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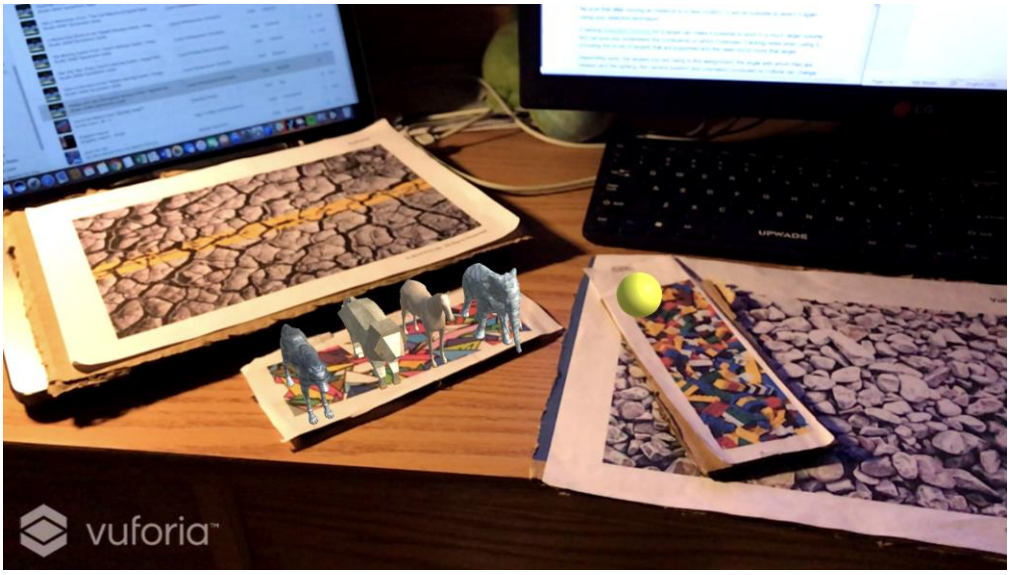
3/31/18
3D User Interfaces
Professor Feiner

Assignment 3 (Written Explanation)

Navigating this System:

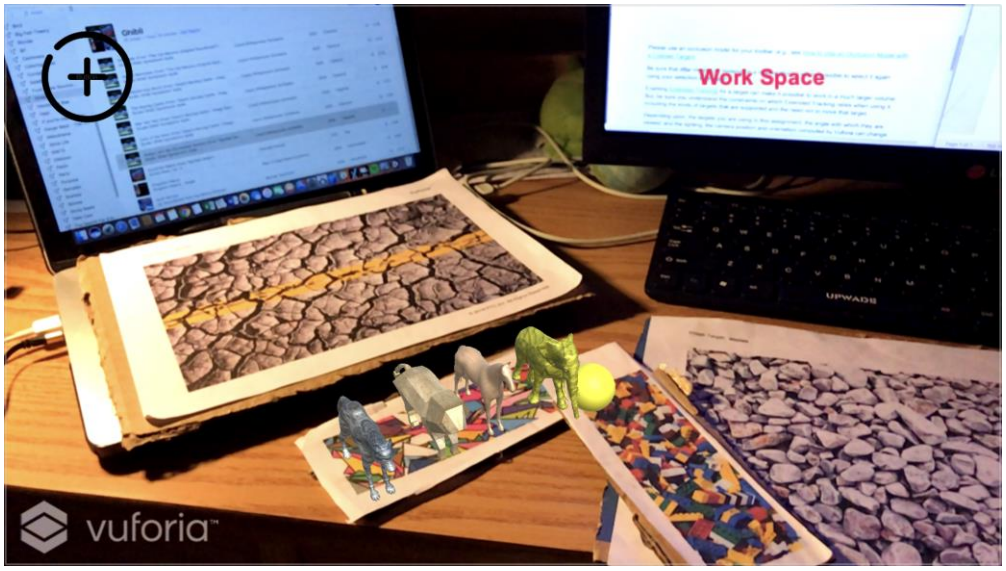
- Selection

1) Initial Workspace



Initially, only the two 2” x 6” Image Targets are activated, where one holds animal objects to create instances of and the other has a sphere that acts as a selection wand. The user should touch the sphere against one of the animal objects to select it. This technique is isomorphic because it naturally mirrors the movement of the user’s hand and body. Additionally, the wand is designed that way to match devices seen in the real world, such as the PlayStation Move wand.

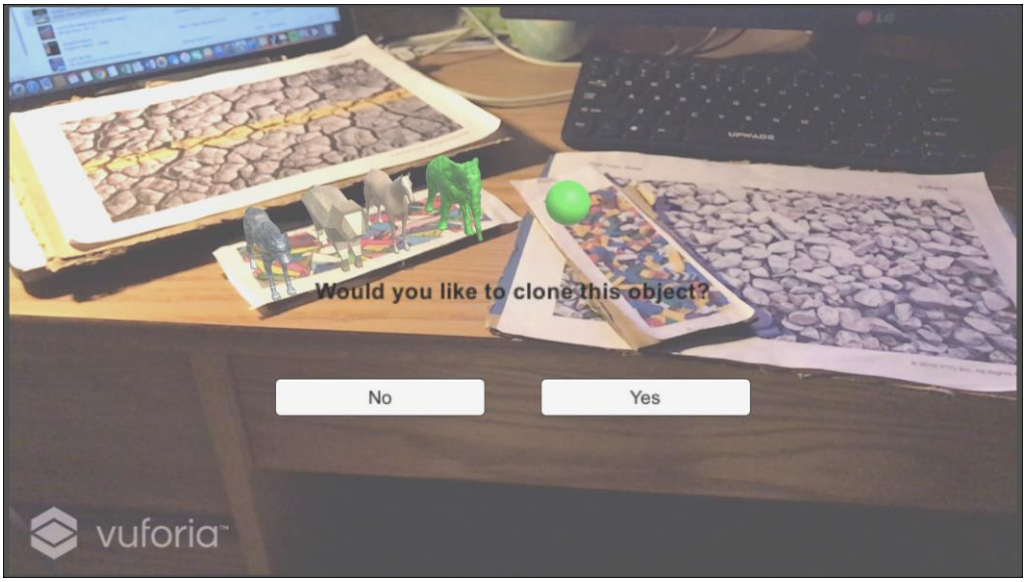
2) Selecting an Object



When you touch the sphere against an animal object, it will “select” it. Depending upon the object’s parent, or Image Target, it will display a UI on the screen showing you what actions you can do to that object. For objects on the “Acid” Image Target, they can only be used to create new instances of the original objects by pressing the “+” symbol in the upper left. This is again to match the real world. The upper right shows text that says “Work Space”, indicating where the object will be added to. This helps with recognition and conveying the system status. Finally, the currently selected object will become the same color as the sphere, indicating it is selected and what mode it is in, helping to provide feedback to the user.

