



# Home Improvement Assistant

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# The power of visualization

- ◆ Tired of wandering through IKEA or Home Depot, carefully measuring items to see how they will fit in your home?
- ◆ Imagine a visit to the store with only a memory card full of photos in hand, and leaving with the perfect upgrades for your home...

- ◆ How many times have you come into this room and wondered, "Why doesn't CS101 have a big screen TV?"



# Welcome to HIA

- ◆ Wonder no longer!
- ◆ Drag and drop your photos into HIA and quickly begin to place new items in your home
- ◆ Quickly visualize your home's new look and feel
- ◆ Rearrange until satisfied!

# HIA at work





# How does HIA work?

- ◆ You click on four points in the corner of your room
- ◆ A 3D frame of reference is established based on these points
- ◆ After final adjustments, it is perfectly aligned with your image, and ready for home improvement!

# Main Components of HIA

- ◆ Alignment
- ◆ Object dynamics
  - ◆ Placement, orientation, movement
- ◆ Scene/Object management

Let's start with the first component, Alignment



# What just happened?

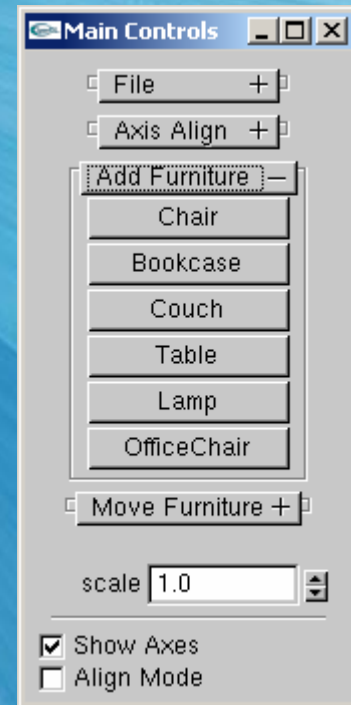
- ◆ Alignment
- ◆ 2D photos have no depth information
- ◆ HIA works on the assumption that the walls forming the corner of your room are at  $90^\circ$  angles

- ◆ Utilizing this assumption, depth values for each of the four user-provided points can be selected, such that the points become 3D vectors forming an orthogonal set of axes



# Time to add to your room

- ◆ When you are ready to add objects to a room, just select the object you want by pressing its button in the GUI
- ◆ Click the point you want to place it on in the scene
- ◆ Drag and drop until it is just the way you like it





# Moving Objects

- ◆ HIA calculates the vector made by the point you click on, and the position of the camera
- ◆ This vector is intersected with the floor plane, giving the exact point under the mouse
- ◆ This way objects move along the floor smoothly

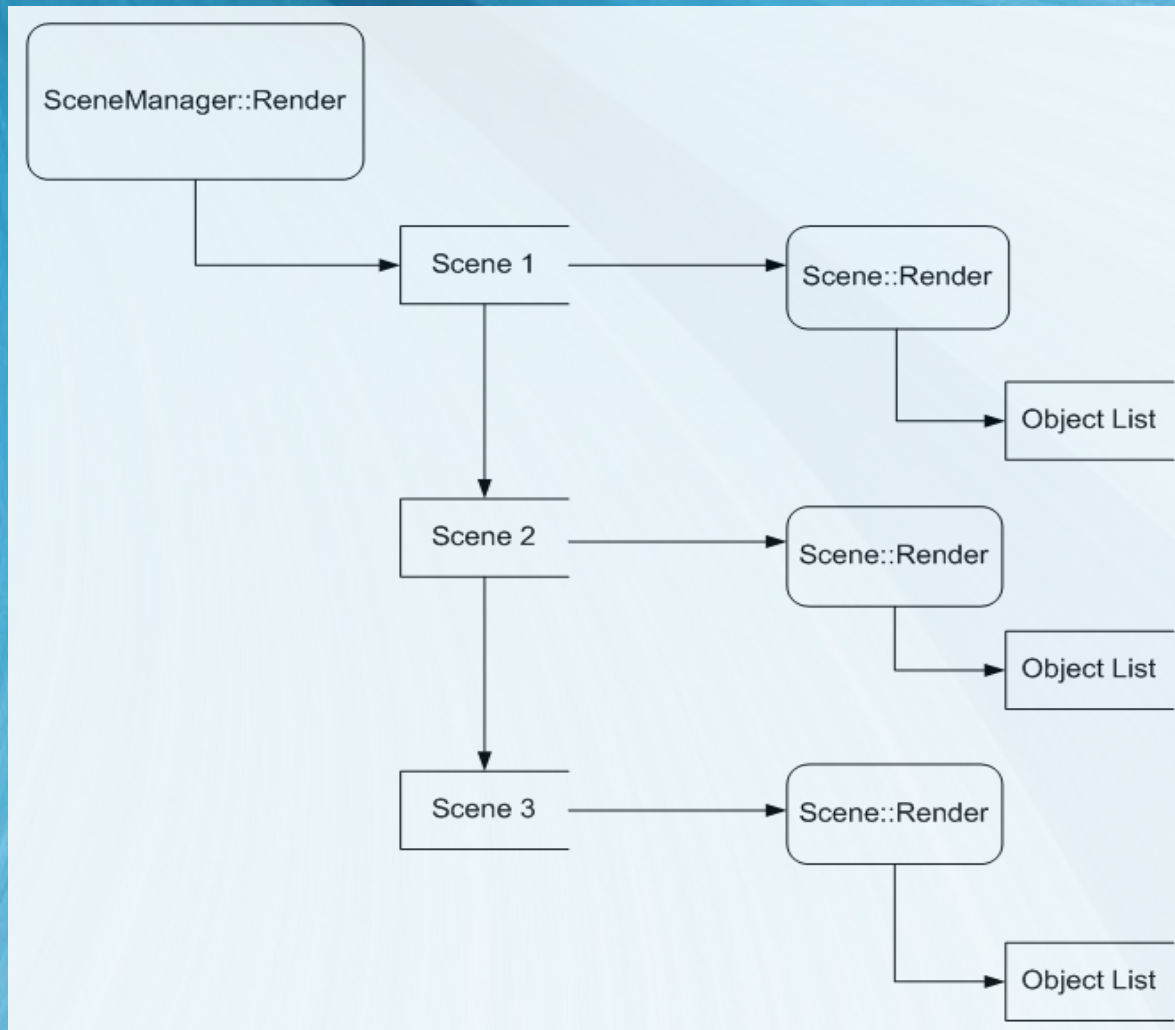
# Scene/Object Management

- ◆ HIA works by maintaining a list of every photo you have loaded into it, and the data associated with each photo
- ◆ This data includes modelview matrices, alignment information, and scaling information
- ◆ There is also a detailed list of each object that has been added to a room, and information such as location and orientation.

# Efficient Design

- ◆ When it is time for HIA to actually render each scene, it's design allows for easy access to necessary scene information

# How HIA generates what you see



# Object Manipulation

- ◆ What if your new chair is facing the wrong way?
- ◆ Use the object manipulation tool to rotate and scale your objects once they are in position



# What an improvement!

- ◆ Compare the original images to the new and improved room!



Questions?