

Alice 3

How-to Guide

(Part 2 - Scene Setup)



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Setting up a Scene



6. ADDING AN OBJECT TO A SCENE

[Video: Adding Objects to a Scene](#)

A brief introduction for adding an object to a scene was previously presented in Part 1, Section 5 of this How-To guide and also in the video, entitled Adding Objects to a Scene. In this section of the How-To guide, more detailed illustrations are provided, with special attention devoted to different kinds of objects. The illustrations will typically make use of the **Browse by Class Hierarchy** tab in the Gallery, although other Gallery tabs are equally useful. In addition, we will illustrate how to add an object that is a Sims 2 person as well as objects from the Shapes/Text tab.

Add an object – two techniques

We will illustrate two different techniques for adding an object to a scene. Which technique you use is a matter of comfort and style. One way to add an object is to single-click the thumbnail sketch of the desired object in the gallery. A dialog box is displayed where a name for the object can be entered (or a default name can be accepted), as shown in Figure 6.1. The name should be all one word (no spaces) and should begin with a lowercase letter of the alphabet. To use two or more words, use camelCase which avoids spaces by starting with a lowercase letter for the first word and then uses a capital letter for each additional word. For example, the *alien* might be named *greenAlien*. Click OK when done.

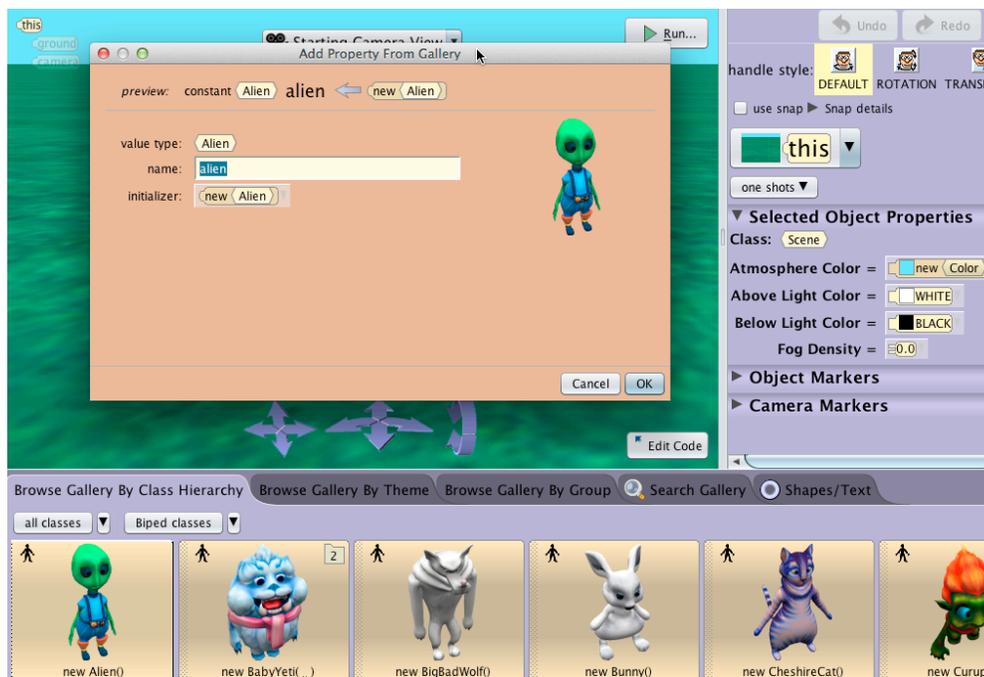


Figure 6.1 Adding an object to a scene

The second technique for adding an object to a scene is to click and hold the left mouse button on the thumbnail sketch and drag it into the scene. The display of the mouse cursor will change to a box-like outline, as shown in Figure 6.2. This is a bounding box that shows where the object will be located when the mouse button is released. When the mouse cursor is released, a dialog box pops up where a name for the object can be entered (or accept the default name) in exactly the same way as described above.

This technique of adding an object to a scene allows the user to control where the object will be positioned in a scene.

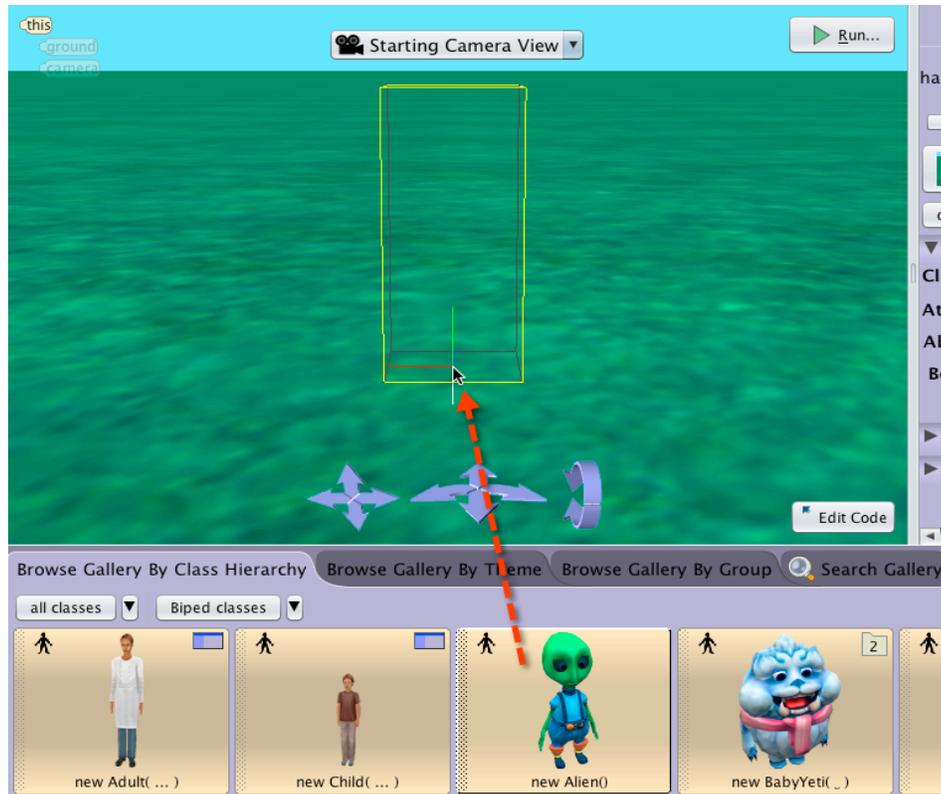


Figure 6.2 Click and drag thumbnail sketch into the scene

Regardless of which technique is used to add an object to the scene, the new object is displayed in the scene and the name of the object is automatically added to the Object tree in the Scene Editor, as shown in Figure 6.3.



