RIFFING ON SURFACE

Andy Wilson & Hrvoje Benko
Microsoft Research

UCSB Talk - March 6th, 2009

Overview

- Surface-like stuff (Andy)
  - PlayAnywhere
  - LaserTouch
  - Pinching
  - TouchLight (maybe)
- Devices on the table (Andy)
  - Work by Alex
- New Form Factors (Benko)
  - 4x6
  - Sphere
  - Dome
- Surface Physics (Andy)
  - ShapeTouch (maybe)
- DepthCam Interactions (Andy) (maybe)
  - MicroMotoCross
  - BeachBall
  - DepthTouch
  - pptPlex + 3DV

FourBySix: Integrating Digital and Physical Worlds

Bjoern Hartmann
Hrvoje Benko
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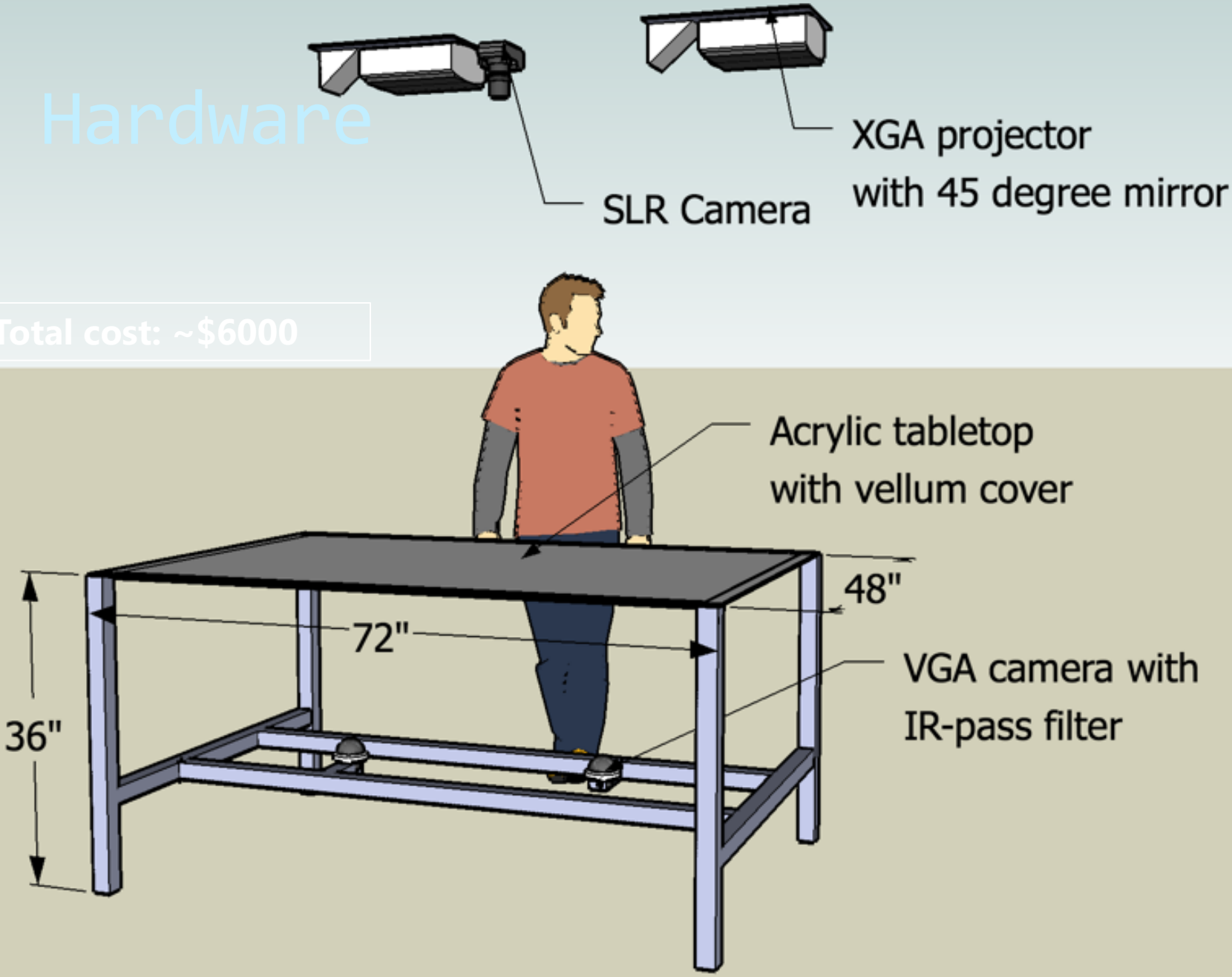
Andy Wilson