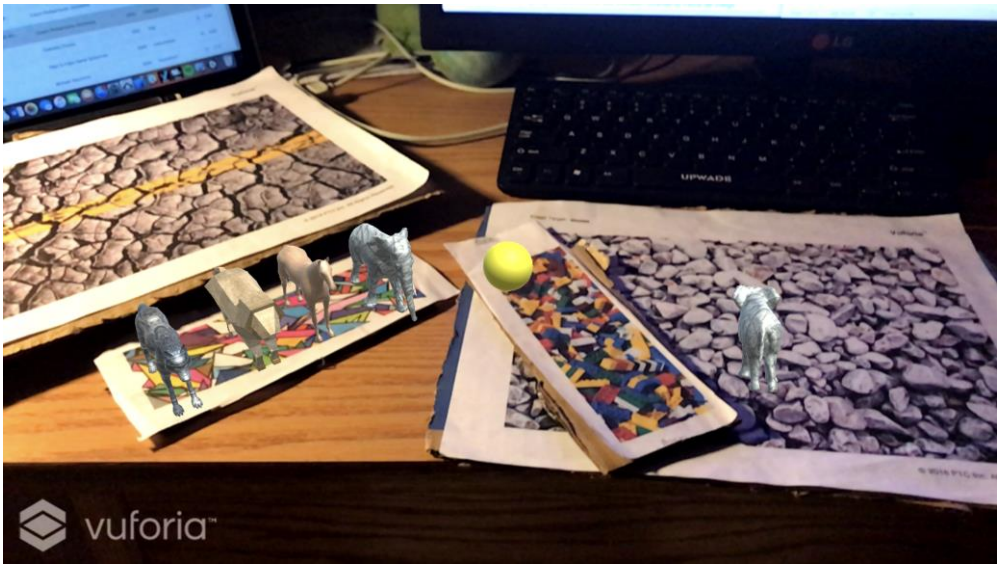
- Creation

1) Creating another Instance



Clicking the "+" button above opens this screen, where the user can choose to create an instance of the currently selected object or not. The user is allowed a choice to help provide more control and prevent errors. Both the wand and selected object are green to signal that the user is in "Create Mode".

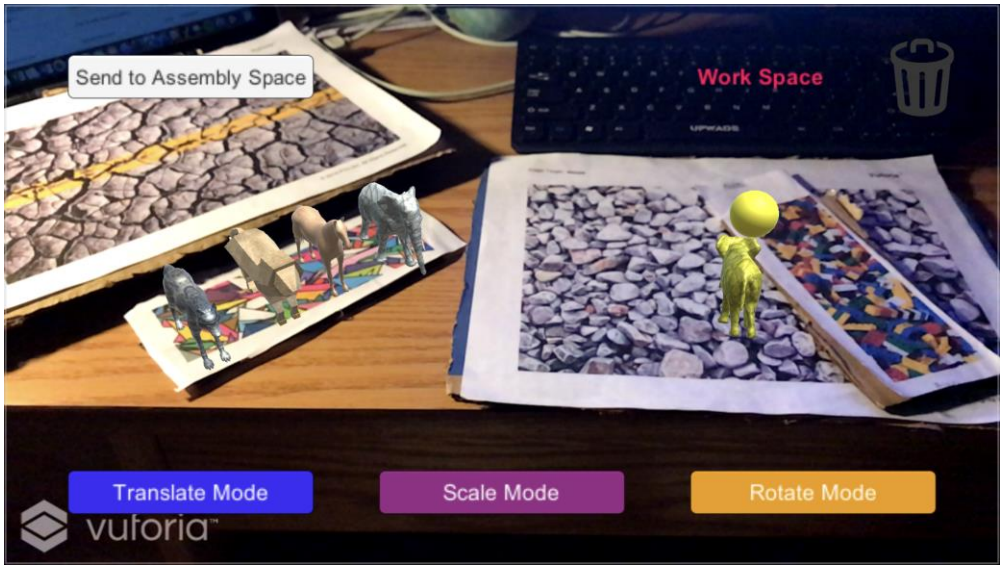
2) Instance Created



Clicking "Yes" on the above UI creates an object instance in the current workspace, or the "Work Space" as indicated in the top right. The system goes back into selection mode, as indicated by the yellow wand, and now any instance can be selected.