Figure 6.3 A new object's name is automatically added to the Object tree

Multiple objects

It is possible to add more than one object of the same class. It is also possible to construct different objects from different classes in the same scene. Figure 6.4 shows four different objects in an Alice scene, each constructed from a different class.



Figure 6.4 Objects of different classes in an Alice scene

Add a Sims 2 person

In the Gallery's Class Hierarchy tab, select the Biped classes tab, as shown in Figure 6.5. The first five 3D Models (left-hand side) are Sims2 people classes. The Sims2 models represent people at various stages of life (elder, adult, teen, child, and toddler). To add a Sims2 person to a scene, click on a sketch for one of the life-stages. In the example shown here, we clicked on the Adult life-stage image, but you may choose any of the models.



Figure 6.5 The Person class defines Sims 2 people objects

When one of the life-stage models is selected, a Person Builder window is displayed to provide options for: life stage, gender, skin tone, outfit (full or top/bottom), waistline slider, hair and hat style, and facial features.

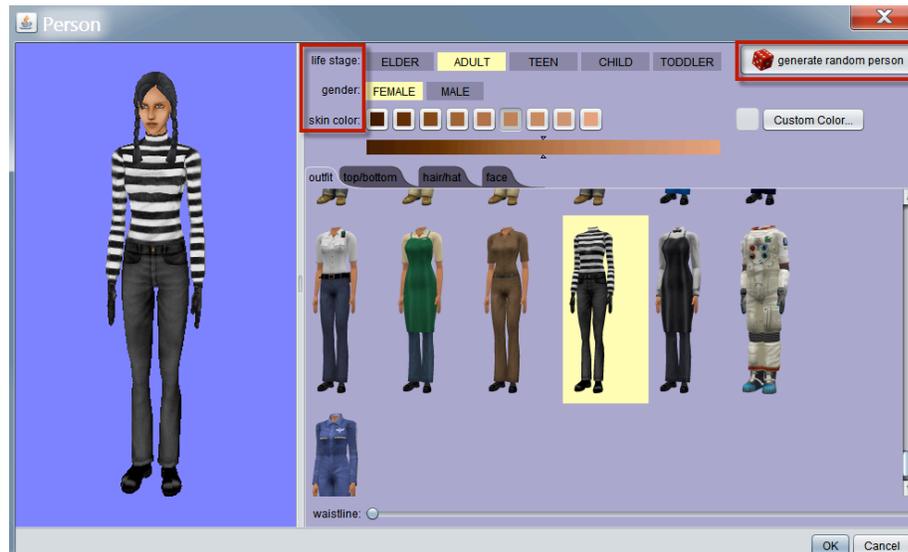


Figure 6.6 Sims 2 people-builder

Select features for each option and then click OK. A naming dialog box will pop up, as shown in Figure 6.7. Note that the features selected in the people-builder options are listed as “resources” to be used in constructing the person object. In this context, a resource is a painted image that is used to create the object’s appearance. In the naming dialog box, enter a name for the person and click OK. The person object will then be added to the scene.

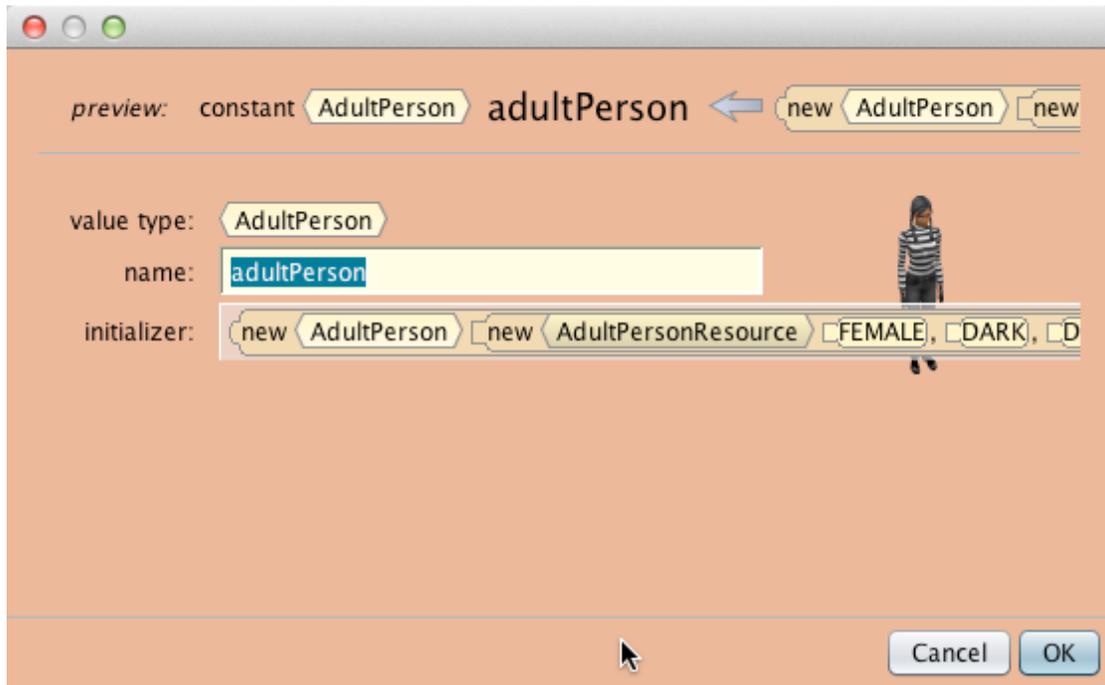


Figure 6.7 Naming a Sims2 person

Add a Geometric Shape object

In addition to the models in various collections, the Gallery also has a few basic, geometric shapes (disc, cone, cylinder, and sphere) and 3D Text models. To create a geometric shape, click one of the thumbnail sketches, as shown in Figure 6.8.