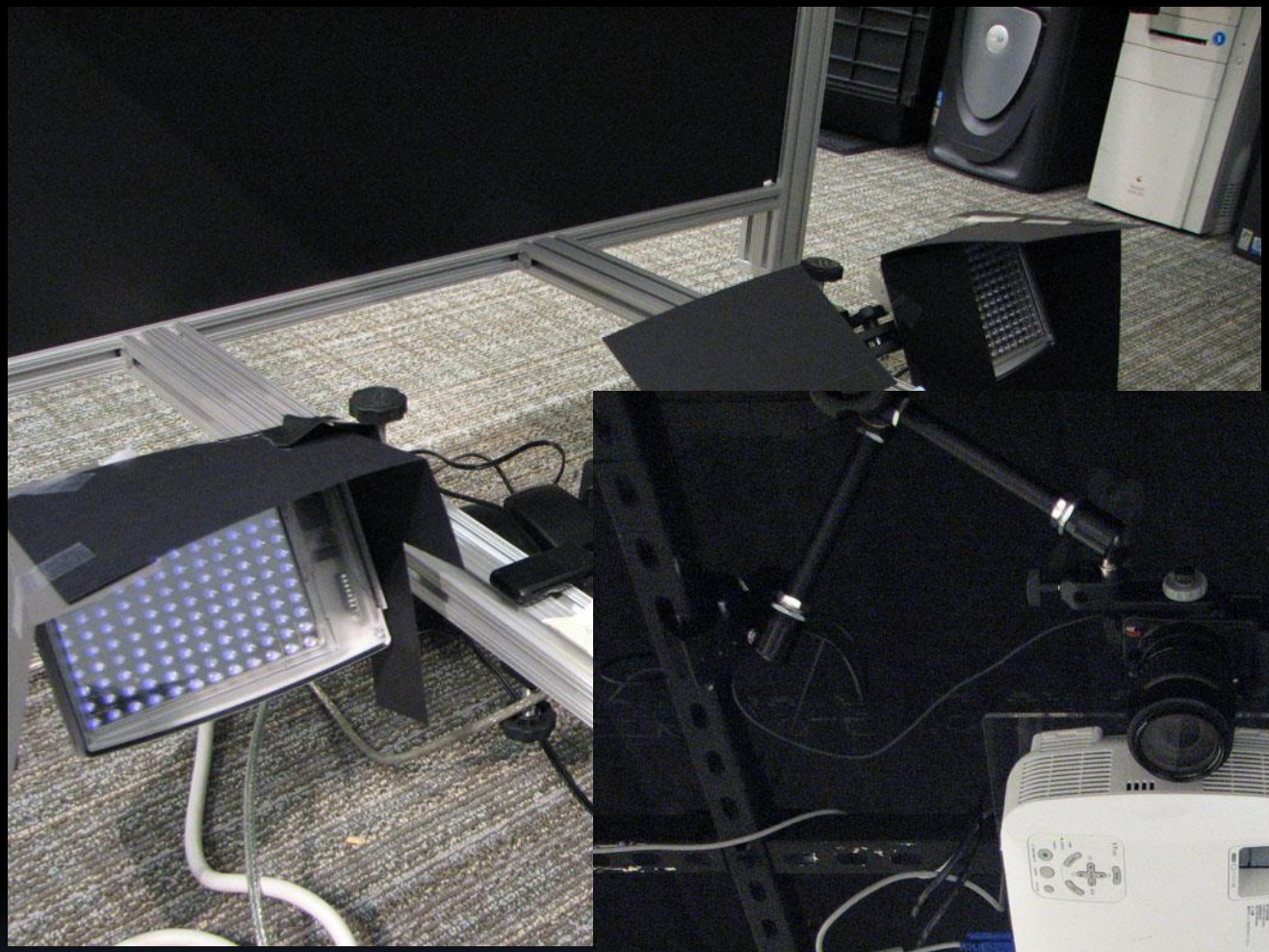
Facilitating Design Brainstorming

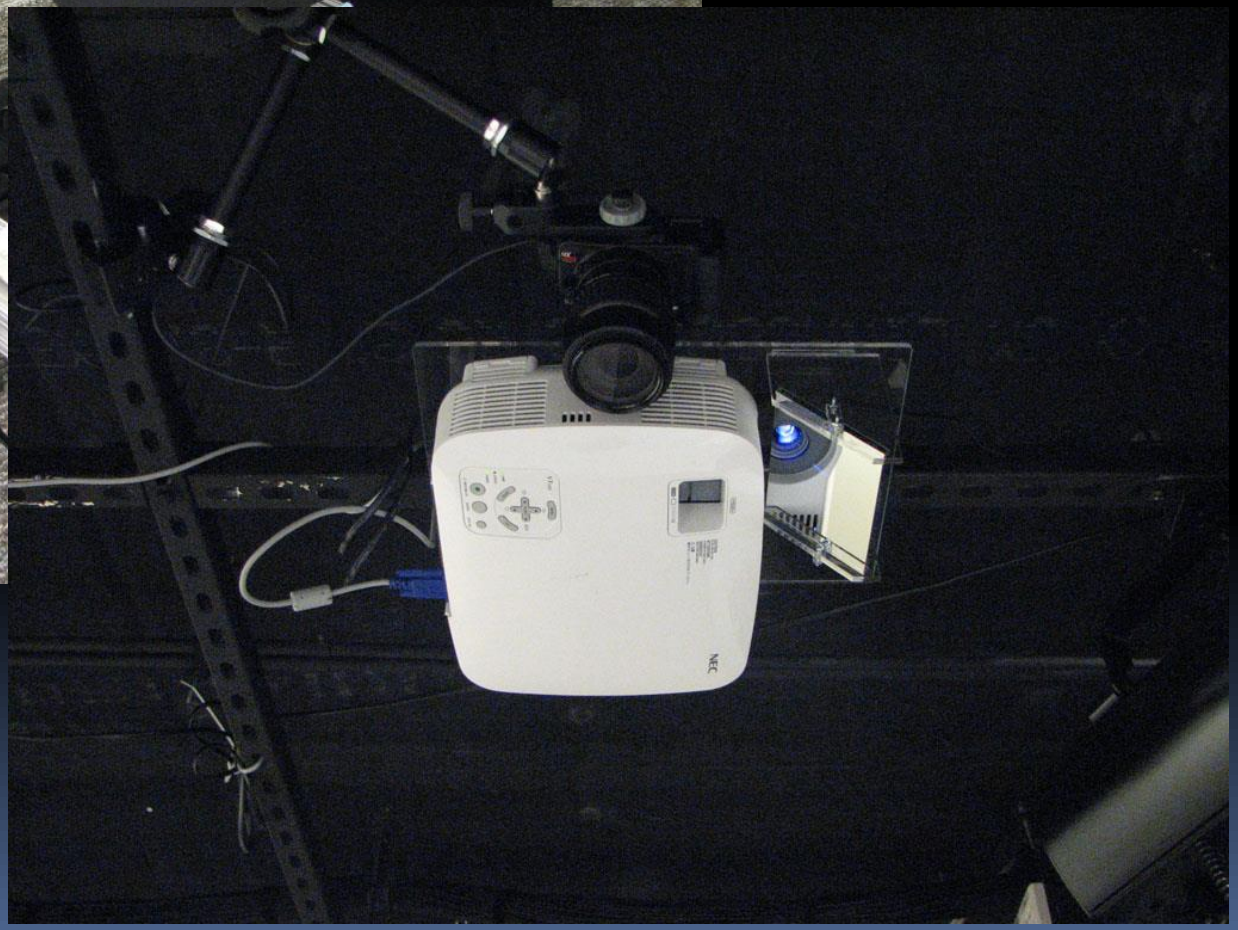
- Multiple designers (no master user)
- Enable *rapid* capture, retrieval, annotation, and collection of visual material
- Easy transition between physical and digital mediums
- Work with found, drawn, and captured imagery
- Organize images into functional collections
- Record meeting histories