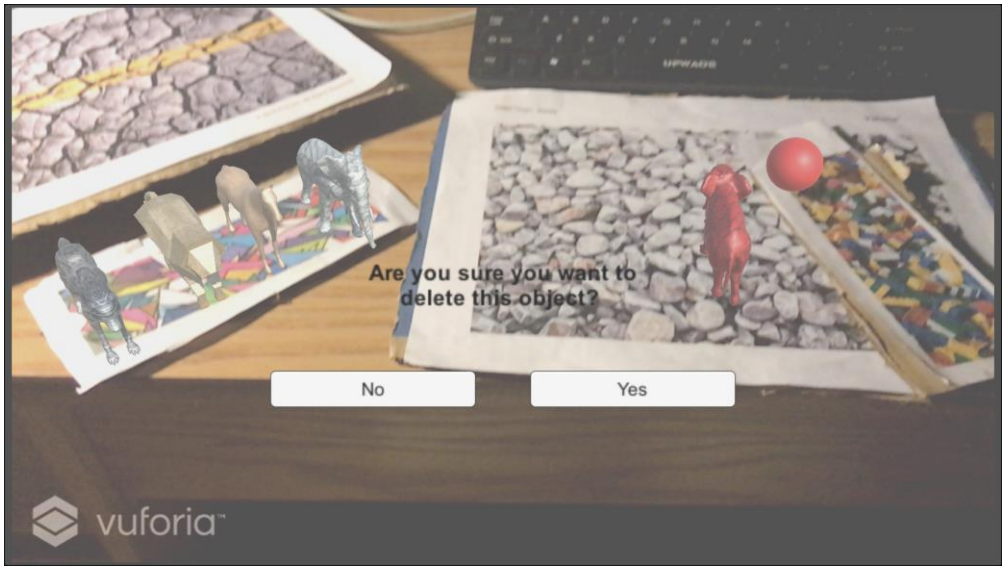
- Deletion

1) Selecting a Work Space Instance



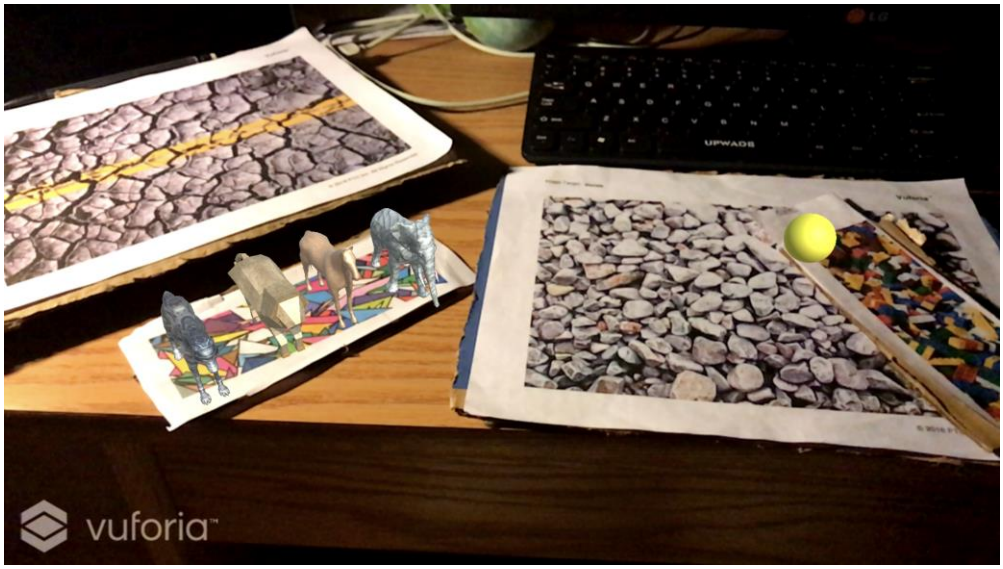
Selecting an instance in the “Work Space” indicates different actions that can be done to it. It can be moved, scaled, rotated, sent to the assembly space, or deleted. This UI is to help provide the user with choice.

2) Deleting an Instance



Clicking the trash icon in the top right will ask the user to confirm whether to delete the object or not. In each mode, the wand and selected object will indicate the action to be done to it, through color, to help provide consistency.

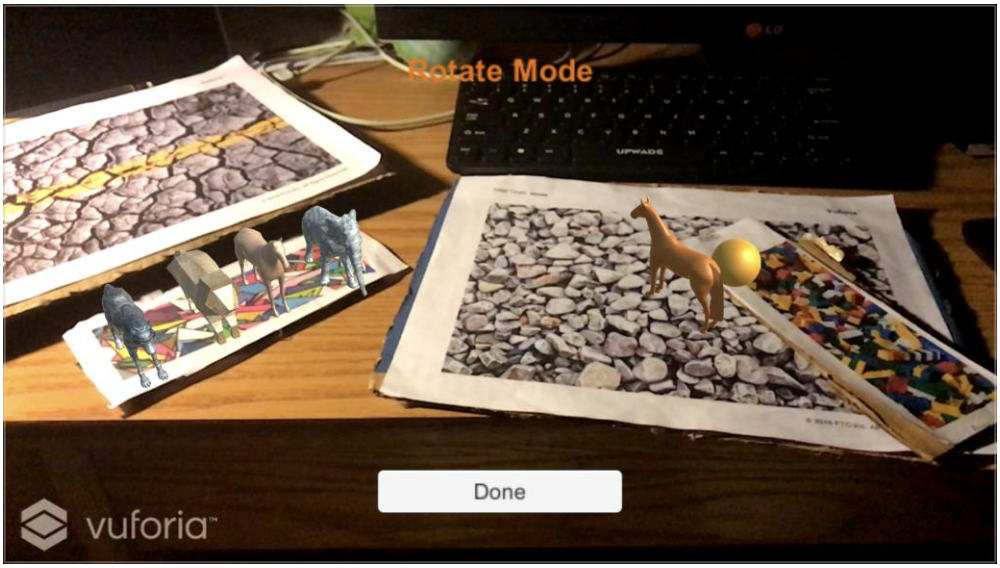
3) Instance Deleted



If the user clicks “Yes” above, the instance is deleted.

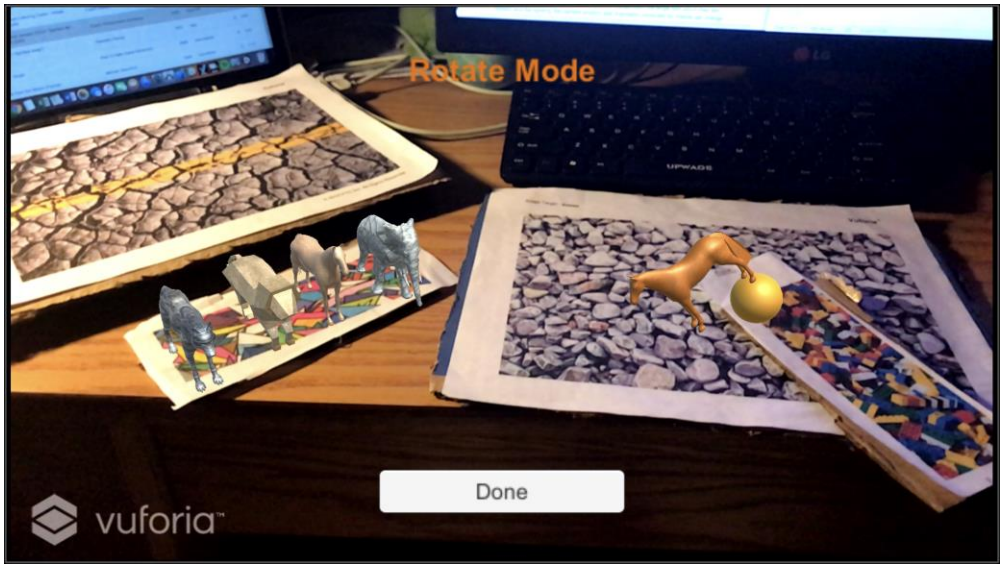
- Rotation

1) Enter Rotate Mode



After creating a “Horse” instance, selecting it, and clicking “Rotate Mode”, the user sees this screen. The three manipulation modes each display a screen similar to this to show the system status.