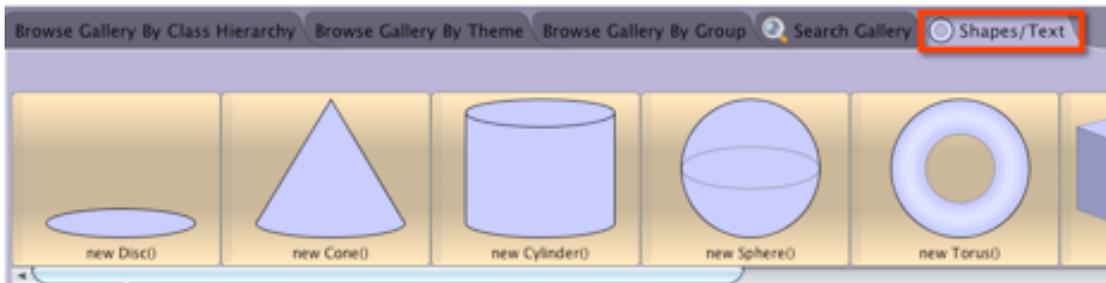


Figure 6.8 Geometric shapes in the Gallery

When a shape model is selected, a dialog box is displayed for entering a name for the new object, as illustrated in Figure 6.9.

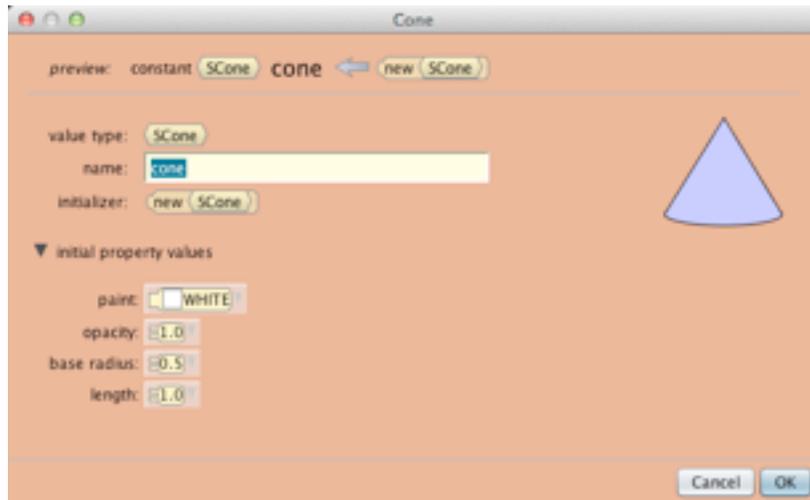


Figure 6.9 Naming a geometric shape object

The new object can be positioned in the scene and properties can be set, as shown in Figure 6.10. Details for setting the properties of an object are provided in Section 7 of this How-To guide.

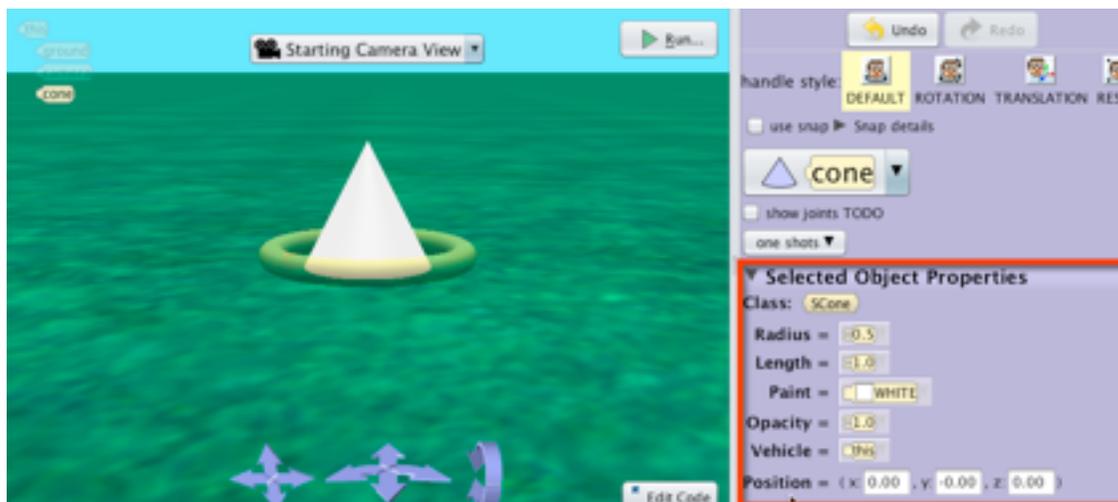


Figure 6.10 Properties can be set for painting, resizing, and other modifications

Add 3D text

To create an instance of the TextModel class, click the TextModel thumbnail sketch in the Gallery, as shown in Figure 6.11. 3D text is useful for displaying screen credits, a timer, or a scoreboard for a story or game.

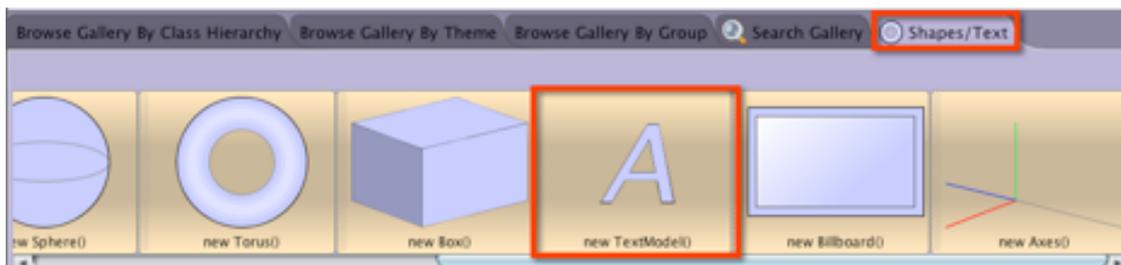


Figure 6.11 TextModel button to create 3D text object

When the TextModel sketch is clicked, a dialog box is displayed where two items of information must be entered, as shown in Figure 6.12. The first item is a name for the 3D text object. The second item is a string of text characters that will be displayed by the text object. The drop down menu for a string of text characters (a TextModel object) allows a string to be empty (“”), the default value “hello”, or a Custom TextString entered using the keyboard.