Hardware



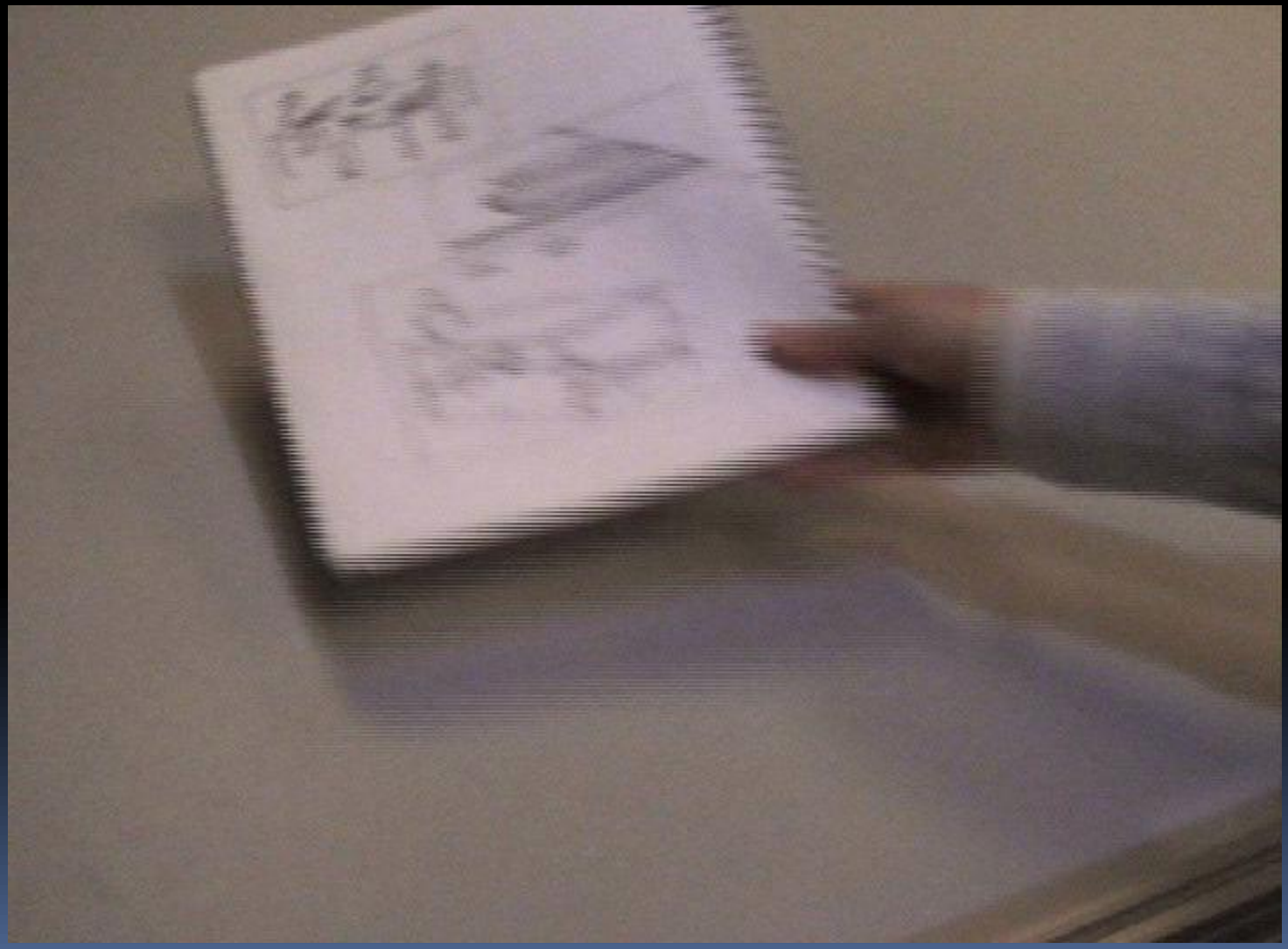
Total cost: ~$6000





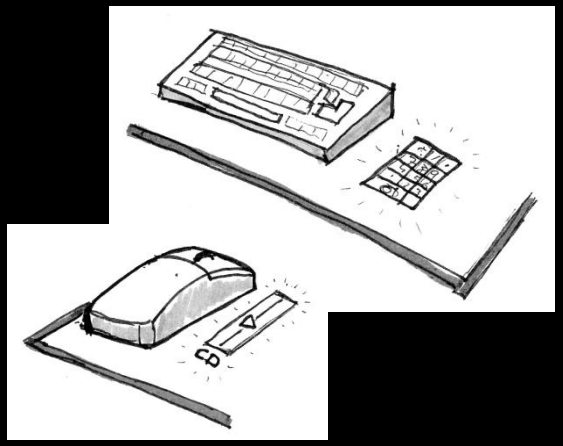
View From the Top (4272x2848 pixels, 60dpi)

