3D Interaction and Virtual Environments

Project Defence

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Overview

1. Project
2. Used Device
3. Navigation
4. Selection
5. Manipulation
6. Demo
7. Q & A

1. Project

Immo House Designer

Interior Design

- Immo website
- Interior design
- Add / remove furniture to an empty house
- Goals:
  - Fast interaction
  - Simple interaction
  - Global decoration (no high detail)

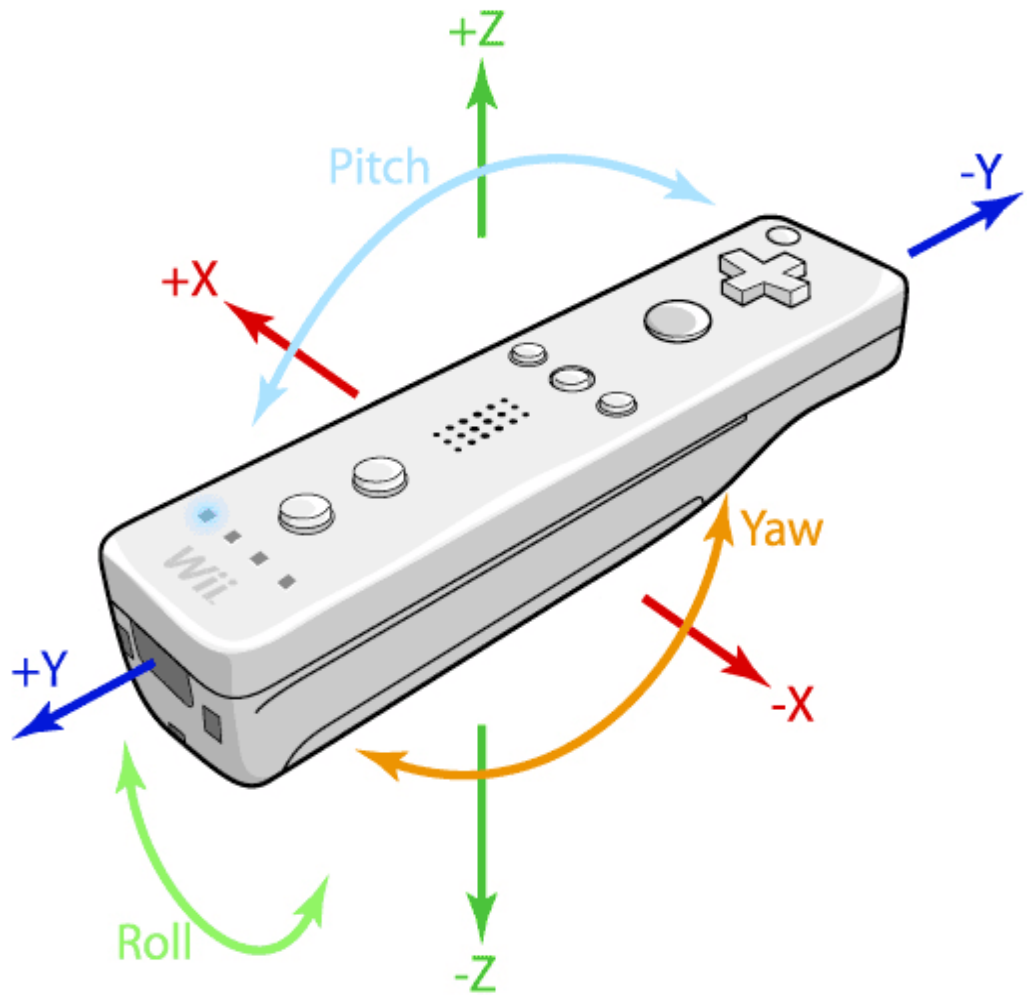
2. Used Device

Buttons and Functionality

Used Device

- Wiimote
- 6DOF with IR

- Goal
  - Simple manipulation
  - More != better



Uniform Buttons

- Home
  - Central location

- Minus-button
  - Previous mode

3. Navigation

Movement and Buttons

Navigation

- Walk
  - Arrow-keys
- Left/Right turn
  - Wiimote L/R twist
- 1 and 2
  - Predefined corners

- Throw wiimote up
  - Top view
  - Divide map
  - No disadvantages with disorientation

Navigation - Tested Interaction Styles

1. Collision detection
    - No collision detection
    - Collision detection on walls and objects
    + Collision detection on walls only
2. Camera axes
    - Rotating around all axes
    + Only rotation around Y-axis
    ± Rotation in steps of 90°
3. Viewpoints & top view
    - No interpolation
    + Interpolation

4. Selection

Selecting an Object

Selection - Tested Interaction Styles

1. RayCast
   + High level of granularity
   - Complex interaction
   - Difficult to select parent with children
2. Flash light metaphor
   + High level of granularity
   + Iterative selection
   - Complex interaction
   - Limited parent - child selection
3. Auto - selection
   + Easy and intuitive interaction
   + Iterative subselection
   + Parent + child selection
   - Low level of granularity

Selection

- Turn left and right to select children
- Selecting
  - Grab movement
  - A + B
  - Shows contextmenu
- Moving through the menu's: click button A
- Exit menu: Home or minus-button

