CSE 118 - Tue 10/15
Mini Quiz – 5 minutes

http://goo.gl/forms/xvSa2sVcsH
Augmented Reality and Google Glass

Credits: D. Johnson, A Wong, G. Schwartz
What Is Augmented Reality (AR)?

- A combination of
  - a real scene viewed by a user and
  - a virtual scene generated by a computer that augments the scene with additional information.
Is this Augmented Reality?
Is this Augmented Reality?
Is this Augmented Reality?

“The yellow line in football shows the location of the first down line”
Is this Augmented Reality?
Is this Augmented Reality?
Is this Augmented Reality?
Our Definition

Augmenting the real-world with data
Augmented vs. Virtual Reality

Augmented Reality
• System augments the real world scene
• User maintains a sense of presence in real world
• Needs a mechanism to combine virtual and real worlds
• Hard to register real and virtual

Virtual Reality
• Totally immersive environment
• Senses are under control of system
• Need a mechanism to feed virtual world to user
• Can be hard to make VR world interesting
Combining the Real and Virtual Worlds

We need:

• Precise models

• Locations and optical properties of the viewer (or camera) and the display

• Calibration of all devices

• To combine all local coordinate systems centered on the devices and the objects in the scene in a global coordinate system
Display Technologies

- Monitor Based
  - Laptops
  - Cell phones
  - Projectors (more Ubiquitous Computing)

- Head Mounted Displays:
  - Video see-through
  - Optical see-through
Monitor Based Augmented Reality

- Simplest available
- Treat laptop/PDA/cell phone as a window through which you can see AR world.
Monitor Based AR

- Successful commercialization
  - Yellow line in football broadcasts
  - Glowing hockey puck
  - Replace times square billboards with own commercials during New Year’s Eve broadcasts
  - Baseball cards
  - Ad campaigns
Optical see-through HMD
Video see-through HMD

Diagram:

- Video of real world
  - Scene generator
    - Graphic images
      - Video compositor
        - Combined video

- Head Tracker
- Video cameras
- Monitors
  - Real World
## Video vs. Optical

**Video**
- More flexible composition
- Greater FOV
- Can match latencies

**Optical**
- Simplicity
- Higher Resolution
- No eye offset
Early Application

• KARMA (91)
  – Feiner
• Optical see-through HMD
• Knowledge-based assistant for maintenance
• Ultrasound trackers attached to assembly parts
Vuforia

https://developer.vuforia.com/
https://www.qualcomm.com/products/vuforia
Google Glass

- Google Glass is a wearable computer with an optical head-mounted display (OHMD) that is being developed by Google in the Project Glass research.
How it works

Martin Missfeldt
Google Glass Apps

http://glass-apps.org/google-glass-application-list
Glass Tutorial

Google Glass Tutorial for CSE118/218

Introduction / Unboxing
The following two videos will help you understand the basics of Google Glass and its interface.

http://ubicomp.ucsd.edu/cse118218/technology/glass/
Next Steps

Readings to discuss on Tuesday

- T. Starner et al. "Augmented reality through wearable computing." [Reading Summary]
- **OPTIONAL**: S. Mann, "Through the Glass, Lightly"
Do not buy Glass (?)
Thanks