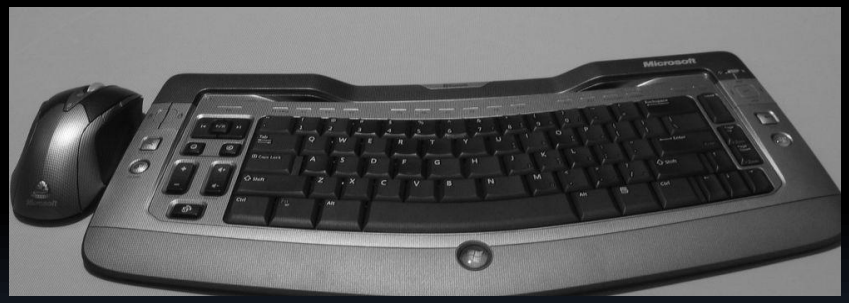
Video: Capture + Annotate

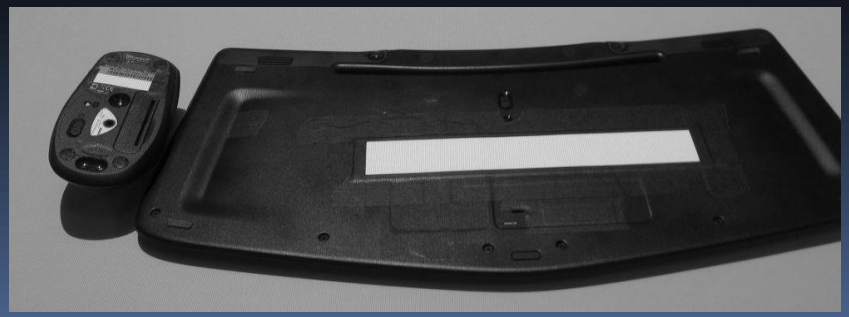


Supporting Multiple Input Devices

- Device-referenced display
- Context-sensitive device configuration



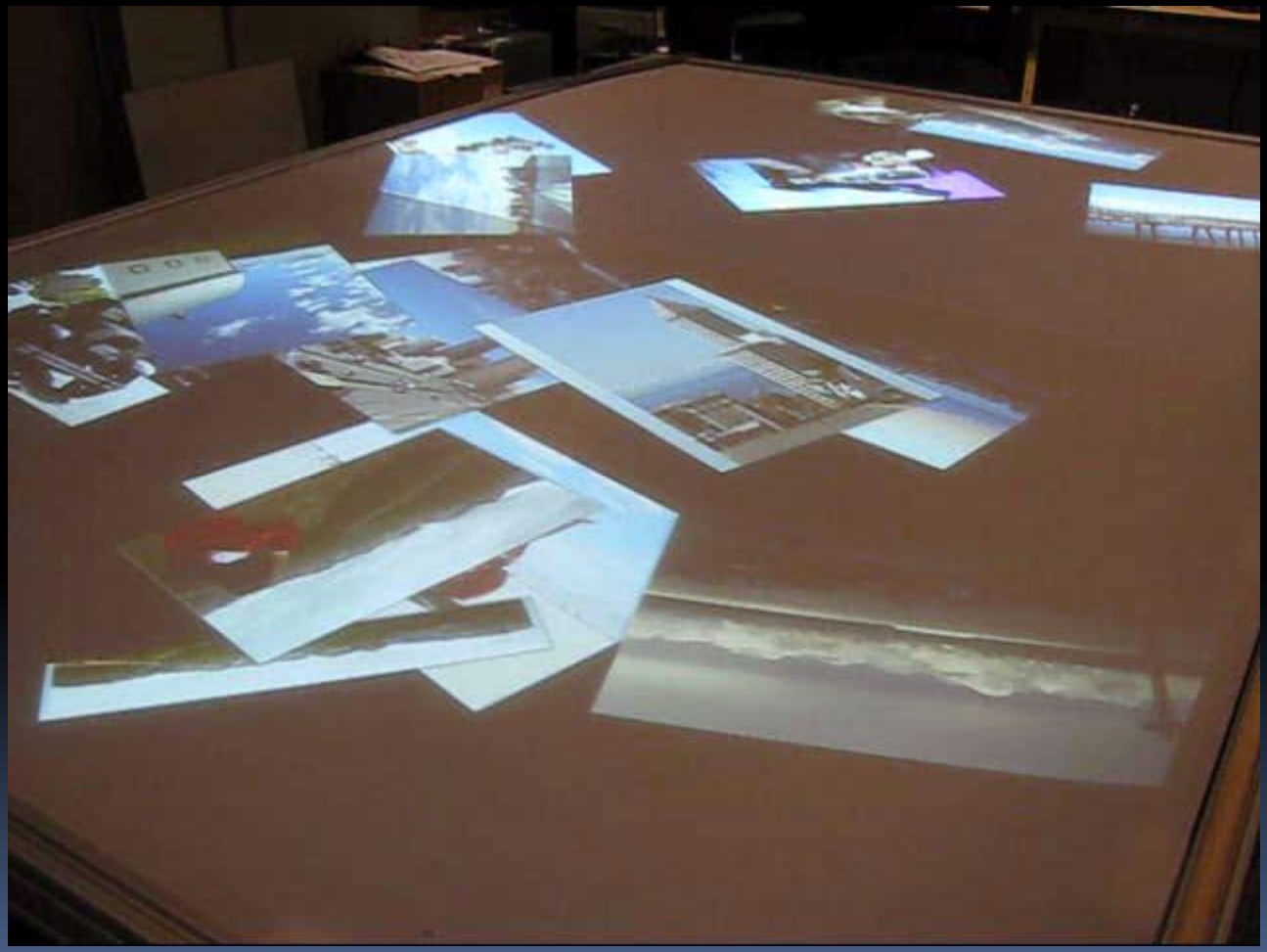




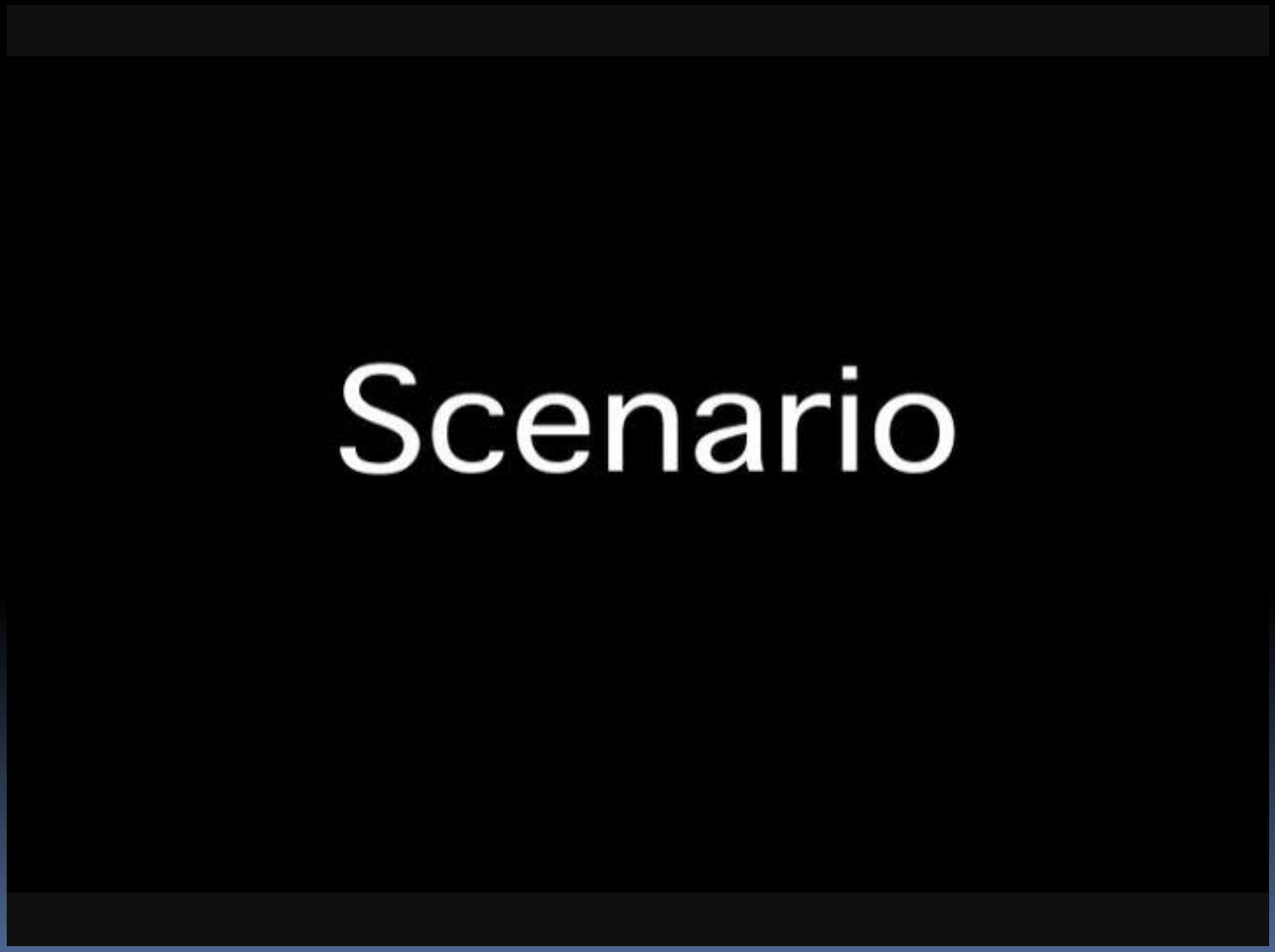
Video: Keyboard + Search

Video: Mice