5. Manipulation

Manipulating a Selected Object

Manipulation

- Rotate
- Scale
- Add
- Move
- Remove

Separate Modes

- Wiimote = 'noise' + unwanted actions
- Action in the application != action desired by user
  - CONFLICT!!
  - Step 1: User specifies the action
  - Step 2: System executes the action

- Example: simultaneous moving and rotating an object

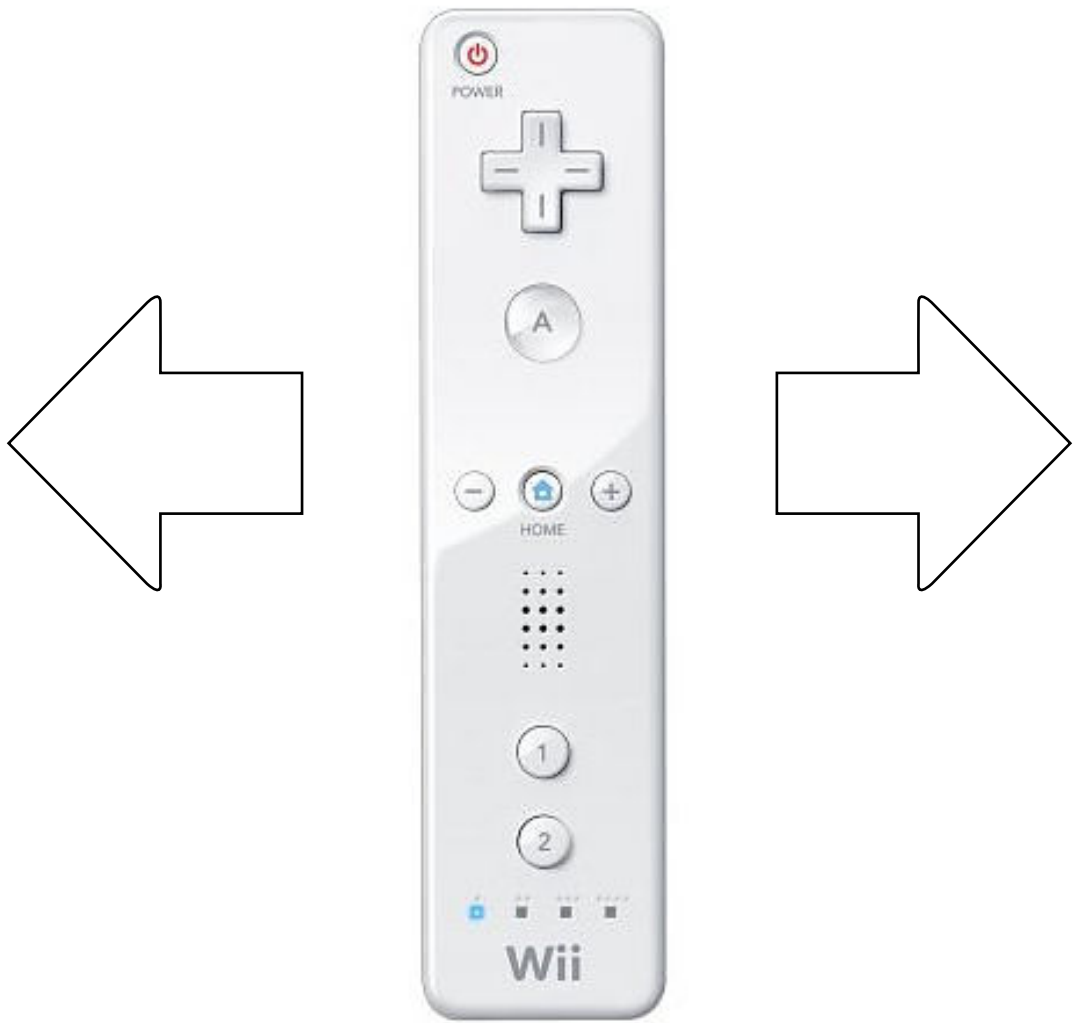
Manipulation - Rotate

- Tilt left
  - Rotate left
- Tilt right
  - Rotate right

Visual feedback

Manipulation - Scale

- Complex!
  - 3 axes
  - Axis per axis
    => No unwanted actions
  - Visual feedback
- Plus-button
  - Change axis
- Tilt up or down
  - Scale selected axis



Manipulation - Add a New Object

- Selected object = parent of new object
- Scrolling through a predefined list of possible objects
  - Tilt wiimote left/right
- Moving new object: similar to moving existing objects
- Ending manipulation => placing the new object
  - Minus-button

Manipulation - Move

- Moving objects
  - Arrow-keys
- Move to another room/parent
  - Aim at another room + A (select)

- Gridmodus
  - Shows visual dragpoints

Manipulation - Tested Interaction Styles

1. Rotating
    - All axes vs. only for some axes
    - No feedback vs. visual feedback
2. Scaling
    - All axes at once vs. axis by axis
    - No feedback vs. visual feedback
3. Adding and moving objects
    - Keep cameraview vs. changing to topview
    - No interpolating vs. interpolating between cameraviews
    - Moving in a grid vs. free moving (horizontally only)
    - Highlighting hoovered possible new parent

Demo