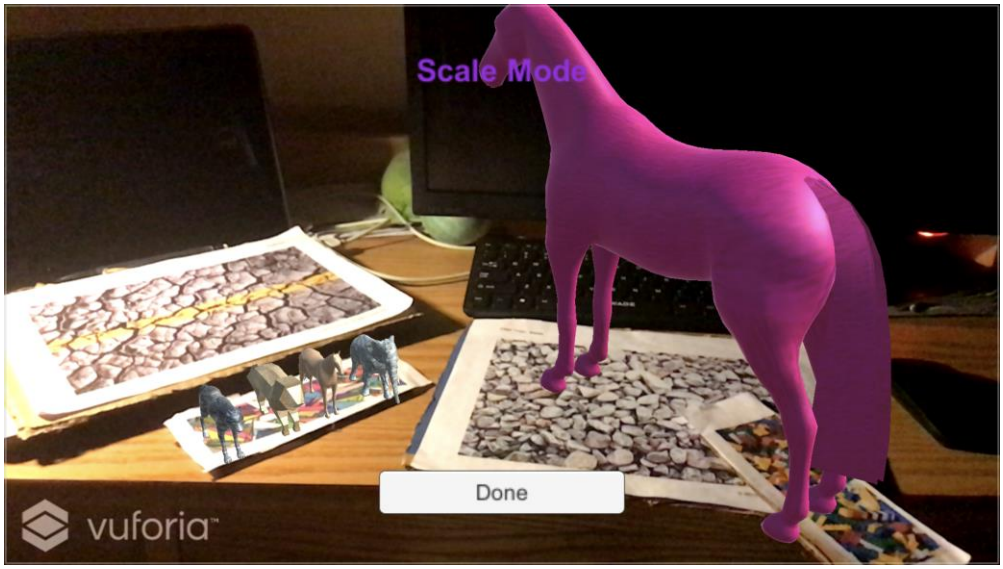
2) Rotate an Instance



To rotate the selected instance, touch the sphere against the instance, and while the sphere is touching the instance it will rotate in the direction away from it. This allows for full rotation along all three axes. Clicking “Done” will leave the instance in this new rotation and allow the user to select an instance again.

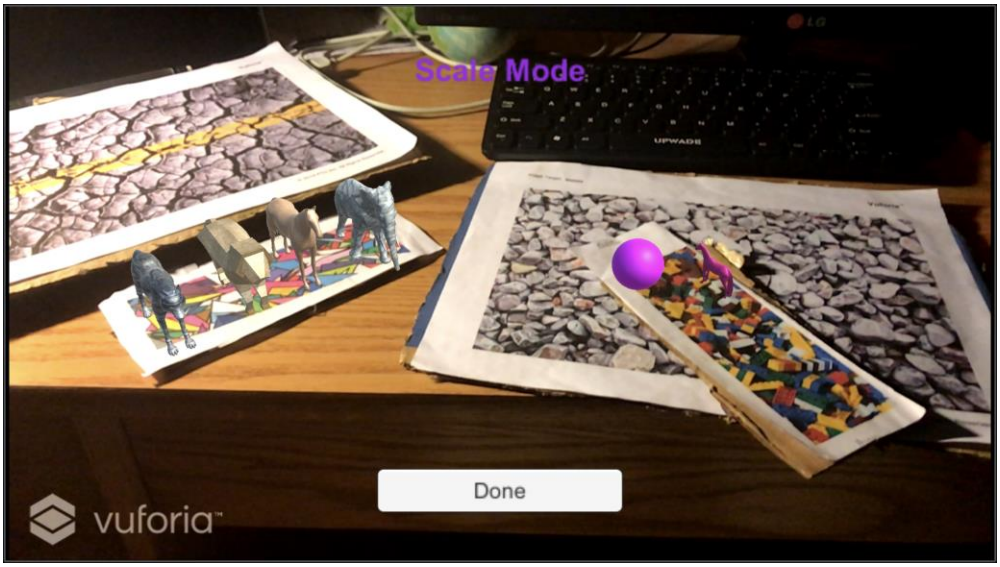
- Scaling

1) Growing an Instance



Selecting a Horse instance again, if the user enters “Scale Mode” and touches the instance with the wand on one side with respect to the X axis it will grow or shrink. Above, I have touched the instance multiple times on the side nearer to me, so it has grown in all three axes multiple times.

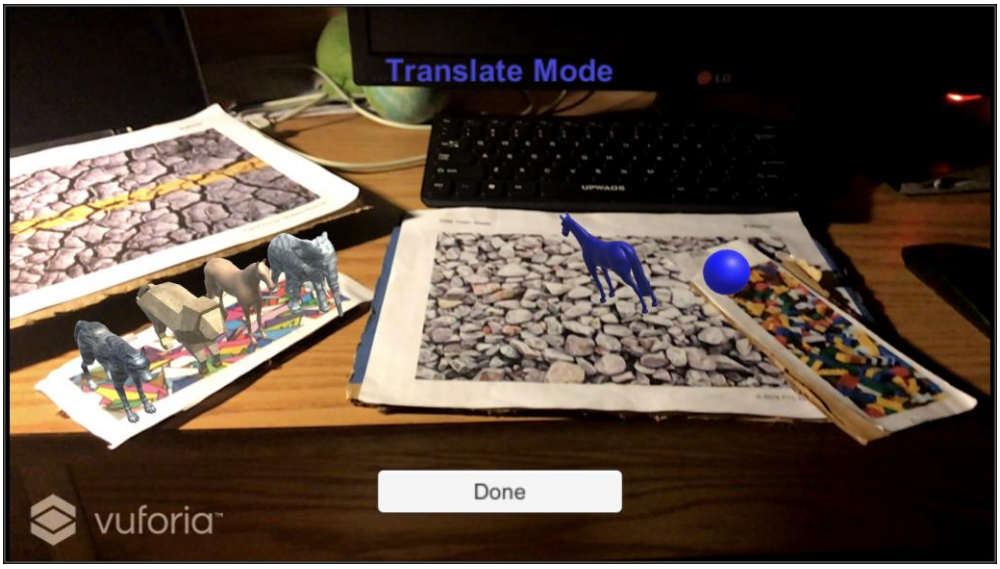
2) Shrinking an Instance



Similarly, if the user touches the instance on the other side multiple times it will shrink. If the user clicks “Done”, the instance will now stay that size.