Video: *Croupier*-Style Interactions



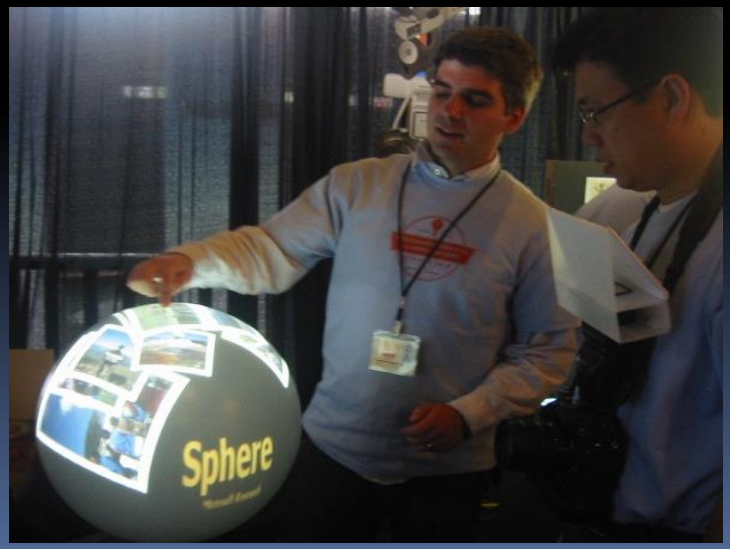
Video: Rapid Prototyping Scenario



Video: Session Record from the Top

Interacting on Curved Surfaces

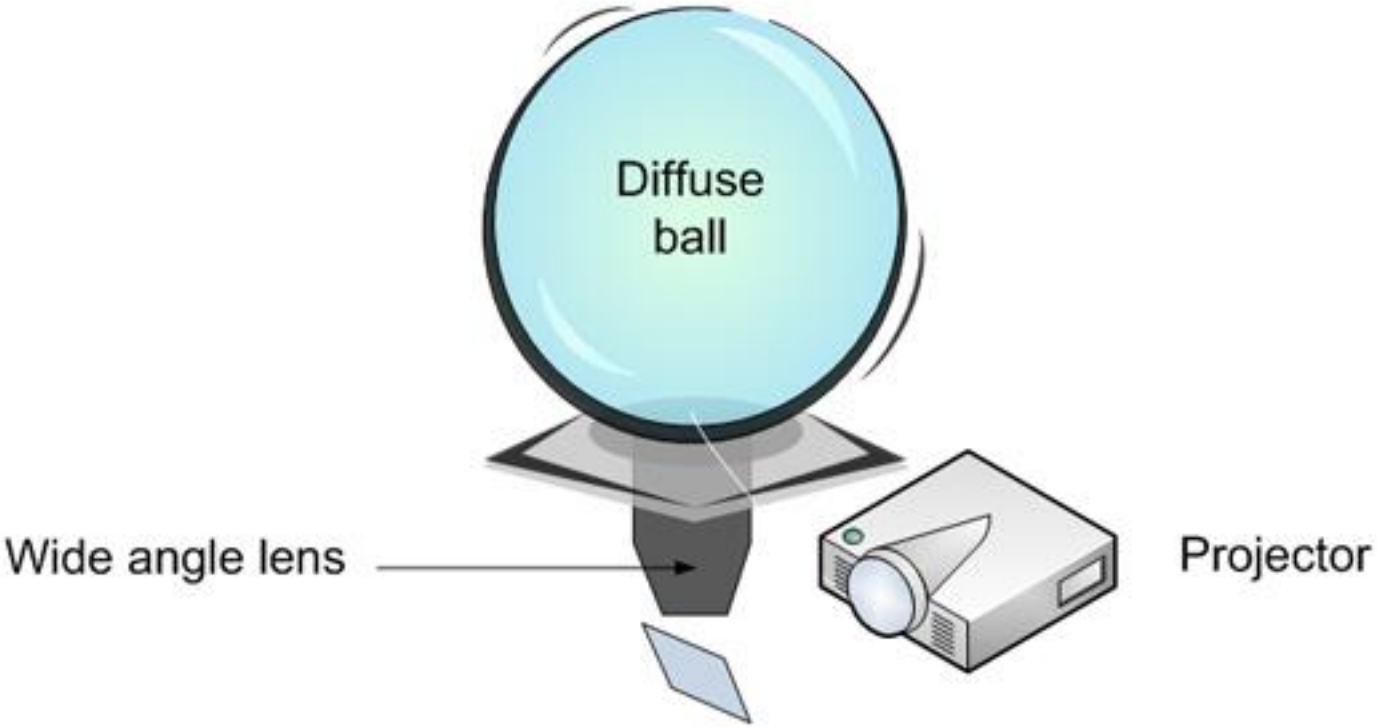
- Projects:
  - Sphere
  - Dome
- Enabling the projection and interaction on a curved omni-directional display



