Questions?

• Project #3
• Homework #5 is due today
• Homework #6 is out today
• Midterm in a week and a half
• Flash refresher this Friday
Computer today
Input devices I

Logitech mouse
IBM Trackpoint

Voice

PlayStation 2

Wacom
Wacom tablet

Microsoft keyboard
Input devices II

- SpaceBall (6DOF)
- Phantom
- Anoto pen
- Ken Hinckley
- 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
Design space of input devices [Card et al.]
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 II

Phantom

VirTouch

Olympus Eye-Trek

Speech
How to select a movie?

• Picking from a list
• Text entry
  – Keyboards
    • *Standard*,
    • *Miniatures*
      – Phones, Blackberry
  • *Virtual on screen*
    – Touch based, game like (selecting each letter with a joystick)
  – Gesture based
    • *UniStroke* [Goldberg 93] *and Graffiti*
    • *QuikWrite* [Perlin 98] *and T-Cube* [Venolia 94]
    • *Dasher* [Ward 2000]
    • *Handwriting recognition*
  – Smart completion and advanced search engines
    • *Google*...
Keyboards

- Office keyboard
- Cell phone
- Blackberry
- Metropolis keyboard (Zhai, IBM, 2000)
Gestures based

Unistroke alphabet [Goldberg 93]

Graffiti (Palm OS)

QuikWriting system [Perlin 98]

Dasher [Ward 2000]