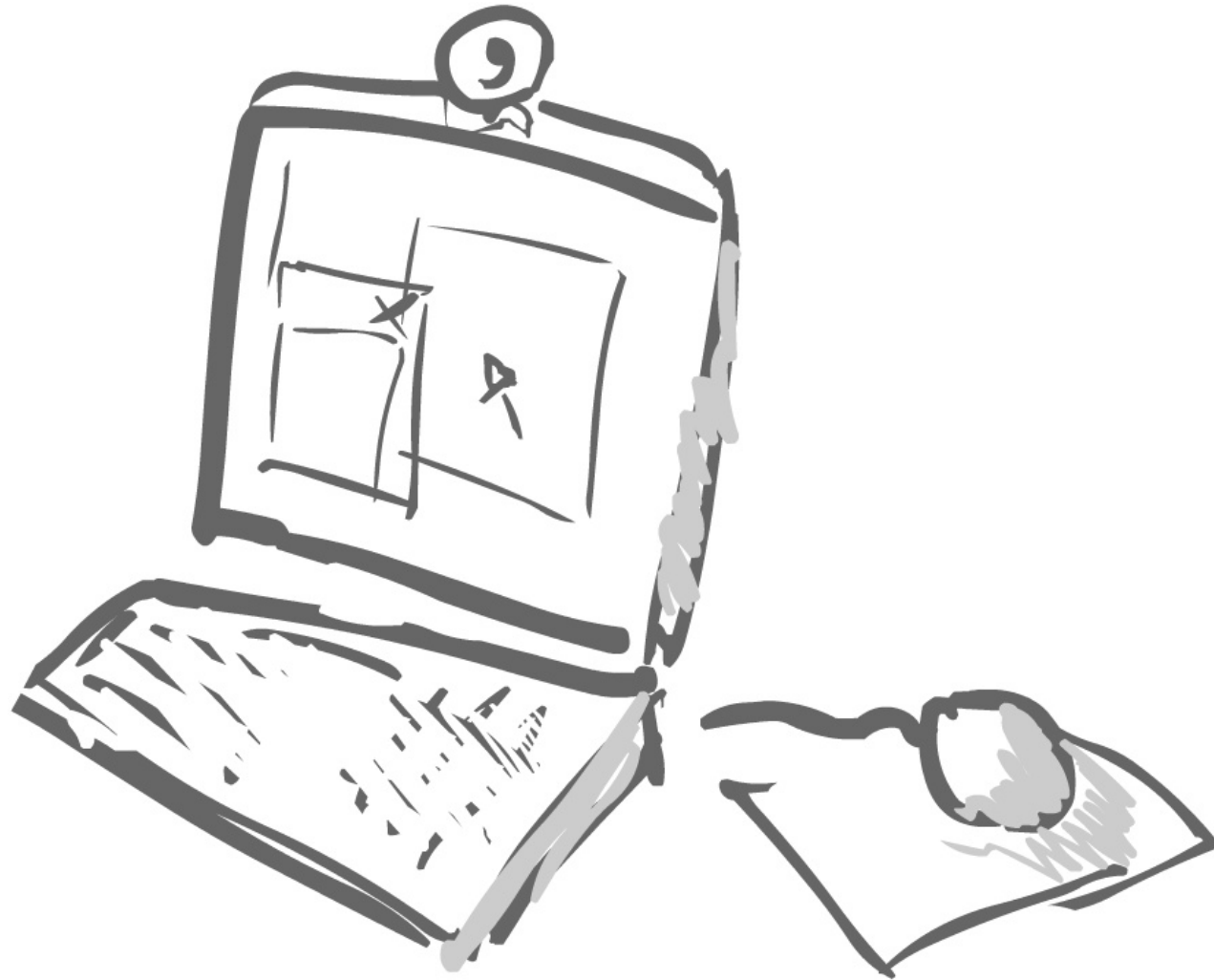


Questions?