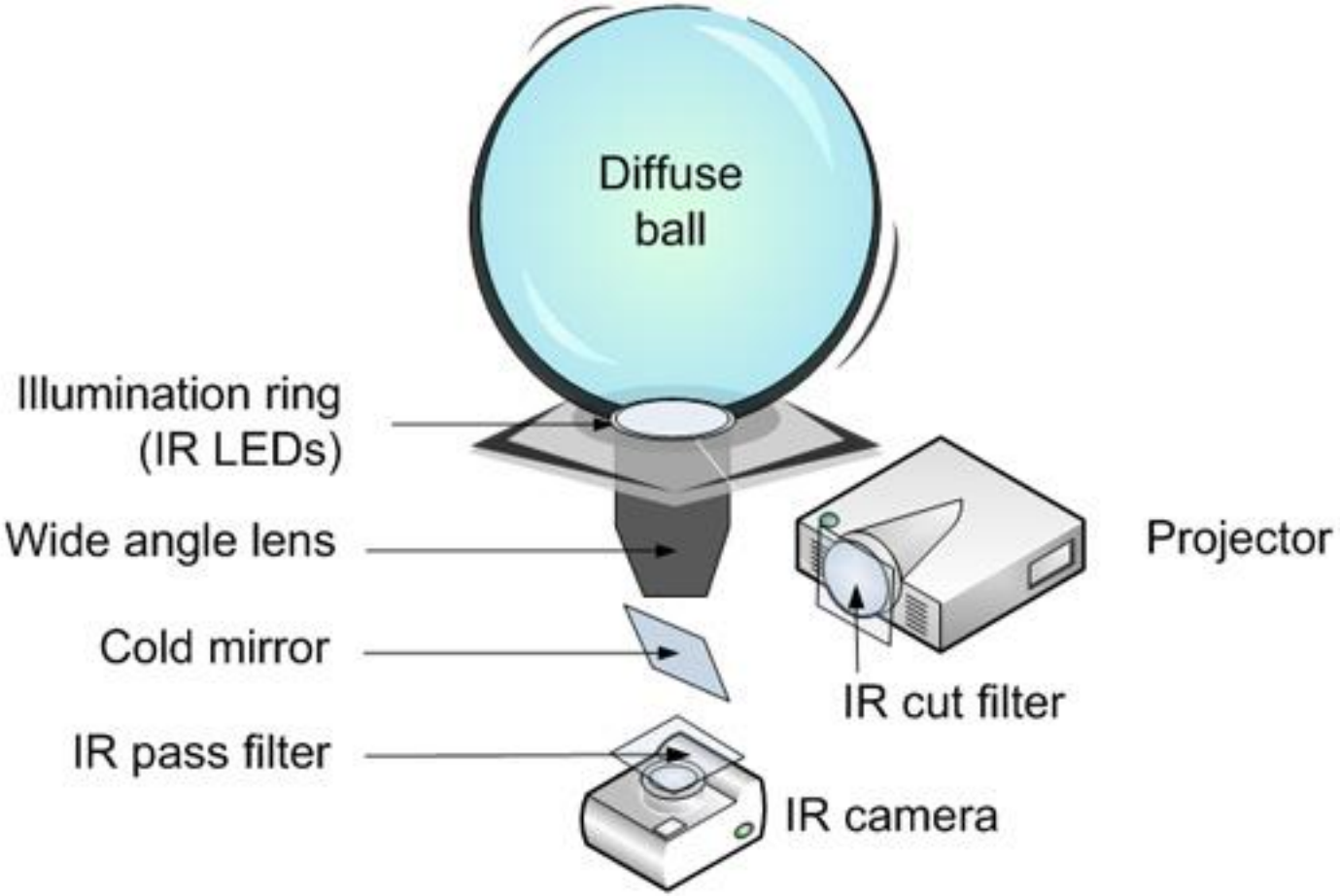
Video: Sphere


Sphere

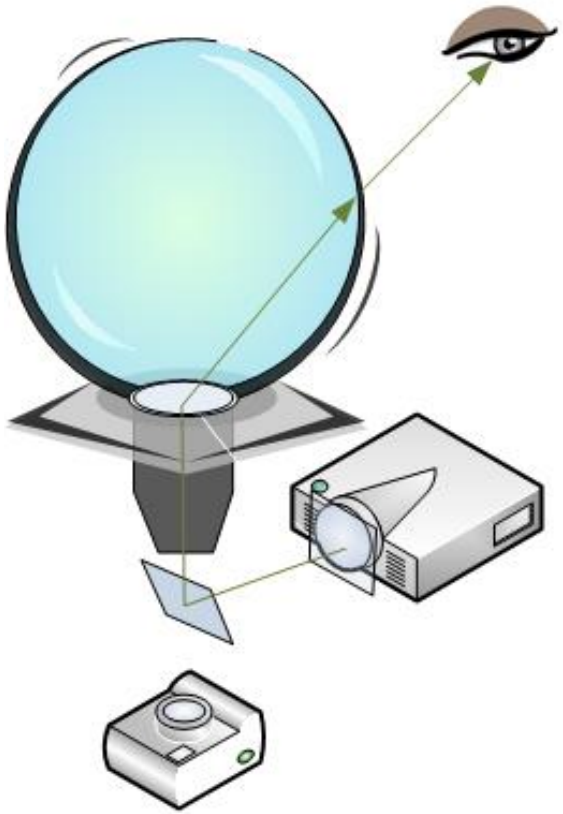
Projection



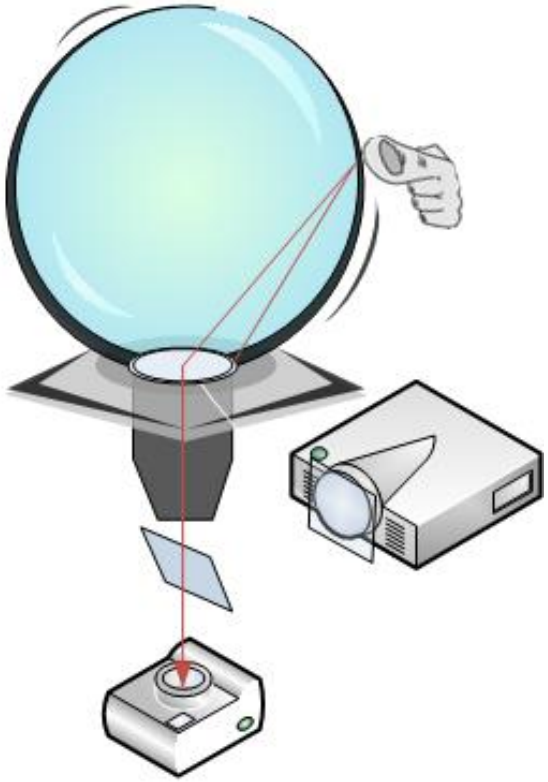
Projection + Sensing



Reusing the Optical Path



Projection path
(Visible)



Tracking path
(IR)

