

Designing 3D User Interfaces Part II

Lecture #14: 3DUI Design Part II

Spring 2017

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CAP6121 – 3D User Interfaces for Games and Virtual Reality

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3DUI Design

- Microlevel
 - devils in the details
 - correct implementation
 - careful choice of parameters
- Macrolevel
 - strengths and limitations of human psychology/physiology
 - common sense
 - rules of thumb
- Two main strategies
 - designing for humans
 - **inventing 3DUIs**

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Inventing 3D UI

- **Realism** (or isomorphism)
 - borrowing from real world
- **Magic** (or non-isomorphism)
 - deviating from the real world and introducing artificial, magic techniques
- Continuum between realism and magic

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Inventing 3DUIs – Simulating Reality

- Tried and true approach
 - replicate world as close as possible
 - bring in certain elements
- Important for simulation applications
 - flight simulators
 - medical training
 - phobia treatment
- Dependent on application
- Advantages
 - + User already knows how to do it from everyday experience
 - + Can be implemented on the basis of designer intuition
- Disadvantages
 - Limitations of technology do not allow exact realism
 - Introduces limitations of the physical world into the virtual world

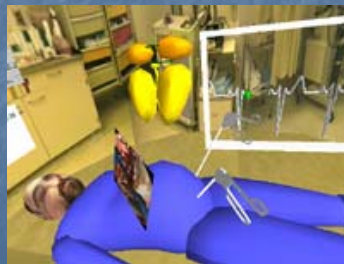
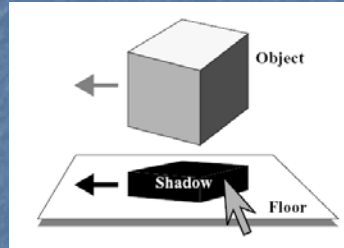
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Inventing 3DUIs – Adapting from Real World

- Adapt artifacts, ideas, philosophies, domains
- Architecture and movies
- Real world metaphors
- Examples
 - virtual vehicle
 - flashlight
 - shadows



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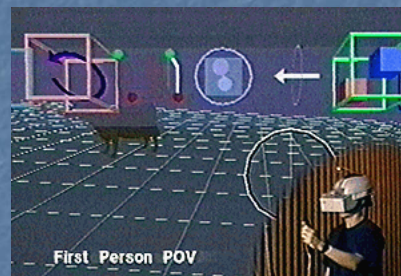
Inventing 3DUIs – Adapting from Real World (II)

Advantages

- + it's already done
- + search for solutions around one
- + experience transfer
- + can be very easy to understand

Disadvantages

- analogy is never exact
- difficult to find analogy for abstract operations
- when is it really effective?



Widgets by Mine et al. , 1996

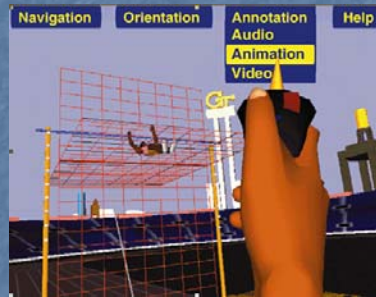
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Inventing 3DUIs – Adapting from 2D

- 2D UIs studied extensively
- Most people fluent with 2D interaction
- Can be easier than 3D
- Approaches
 - literal overlay
 - elements in 3D environment
 - 2D interaction with 3D objects



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Inventing 3DUIs – Pen and Tablet

- Two-handed, asymmetric
- Physical props
- 2D interaction (reduces DOF)
- Surface constraint
- Body referenced

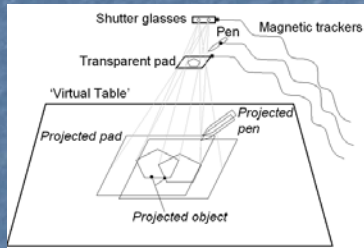


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Inventing 3DUIs – 2D Interaction with 3D Objects



Transparent props



ErgoDesk

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Inventing 3DUIs – Magic and Aesthetics

- Real power of 3DUIs
 - better reality
 - alternate reality
- Overcome human limitations
- Reduces effects of technological limitations



<http://www.cantonmagicrafters.com/images/rabbit.jpg>

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Magic: Cultural Clichés & Metaphors

- Examples: Flying carpet, Go-Go, WIM
- Advantages:
 - + easy to understand if you know the metaphor
 - + usually they are very enjoyable
 - + many metaphors are available
 - + need not to be learned
- Disadvantages:
 - the metaphors can be misleading
 - the metaphors are often rooted in culture
 - it is difficult to come up with good magic metaphor

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Magic: Violating Assumptions

- Can we systematically design and evaluate new interfaces by systematically violating our own assumptions? -- Jeff Pierce, CMU
 - Examples
 - what if 2 objects can occupy the same place in space and time?
 - what if we can make time go backwards?
 - what if we have a technology that has no flaws?
 - Advantages:
 - systematic approach toward inventing 3D user interfaces
 - Disadvantages
 - how far can we violate our assumptions?

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Next Class

- 3DUI Evaluation
- Readings
 - 3DUI Book – Chapter 10, 331-347