- Project #3
- HW#6
- Example of ECS:
<http://www.cs.umd.edu/class/spring2005/cmsc434/amazon.htm>

Computer today



Input devices I



Logitech mouse
IBM Trackpoint



Wacom



Wacom tablet



PlayStation 2

Voice



Microsoft keyboard

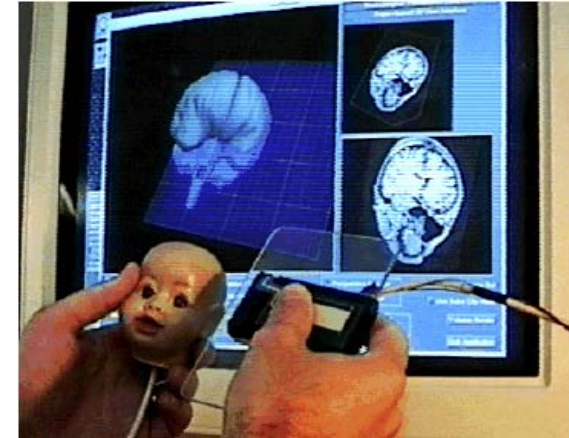
Input devices II



SpaceBall (6DOF)



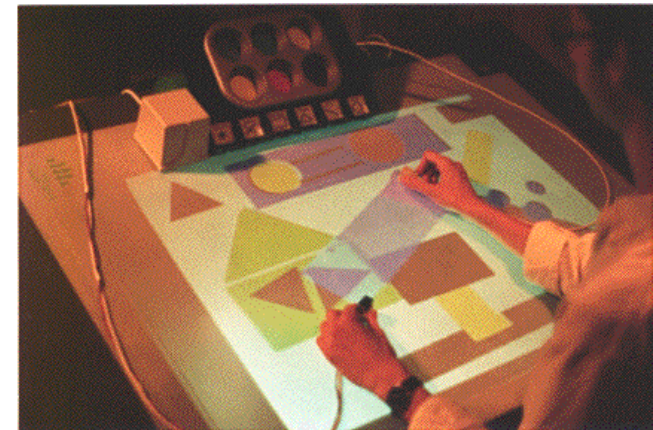
Phantom



Ken Hinckley



Anoto pen



George Fitzmaurice

Input devices characteristics

- Degrees of Freedom
 - Rotary knob: (1 DOF), Mouse (2 DOF)...
 - SpaceBall (6 DOF), 2 Handed Polhemus (12 DOF)
- Isometric or Isotonic
 - TrackPoint versus mouse
- Relative or absolute
 - Mouse versus a pen on the screen
- Direct or indirect
 - Working on your desk versus working on the screen
- Linear or rotary
 - Knob versus a slider

Some Insights

- Isometric or Isotonic
 - Isotonic best for position
 - Isometric best for rate control
 - *Good driver difficult to implement*
- Relative or absolute
 - Relative saves space
 - Absolute faster
- Direct or indirect
 - Direct is faster
 - Indirect maybe more ergonomic

Output devices characteristics

- Modality
 - Sight, hearing, touch, taste and smell
- Dynamic or static
 - Computer display versus printer
- Resolution and size
 - From cell phone display to mural size
- How faithful to our everyday experience
 - From grey scale printed image to full color stereoscopic display

Output devices I



Wacom



Printer



Stanford interactive Mural

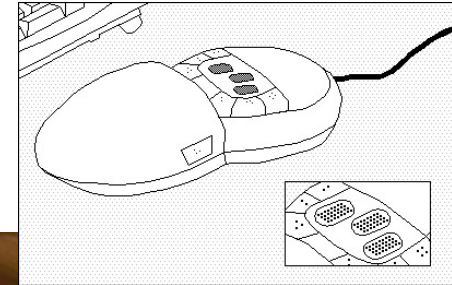


IBM (9 Mpixel)

Output devices II



Phantom



VirTouch



Olympus Eye-Trek

Speech

Buxton's point of view

- The importance of pragmatics
 - The problem with cross modality mapping
 - Phrasing of gestural input
 - The importance of physical feedback
- Beyond one-handed visual interface
 - Two-handed interactions
 - Foot pedals
 - Audio interface...

How to select a movie?

Keyboards



Office keyboard



Cell phone



Blackberry



Metropolis keyboard (Zhai, IBM, 2000)
SHARK (Zhai 2003)