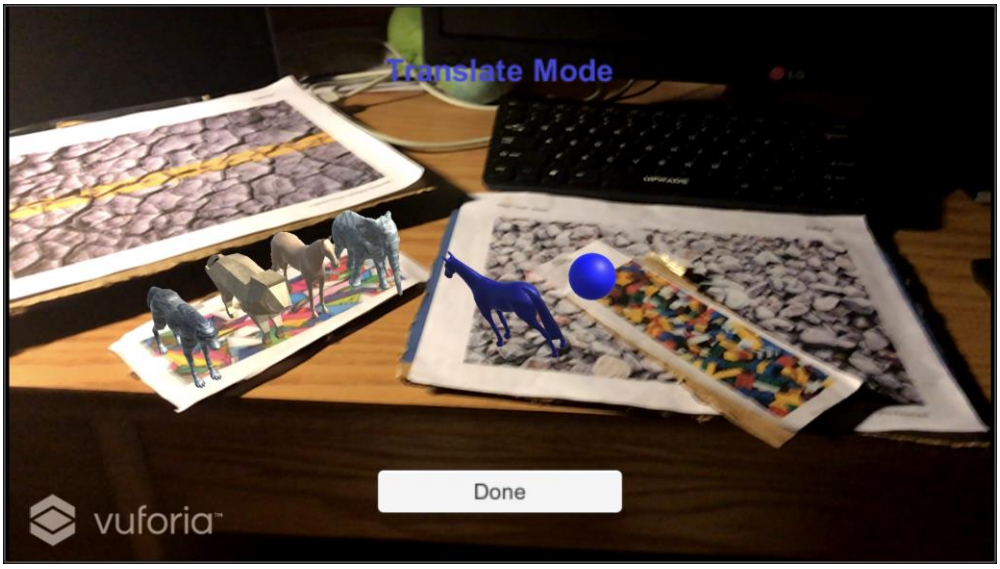
- Translation

1) Entering Translate Mode / Seamless Transfer



Selecting an instance and entering Translate Mode will seamlessly transfer the selected object to the wand and its workspace. The selected instance will not visually change at all, but once the user moves the wand the instance will move with it at the same rotation and position it was initially in with respect to the wand. I freeze the instance's RigidBody component to make sure no rotation would happen when the user is moving the instance. The translation happens in this way to mirror real life object movement, where users typically just grab an object and place it in a new location.

2) Translate Complete

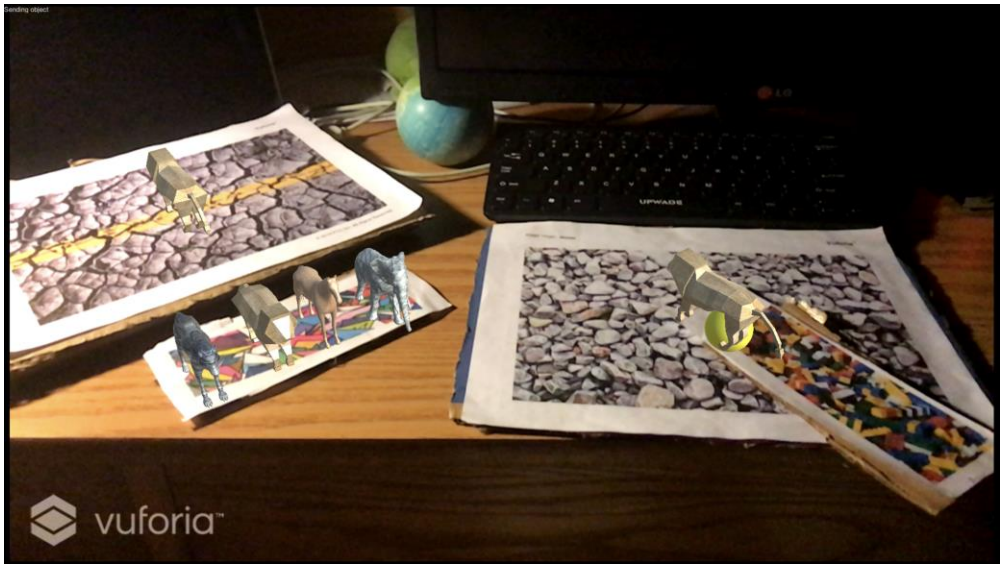


Once the user has moved the instance to where they desire, the instance now has the same rotation as before but is in a new 3D location. Clicking “Done” will leave the instance in that location but re-parent the instance to the workspace it was in previously and seamlessly transfer it back.