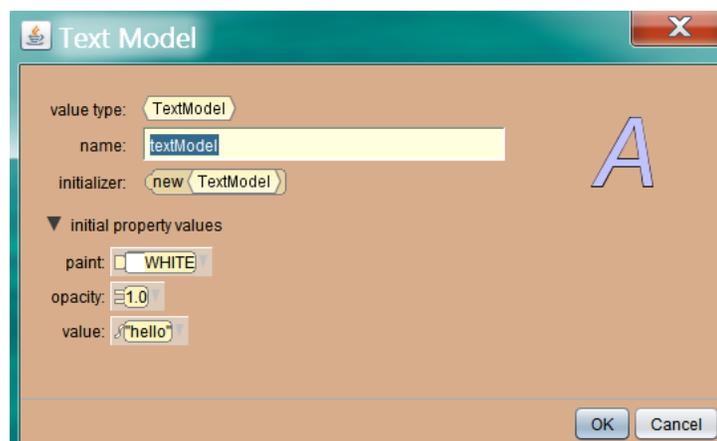


Figure 6.12 Text Model dialog box

An example is shown in Figure 6.13, where we entered “Scoreboard” as the name and selected Custom TextString. Then, in the pop-up Custom TextString box, we entered “0” as the value of the text to be displayed. Just to be clear, note that the name of the object is Scoreboard and the text string it displays is “0”. That is to say, the name of a text object and the text string it displays are not necessarily the same.

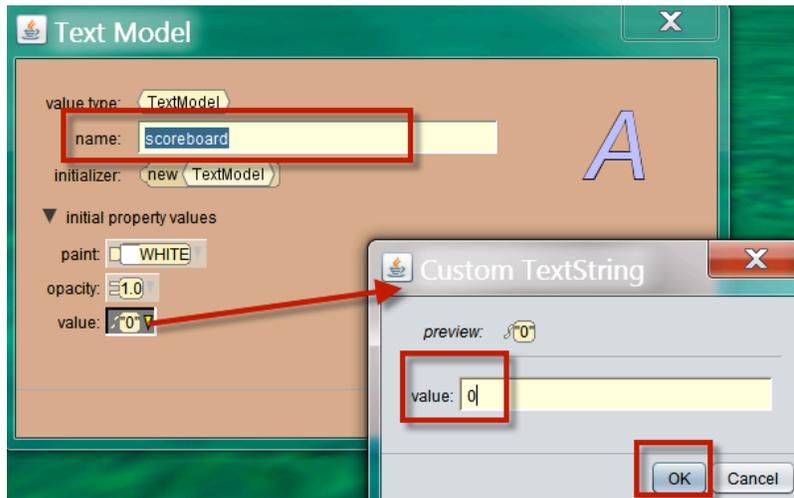


Figure 6.13 Naming a text object and initializing the text string (alphanumeric)

The new 3D text object will be displayed in the scene, as illustrated in Figure 6.14. The text object can be positioned in the scene, and its properties can be modified in the Setup panel on the right.



Figure 6.14 A 3D text object

Add a billboard (2D image resource)

A 2D image may be added to a scene as a billboard. Billboards are useful as backdrops, a narrative element in a story, and for presenting instructions on how to play a game. To create a billboard from a 2D image, click the Billboard thumbnail sketch, as shown in Figure 6.15.

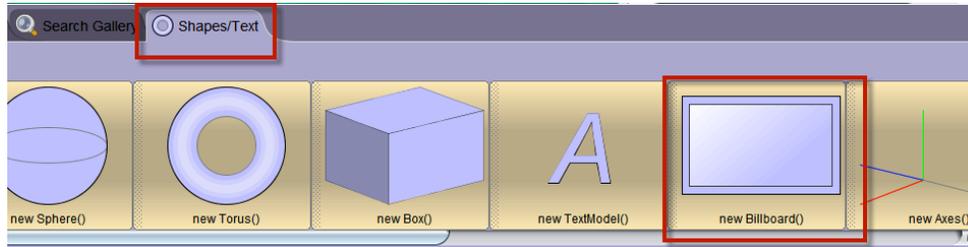


Figure 6.15 Billboard in the Shapes/Text Gallery

When the Billboard is selected, a dialog box is displayed, as shown in Figure 6.16, where three items of information must be entered.

- The first entry item is a name for the object.
- The second item is a drop-down menu for finding and importing a 2D image or to create a billboard of a solid color. The file format of a 2D image must be .jpg, .png, .bmp, or .gif (must be all lower-case).
- The third item is a drop-down menu to select an image or color for the back of the billboard. (As a 2D object, a billboard has two sides: front and back.)

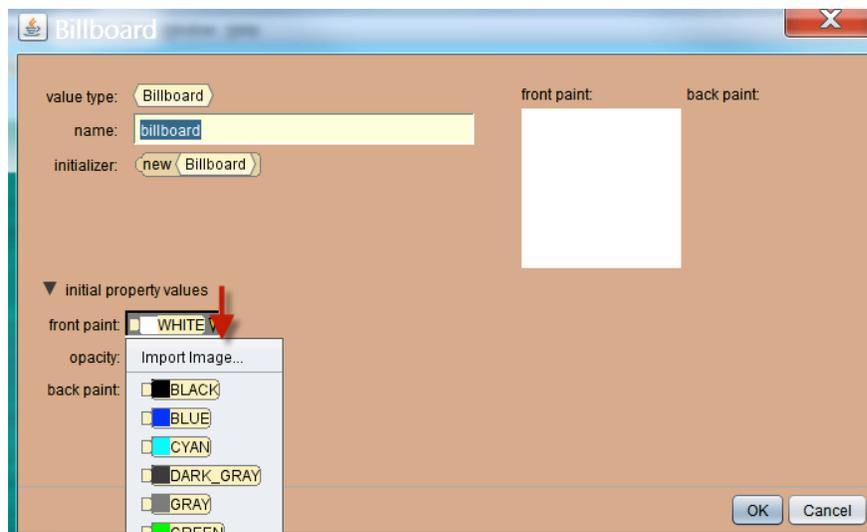


Figure 6.16 Billboard dialog box requires a name and image or color

An example is shown in Figure 6.17, where we accepted the default name "billboard" as the name for the new billboard object, selected an image source (an Alice Team photo) and then, in the pull-down menu for the back of the billboard, selected a solid black color.

