

CSE165 3DUI
- Winter 2014

CSE 165: 3D User Interaction

Lecture #4: Displays
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Announcements

- Homework project 1 due next Friday
- In next office hour: Razer Hydra check out
- Research paper presentations
 - title due tomorrow
 - new web page

Paper Presentation

- Paper Stats
 - Title
 - Authors
 - Institute
 - Conference/Journal
 - Year
- Outline
- Related Work
- Methodology
- Results
- Conclusions
- Q&A

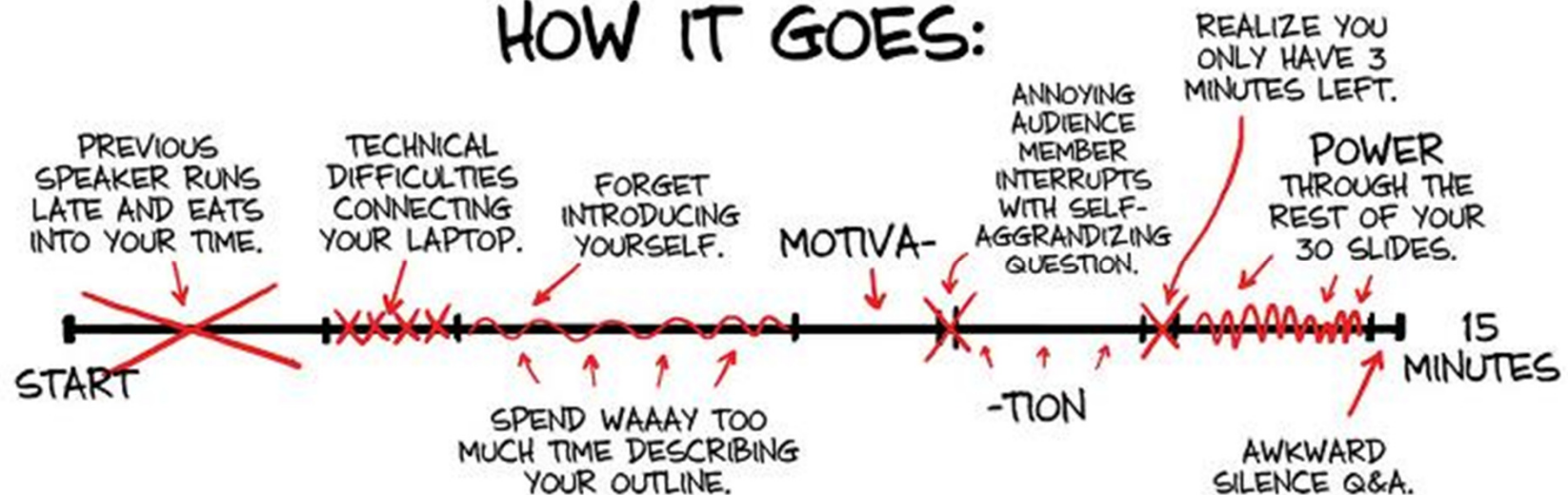
Paper Presentation

HOW YOU PLANNED IT:



Paper Presentation

HOW IT GOES:





Displays - Continued

Surround Screen Virtual Environments (SSVE) – Advantages

- Provide high resolution and large FOV
- Passive stereo: user only needs a pair of light weight glasses for stereo viewing
- User has room to move around
- Real and virtual objects can be mixed
- A group of people can use the space simultaneously

SSVE – Disadvantages

- Expensive (often >\$1 Million)
- Requires a large amount of physical space
- Projector calibration must be maintained
- Normally only one user head tracked
- Stereo viewing can be problematic (ghosting, focal plane far away)
- Physical objects can get in the way of graphical objects

SSVE – Interface Design

- Do not need to represent physical objects (i.e. hands) as graphical objects
- Can take advantage of the user's peripheral vision
- Do not want the user to get too close to the screens
- Developer can take advantage of the space for using physical props (i.e. car seat, treadmill)

Workbenches and Variants (1)

- Similar to SSVE but only one or two displays
- Can be a desk or a large single display (e.g., PowerWall)
- Traditionally a table top metaphor



Workbenches and Variants (2)



Workbenches and Variants (3)



zSpace



- Full HD resolution
- Active stereo screen
- Passive glasses
- Tracked glasses and stylus
- Stylus with infrared markers and gyroscope

Workbenches – Advantages

- High resolution
- For certain applications, makes for an intuitive display
- Can be shared by several users

Workbenches – Disadvantages

- ◉ Limited movement
- ◉ Typically only one user head-tracked
- ◉ No surrounding screens
- ◉ Physical objects can get in the way of graphical objects
- ◉ Stereo can be problematic

Workbenches – Interface Design

- Ergonomics are important especially when designing interfaces for table displays
- User can take advantage of direct pen-based input if display surface permits
- No need to create graphical representations of physical objects

Head Mounted Displays

- Device has CRT or LCD screens with special optics in front of the eyes
- User cannot see the real world
- Provides a stereoscopic view that is updated with the user's head motion



HMDs – Advantages

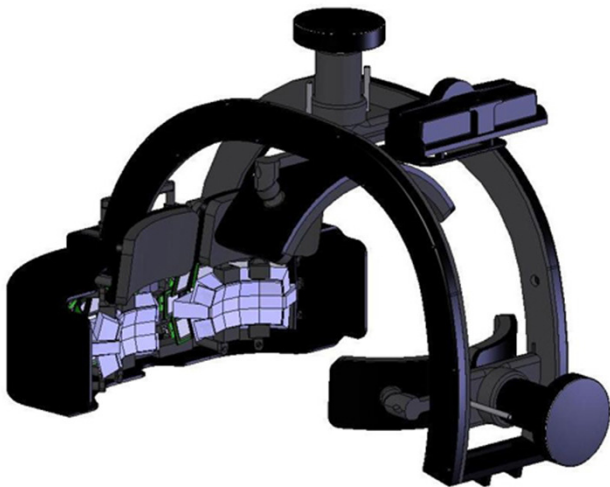
- Provide an immersive experience by blocking out the real world
- Easy to set up
- Do not restrict user from moving around in the real world
- Average quality HMD is relatively inexpensive
- Can achieve good stereo quality

HMDs – Disadvantages

- Most HMDs have poor resolution and field of view (FOV)
- Do not take advantage of peripheral vision
- Isolation and risks related to not seeing the real world (e.g., stumbling)
- Most devices cost in the \$100,000 range, but consumer solutions around the corner
- Often heavy and do not fit well, cumbersome to put on

HMDs – Interface Design

- Physical objects require a graphical representation
- Limits the types of input devices that can be used



Oculus Rift



- Kickstarter project, soon to be commercially available
- >90 degrees horizontal field of view
- 110 degrees diagonal field of view
- More than 2x field of view of competition
- 640 x 800 pixels per eye, soon 1/2 HD
- 7" display
- 1000 Hz head tracking with novel gyro-sensor