- Assembling Compound Instances

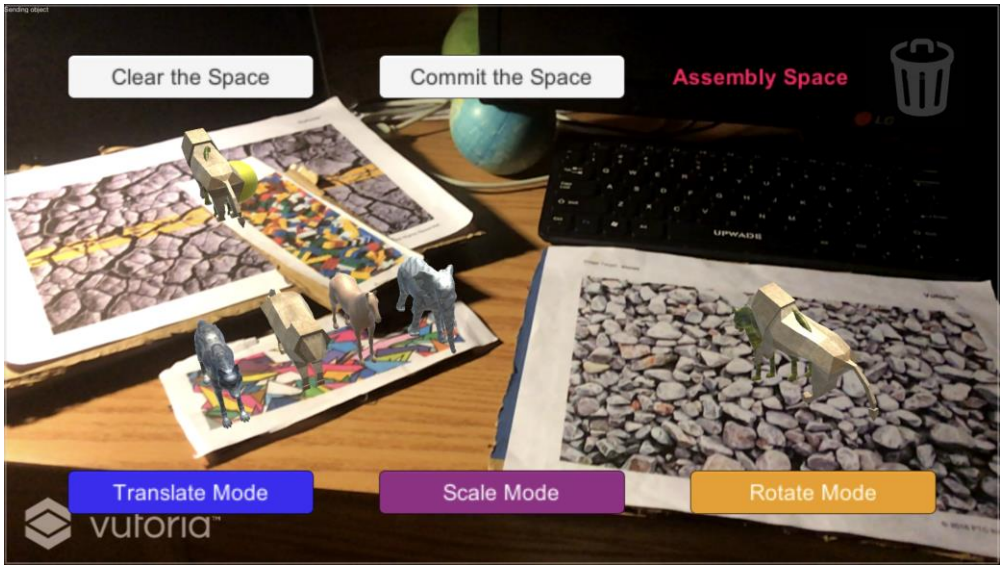
A) Using the Assembly Space

1) Sending to Assembly Space



Selecting an instance and clicking “Send to Assembly Space” in the upper left will create a copy of the instance you have selected in the Assembly Space, or the “tarmac” Image Target. Now, as indicated above, objects in the “Work Space” cannot be selected.

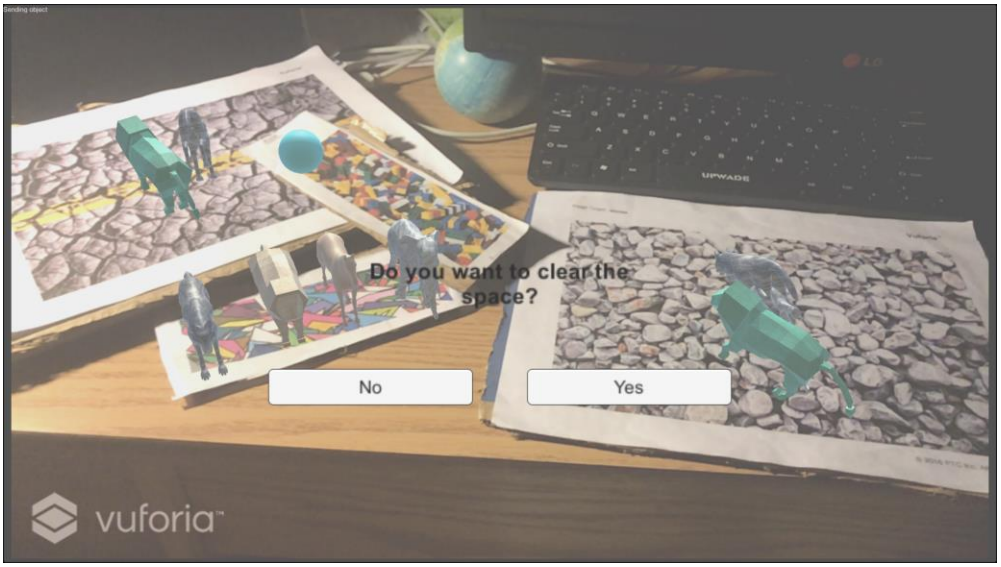
2) Adding to the Assembly Space



After adding a Wolf instance to the assembly space, both the assembly space and corresponding object in the work space have updated. Selecting one of the instances in the assembly space lets the users perform the same manipulations as in the work space, but now the user can commit or clear the space. Additionally, the UI indicates that the current work space has changed to the "Assembly Space" to help the user remember the current state.

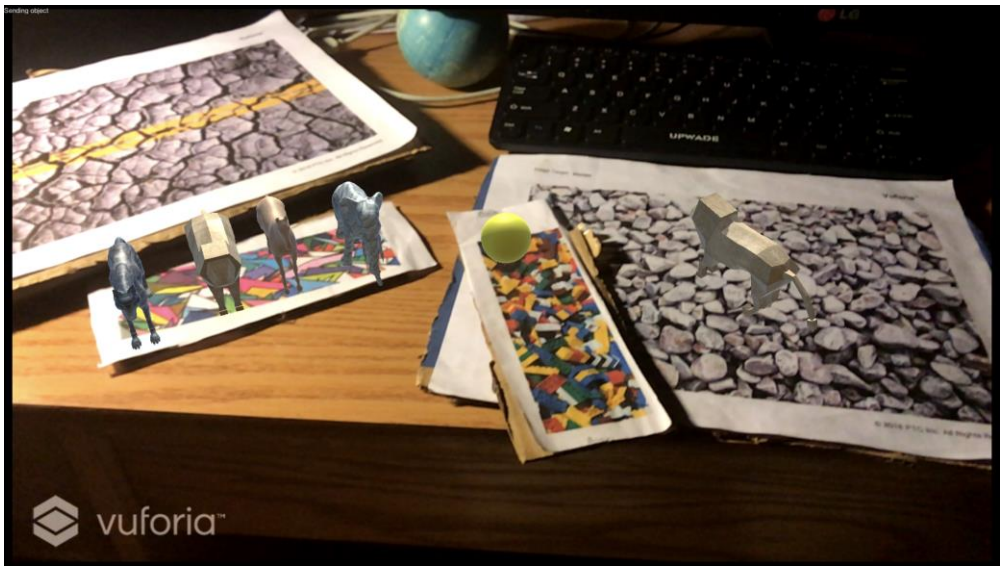
B) Clearing the Assembly Space

1) Entering Clear Mode



After making slight changes to the above assembly space, I clicked the “Clear the Space” button. As I made changes to the assembly space, they reflected in the work space as well. Now, the user can choose to clear the space or not.