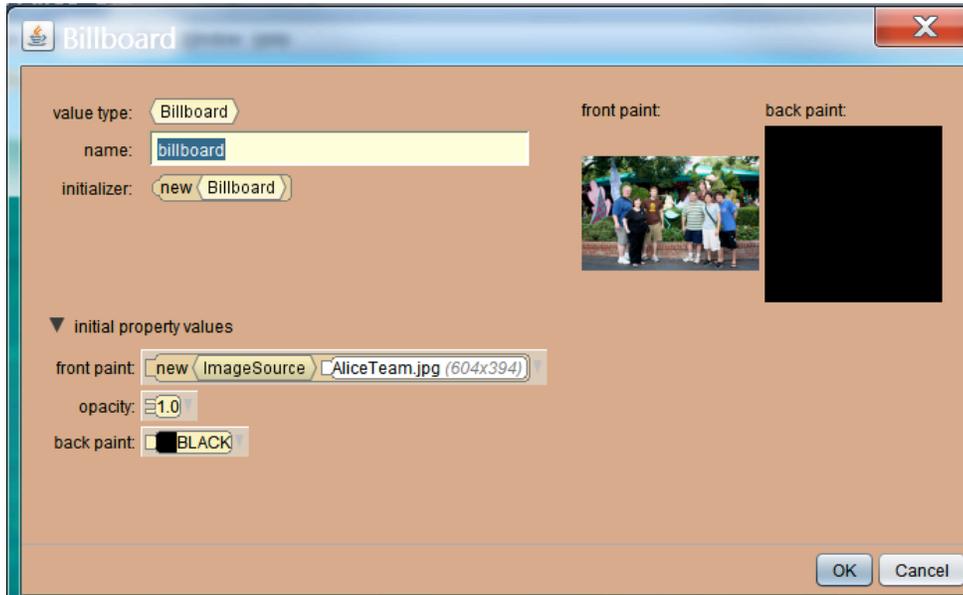


Figure 6.17. Example Billboard entries

When OK is clicked, the object is displayed in the scene, as shown in Figure 6.18. The image can be positioned in the scene and its properties can be set in Setup.



Figure 6.18 Alice team photo as a Billboard object in a scene

Once a 2D image is added to a scene as a billboard, the image will show up in the list of resources found in the Project menu under Manage Resources, as shown in Figure 6.19.

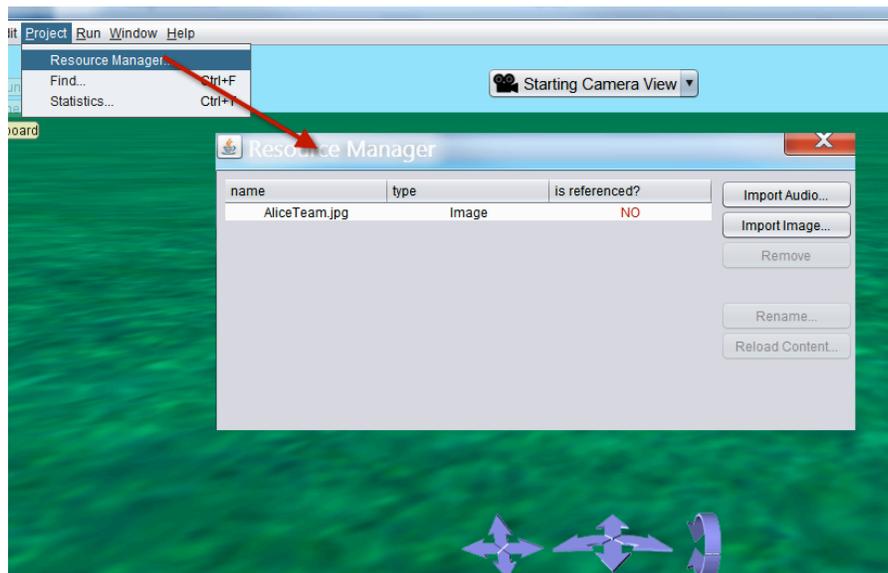


Figure 6.19 Billboard image is listed in Manage Resources

Add an Axes object

To create an Axes object, click the Axes thumbnail sketch, as shown in Figure 6.20.

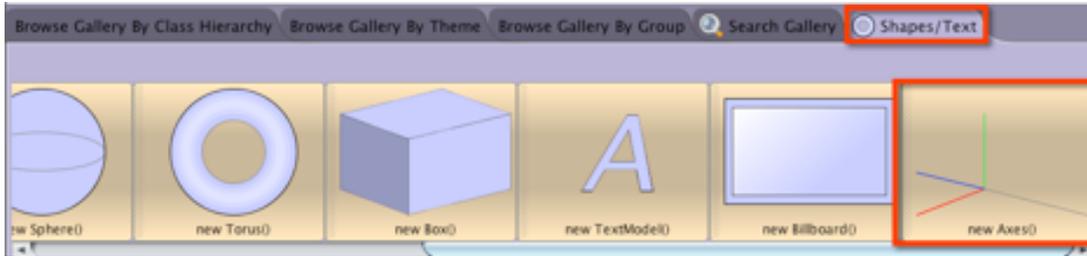


Figure 6.20 Axes button in the Gallery

When the Axes is selected, a dialog box is displayed, as shown in Figure 6.21, a name is entered for the object. Click OK. An Axes object will be added to the scene, as shown in Figure 6.22