Video: Touch-Sensing


Touch Sphere Vision
File
Video
Calibration
Output
Sphere

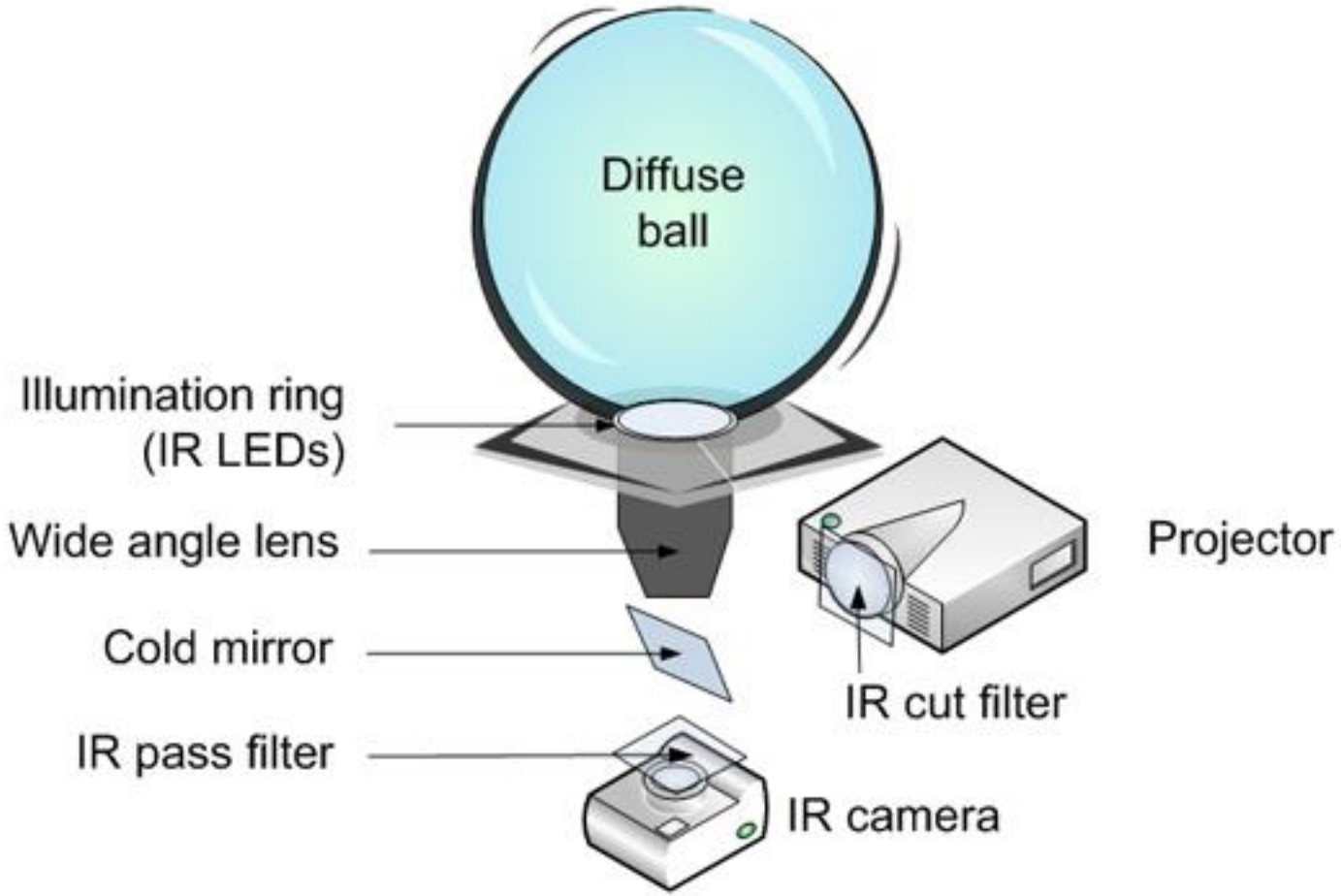
Video: Projection Distortions


Sphere

Video: Sphere Interactions

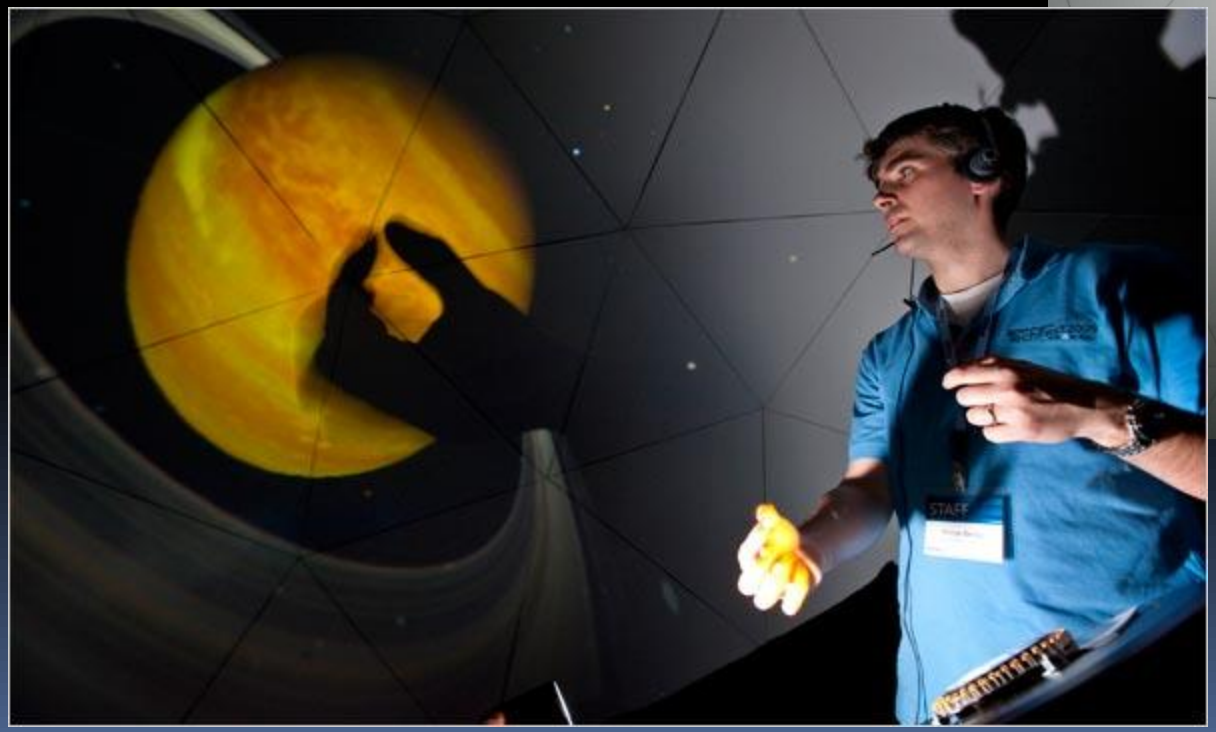

Sphere

Video: MiniSphere


Diffuse ball
Illumination ring (IR LEDs)
Wide angle lens
Cold mirror
IR pass filter
Projector
IR cut filter
IR camera

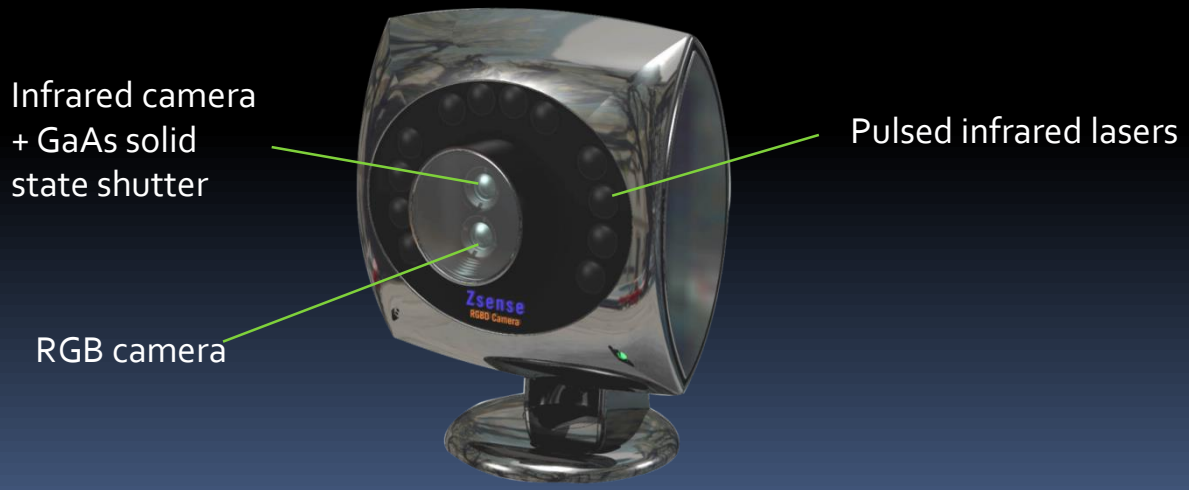
“Pinch the Sky” Dome

- OmniDirectional Content:
  - WorldWideTelescope
  - RoundTable 360 deg. camera
  - 3D social network graph
- TechFest video

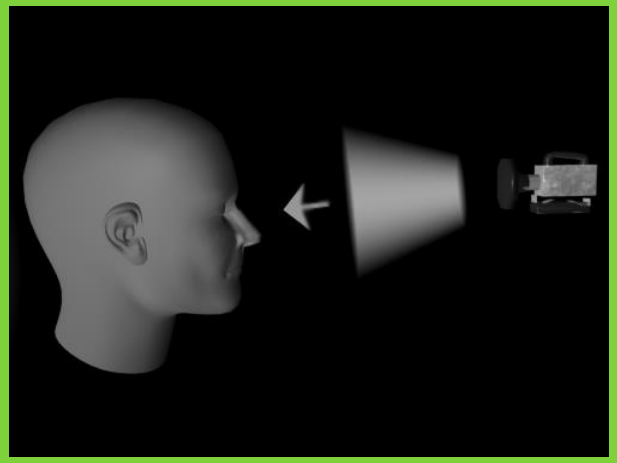


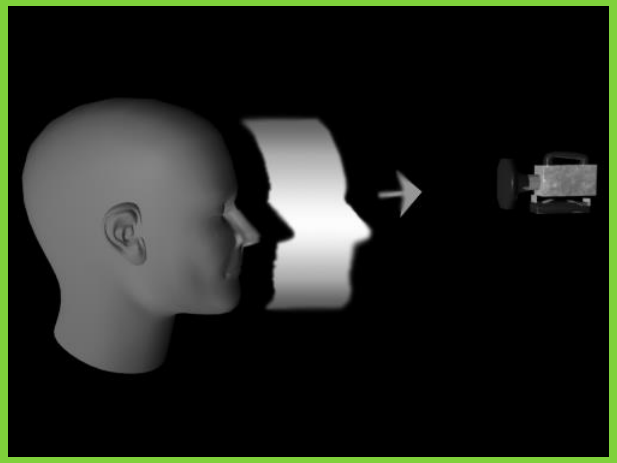
Above-the-surface Interaction

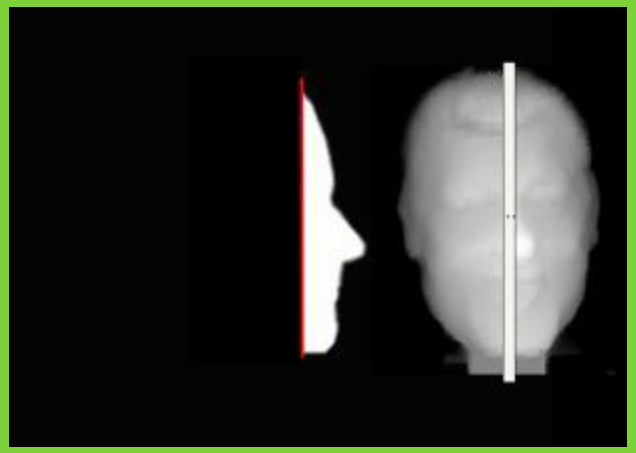
- New cameras give depth map + color: RGBZ
- Improves understanding of physical objects on surface
- Can compute ‘world coordinates’ directly