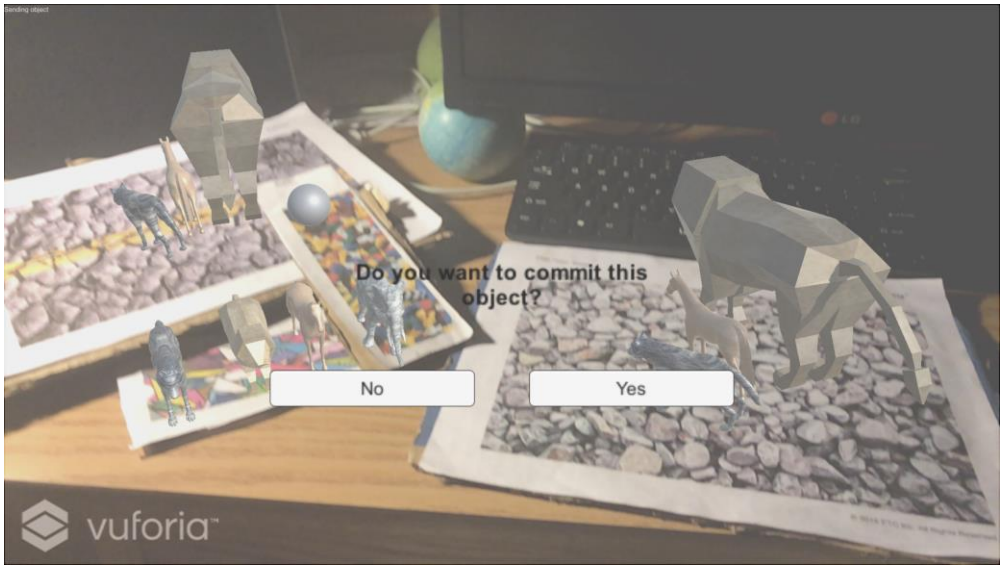
2) Clearing the Assembly Space



After clicking “Yes” on the above UI, the assembly space clears, the work space reverts to “Work Space”, and the instance that was originally sent to the assembly space reverts to its original orientation, size, and position without any added instances. Objects in “Work Space” can now be selected and sent to the Assembly Space once again.

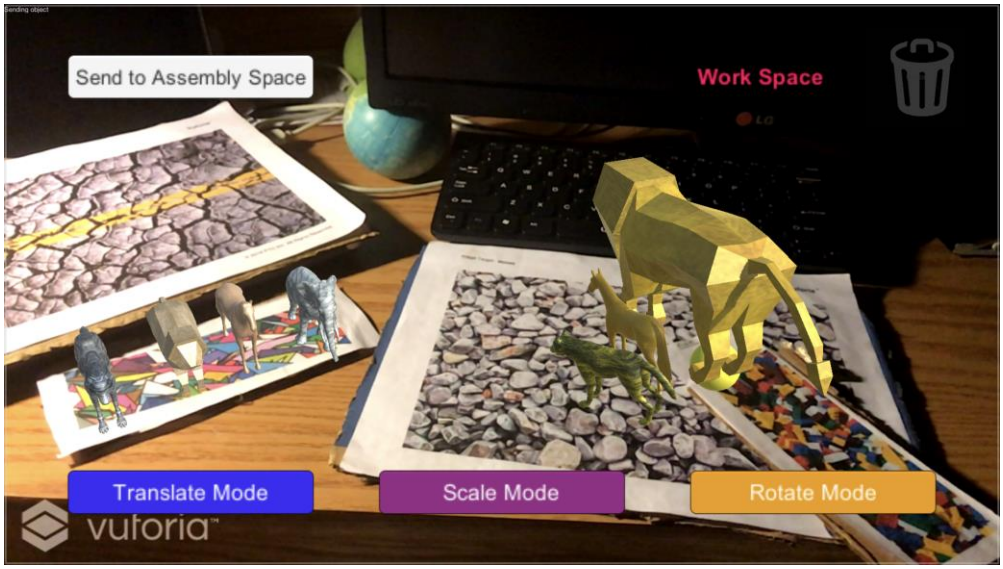
C) Committing the Assembly Space

1) Entering Commit Mode



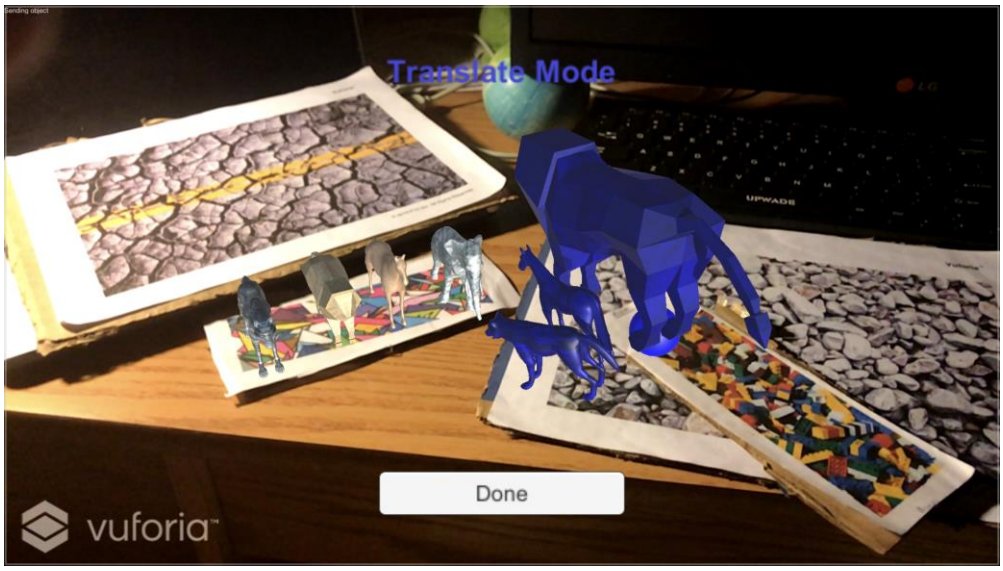
After sending an instance, creating two more, and manipulating them all in the assembly space, I have clicked the “Commit the Space” button above. Once clicked, this will update the original instance in the work space with this compound instance where all three instances act as one.

2) Selecting Compound Instances



After the assembly space has cleared, it is now empty and its instances act as one in the work space, which has been updated accordingly. Additionally, when selecting any part of this compound instance it selects the whole compound, which can be manipulated or deleted as a unit. Highlighting all components of the compound instance helps the user understand it is a singular unit.