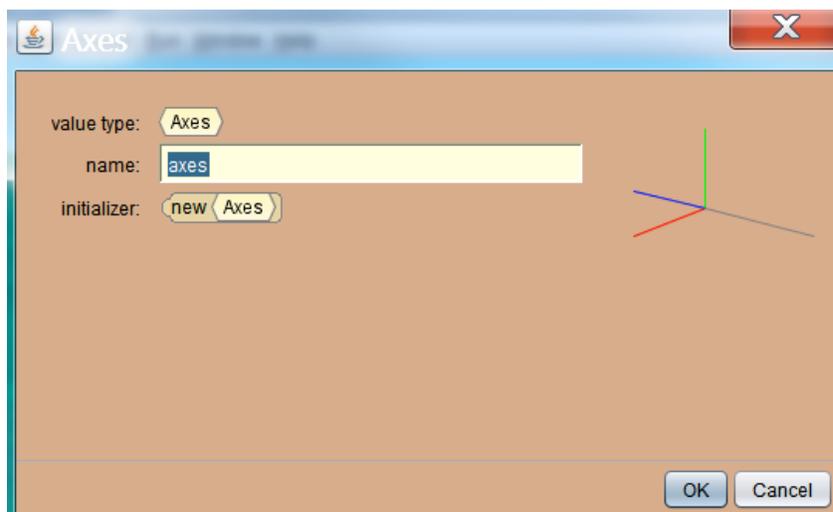


Figure 6.21 Naming a new Axes object

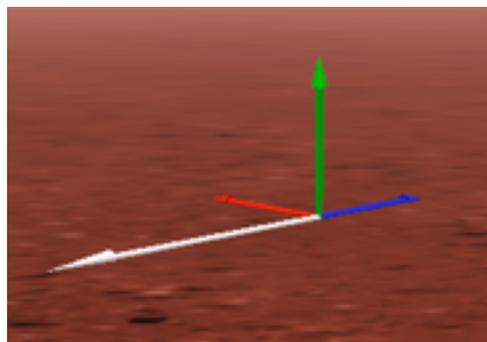


Figure 6.22 A new Axes object in a scene

Using an axes for orientation

The orientation of an object and its skeletal joints is very important when working with 3D objects in a virtual world. One way to determine the orientation of an object (or a skeletal joint within an object) is to create an Axes object and align it to the orientation of the target object or a joint within the object.

To illustrate, we created a new Mars scene with an asteroid, as shown in Figure 6.23. Just looking at the asteroid, we have no way of knowing its forward direction. To determine the orientation of the asteroid, we selected the axes and used a *moveAndOrientTo* method to move and orient the axes to the asteroid. Then, as shown on the right in Figure 6.23, the axes arrows are aligned with the orientation of the asteroid. The white arrow of the axes shows the forward direction for the asteroid, the red arrow shows the asteroid's right, and the green arrow shows the asteroid's up direction.



Figure 6.23 Original axes location (left) and aligned with asteroid (right)

7. HOW TO SET OBJECT PROPERTIES IN THE SCENE EDITOR

The purpose of this section is to demonstrate how to set a property of an object in the Scene editor. An object's properties are items of data that identify that object as an individual. For example, a driver's license is a form of identification that typically includes a person's with a photo and their first, middle, and last name, hair color, eye color, skin tone, height, and weight. In a similar way, identifying data about an Alice object include its **Name**, **Paint**, **Opacity**, **Vehicle**, **Position**, and **Size** (composed of Width, Height, and Depth) properties.

Setup Panel

To view property data about an object, first select the object in the scene. When clicked, the selected object will be surrounded by a ring-shaped handle, as shown in Figure 7.1. (The ring handle is a mouse control that can be used to turn the object left and right.) The selected object's properties are displayed in the Setup Panel just to the right of the scene. In this example, the selected object is named seaweed2.

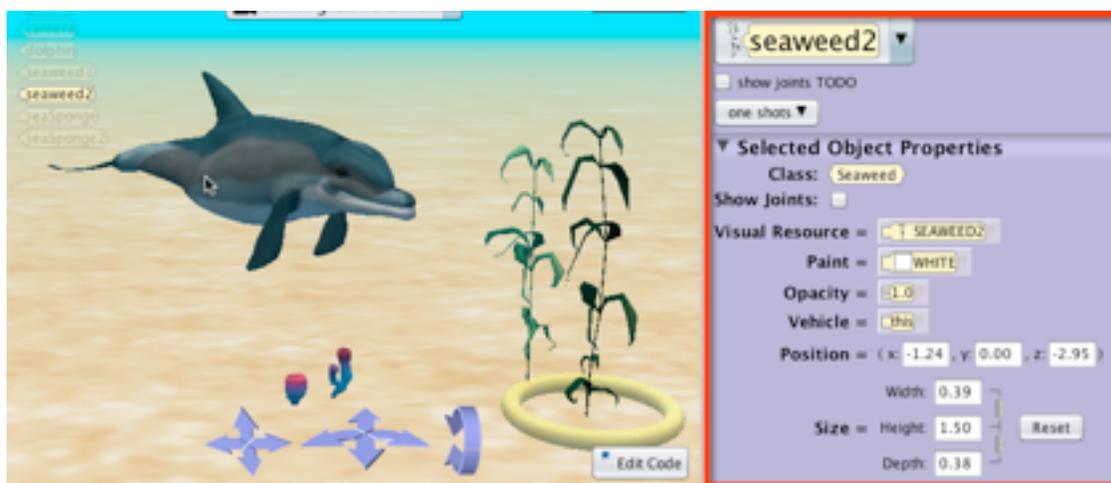


Figure 7.1 Selected object and its properties

Set a property

The phrase “set a property” means that a new value is specified for that property. The following paragraphs illustrate how to set properties (paint, opacity, vehicle, position, and size).

Set paint

Paint includes both the texture map and the color of an object. An object has a wire mesh of polygons that creates the external appearance of the object. A texture map is applied to the mesh surface to create a "skin" coating that encloses the object. For people objects, the “skin” includes

hair and eyes and for animal objects the color of fur, eyes, nose, ears, paws, and tail (if appropriate). An object's color is a coating that covers the texture map. By default, a WHITE color coating is actually just a clear coating that does not change the colors on the skin (somewhat like a clear sugar-glaze on a doughnut).

To change the color coating, click the Paint's pull-down menu in Setup and select a color in the menu. In Figure 7.2, MAGENTA has been selected and the seaweed is painted with this color. The visual effect, as seen in Figure 7.2, is a darker color overall.