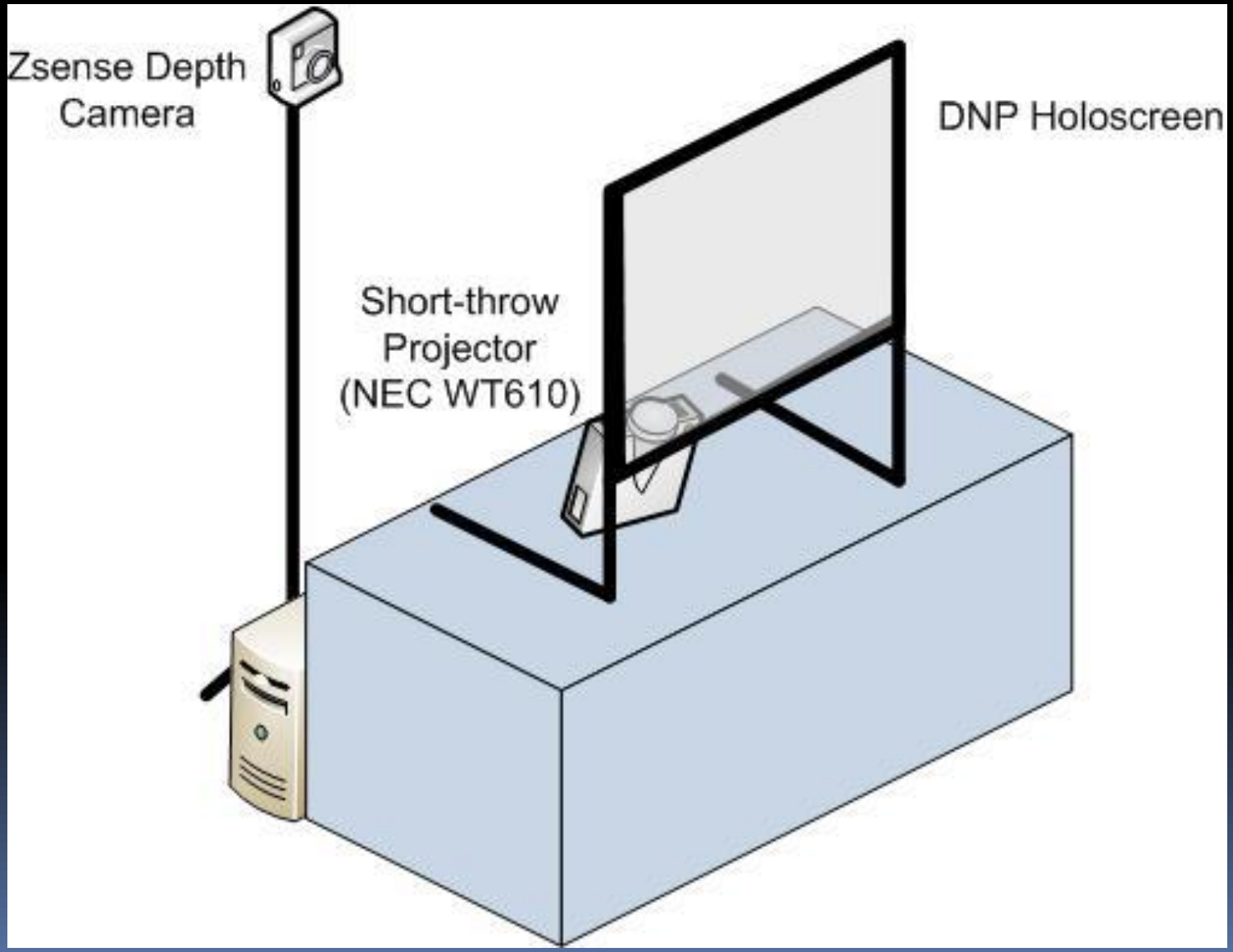
Example: time of flight (3DV)







DepthTouch Hardware Setup

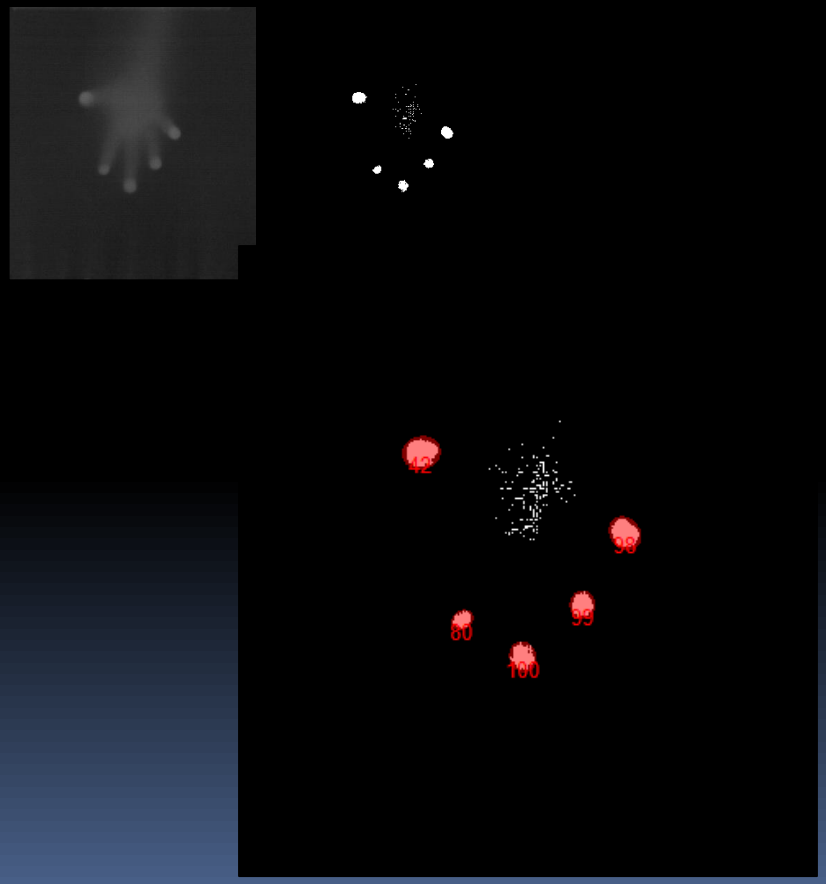


Above-the-surface Videos

- DepthTouch
- pptPlex
- BeachBall
- MicroMotoCross

Cursors considered harmful

- Multi-touch systems are still typically rooted in the "standard cursor model"



Interactions

Cursors considered harmful

- Pulling out discrete contact points is an *ill-posed* problem
  - Leads to all sorts of mayhem!

Shape and Physics Interactions

- ShapeTouch
- SurfacePhysics

Contact

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