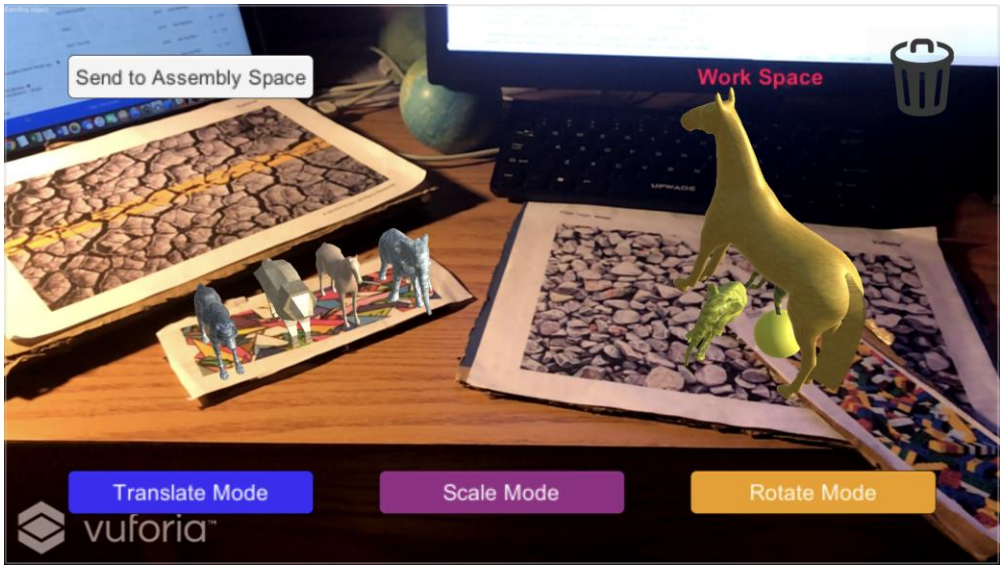
3) Manipulating Compound Instances



The user can then manipulate (move, scale, or rotate) or delete the compound instance as it could a single instance.

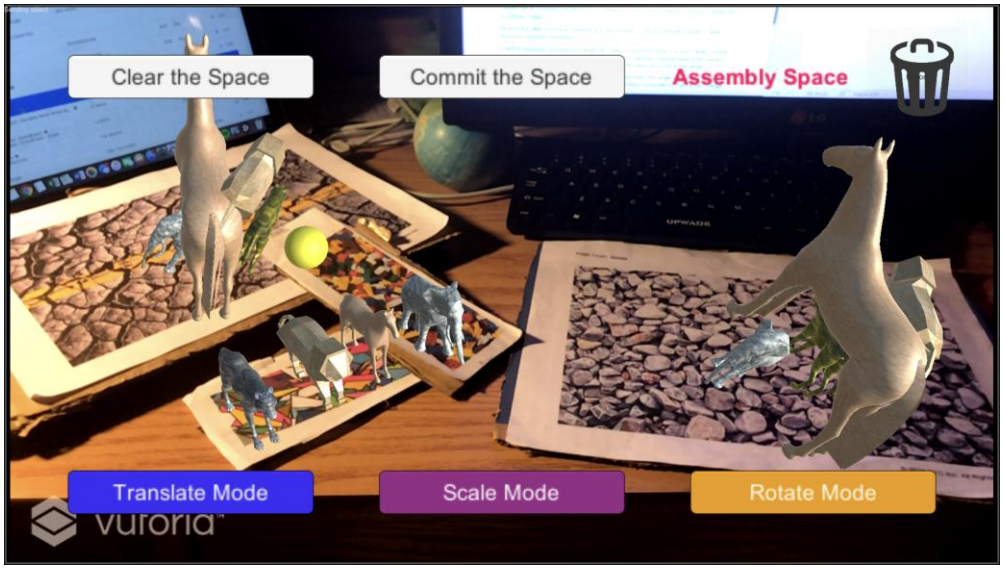
D) Assembling Upon Compound Instances

1) Sending a Compound Instance to the Assembly Space



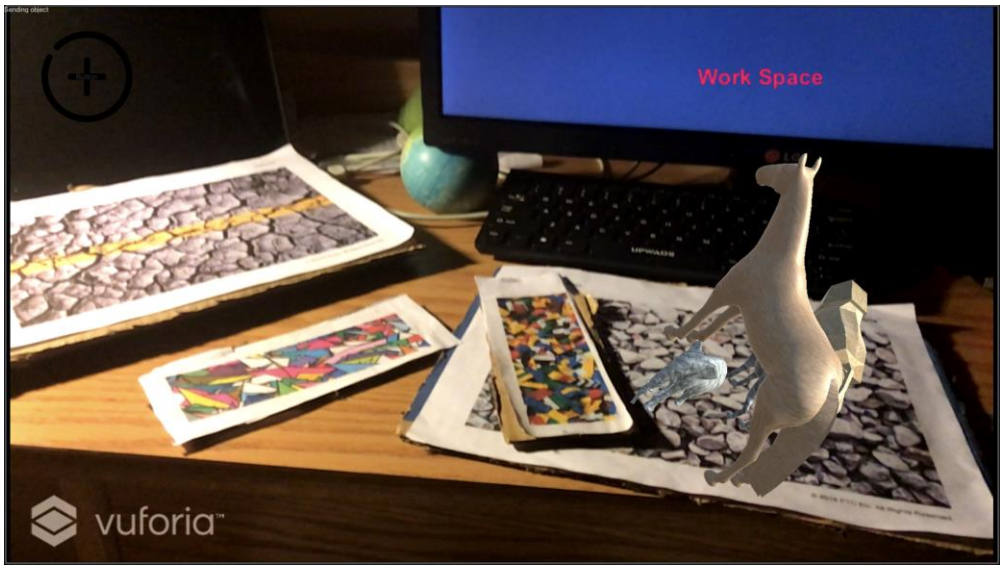
Above I have created a compound instance that now resides in the Work Space, and I would like to update this compound instance in the assembly space. Once the user clicks “Send to Assembly Space”, a copy of the compound instance is sent to the Assembly Space. However, each component is considered distinct from each other and is manipulated independently.

2) Updating the Compound Instance



After the compound instance was sent to the assembly space, I added a Lion instance that was updated accordingly in the Work Space as well. Now, however, when I select instances it does not select the whole compound instance but instead each individual instance, which allows the user to update the compound instance.

3) Committing the Updated Compound Instance



Once I commit the above assembly space, the compound instance has now been updated and can be manipulated in the Work Space as a singular unit once again. This concludes the general extent to which users can build, manipulate, destroy, and join instances.