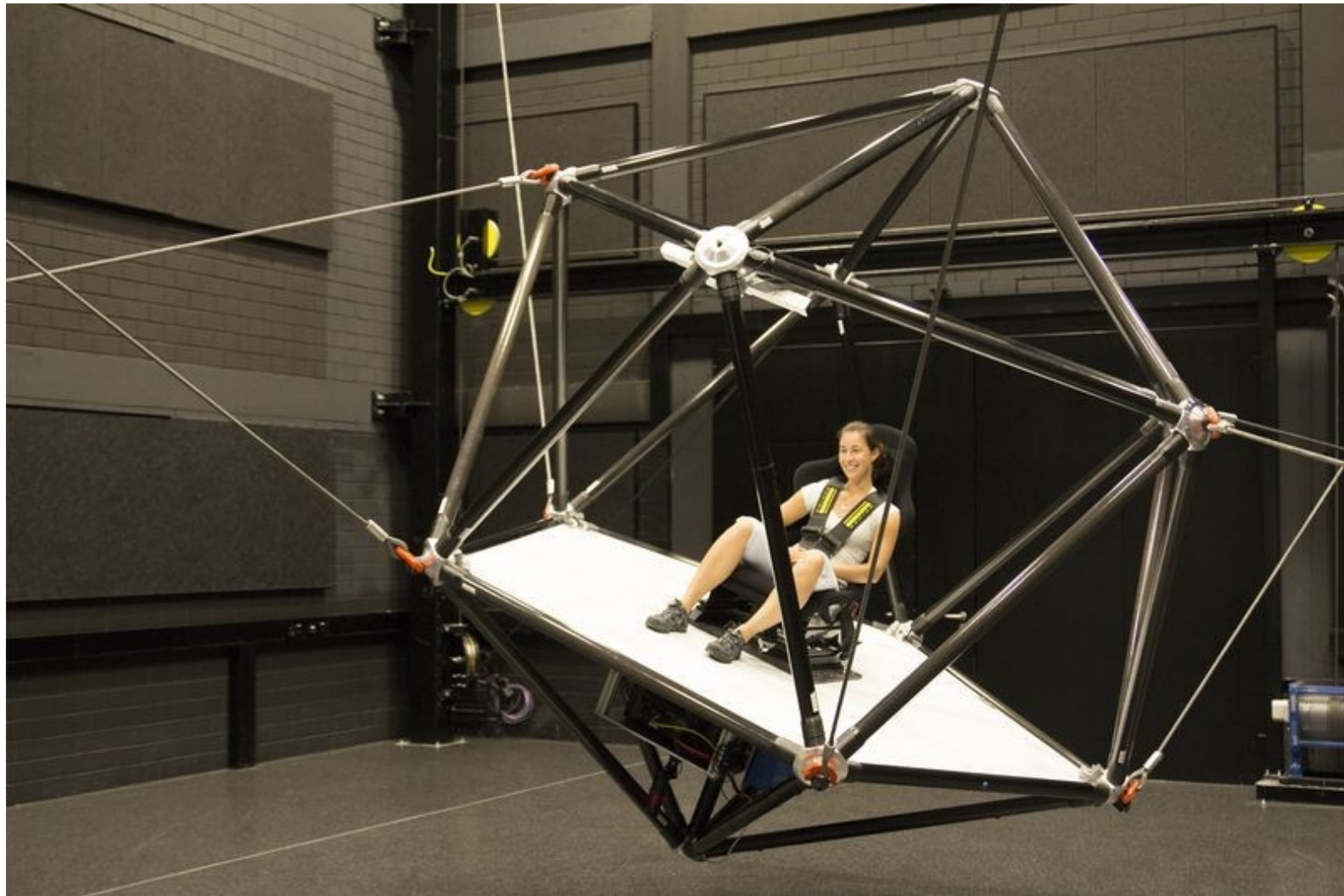
Microsoft HoloLens



Motion platform



Cable Robot Simulator



Razer Hydra



Virtuix Omni



Application: Treating phobias



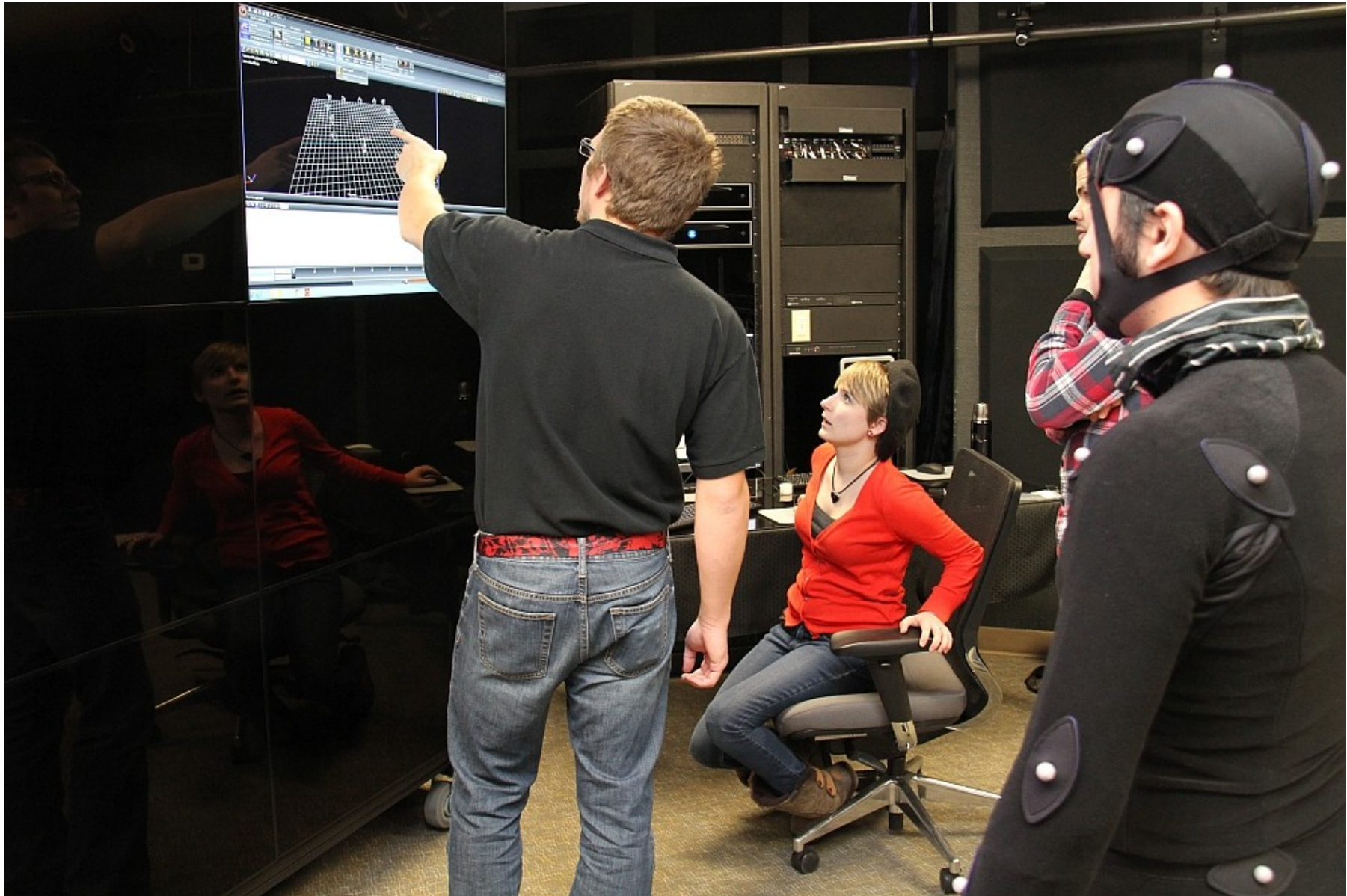
Autodesk 123D



Toys at MTU: HMDs



Toys at MTU: Motion capture



Toys at MTU: 50 megapixel screen



Research topics at MTU

- How can you explore a large virtual space while confined in a small real-world space?
- Do people perceive sizes, distances, speed, etc. correctly in a virtual environment?
- How would you use an HMD to accomplish real work at your desk?

What problems do you think VR will introduce?

Could research help solve those problems?

We regularly need people to help us
with research!

It is possible to get involved as a
freshman and have a publication within
a year.

BUT, it takes hard work and motivation!

Interested in **Virtual Reality** or **Game Development**?

Plan on taking:

CS 4611 Computer Graphics

CS 5641 Immersive Virtual Environments

Husky Game Development Enterprise

Visit my website:

<http://www.cs.mtu.edu/~kuhl>

<https://github.com/skuhl/opengl-examples>

Sign up for the vr-l@mtu.edu mailing list