Figure 7.2 Setting the color for painting an object

Set opacity

One way to think about opacity is as the opposite of transparency. By default, the opacity of an object is 1.0, which means the object is totally opaque (it looks solid). Setting the opacity to 0.0 would mean that the object is totally transparent (it is invisible). The range of values for opacity, therefore, is from a low of 0.0 to a high of 1.0.

To set the opacity of an object, select the object in Setup and then click on the Opacity button. A drop-down menu allows the selection of opacity in a scale of 0.0 to 1.0, as shown in Figure 7.3. In this example, the seaweed2 object was selected and the opacity was set to 0.4. As can be seen by comparing the seaweed2 object with the other seaweed object beside it, the seaweed2 object has faded and is now partially transparent.

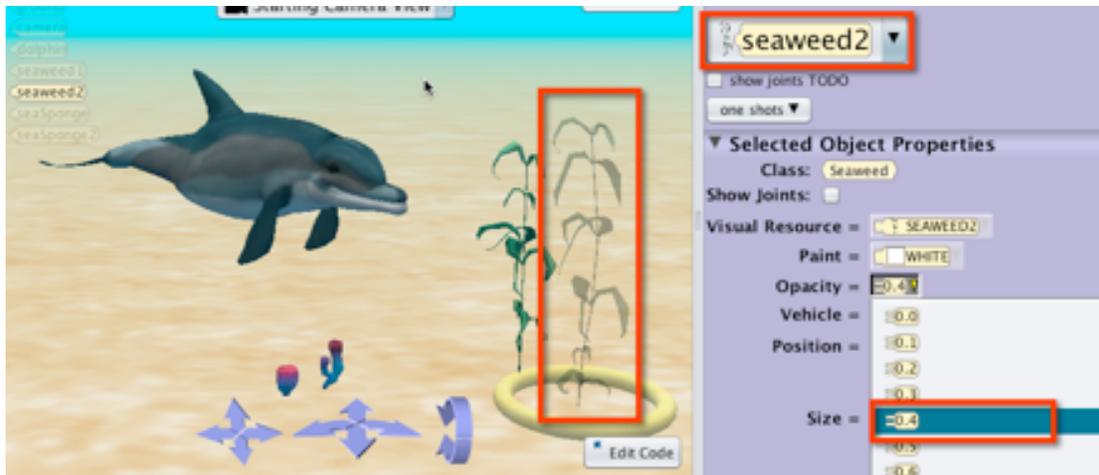


Figure 7.3 Setting opacity

Set vehicle

In Alice, a vehicle is an object whose motions affect the motions of another object in the virtual world. As an analogy, consider a car as a vehicle. When a person is riding in a car and the car moves forward, the person moves forward with the car. In Alice, the current scene is, by default, the vehicle for all objects within it. So, if the scene moves left all objects within the scene would move left with it.

To set the vehicle of an object, first select the object for which the vehicle is to be changed. Then click on the Vehicle button. A drop-down menu allows selection of another object to be the vehicle, as shown in Figure 7.4. In this example, we added a pajamaFish to the scene. The pajamaFish has been positioned on top of the dolphin's tail, where he wants to hitch a ride with the dolphin. To make this happen, first select the pajamaFish in the Properties Panel. Then, click the down arrow for the Vehicle property and select dolphin from the pull-down menu. Now, if the dolphin moves the pajamaFish will move with it, in the same direction and distance or if the dolphin turns, the pajamaFish will turn with it in the same angle of rotation.

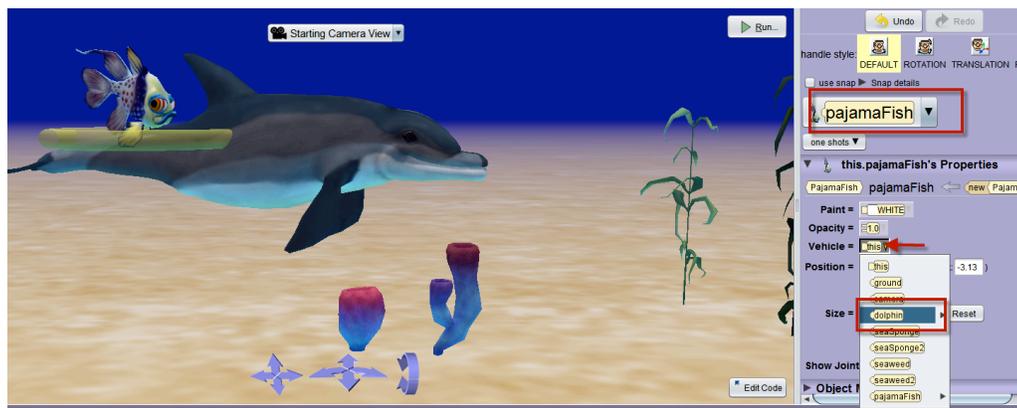


Figure 7.4 Set the vehicle of pajamaFish to be the dolphin

Set precise position

The position of an object in a scene is relative to the center point of the scene. Using the mouse to drag an object around in the scene is most common method of setting the position of an object in a scene. However, there may be some worlds in which it is important to position an object in an exact location in the scene.

The Setup panel of the Scene editor allows precise positioning of an object by setting its position coordinates. To set the position, click the mouse in one of three coordinate boxes and use the keyboard to enter a numeric value. As an example, in Figure 7.5 we added a blue cone and positioned it precisely at the center point of the scene (0,0,0). Then, the dolphin was positioned by entering numbers in the position boxes for x (-1.36), y (-0.04), and z (1.35). After the new values were entered and the Enter key was pressed the dolphin was immediately repositioned at that location in the scene.

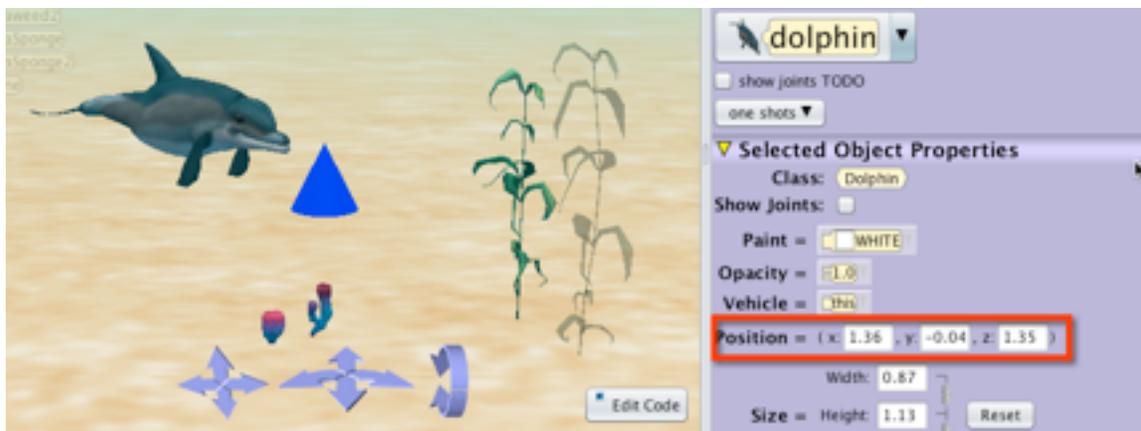


Figure 7.5 *Setting the precise position coordinates of an object*

Set size

An object's size has three dimensions: width, height, and depth. The size of an object in a 3D world often needs some adjustment when added to a scene and it appears to be out of proportion with the size of other objects currently in the scene. For example, in Figure 7.6 the seaSponge object looks very small when compared to the size of the seaweed objects. To change the size of the seaSponge object, first click on the seaSponge object. Then, click the mouse in one of three dimension boxes (width, height, or depth) and use the keyboard to enter a numeric value. By default, changing the size of one dimension automatically updates the other two dimensions, proportionately. If you change your mind about the size change, you can use the Reset key to set the size back to its previous dimensions.

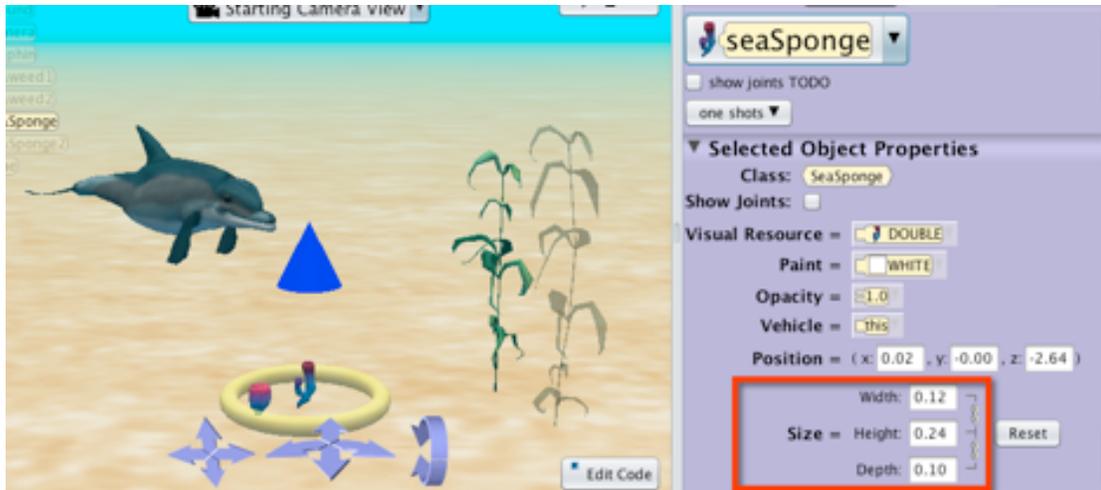


Figure 7.6 Setting the size dimensions of an object

As illustrated in Figure 7.6 above, size dimensions are locked to a proportional resize. Therefore, a change in one dimension results in all dimensions changing proportionately. A major exception to proportionate resizing is that it is possible to resize geometric shapes in one dimension only. For example, in Figure 7.7 a box object has been positioned in the scene. Note that it is a perfect cube, having a width, height, and depth of 1 meter each.

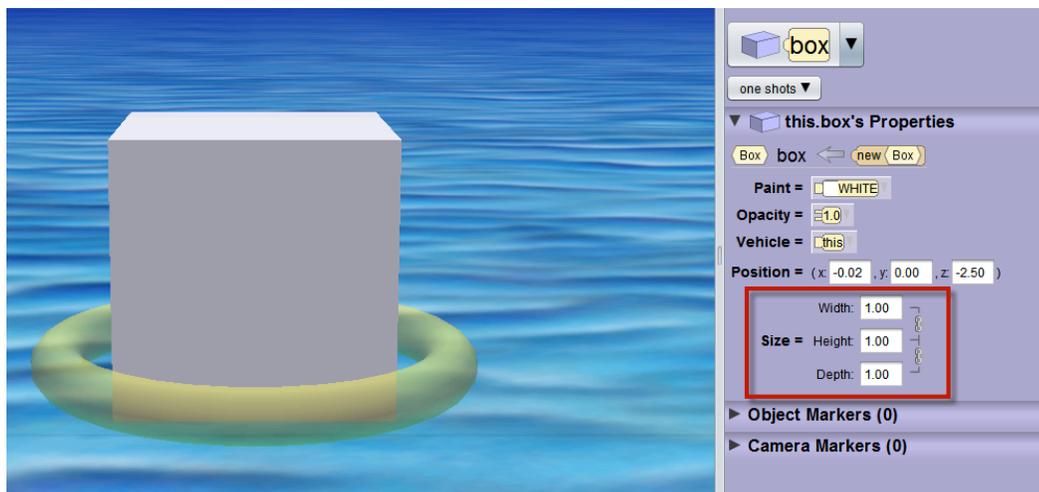


Figure 7.7 Dimensions of a new box object

As shown in Figure 7.8, we clicked on the lock icons at the right of the cube to disable proportionate resizing. Then, enter a value in one of the dimensions. That dimension will change and the other two will remain as before. Figure 7.9 shows the result of changing the box width to 2 meters.

(Note: After disabling proportionate resizing, be sure to re-enable it by clicking again on the lock icons at the right. The icon will not automatically revert, because the Scene editor adheres to a principle of maintaining state.)

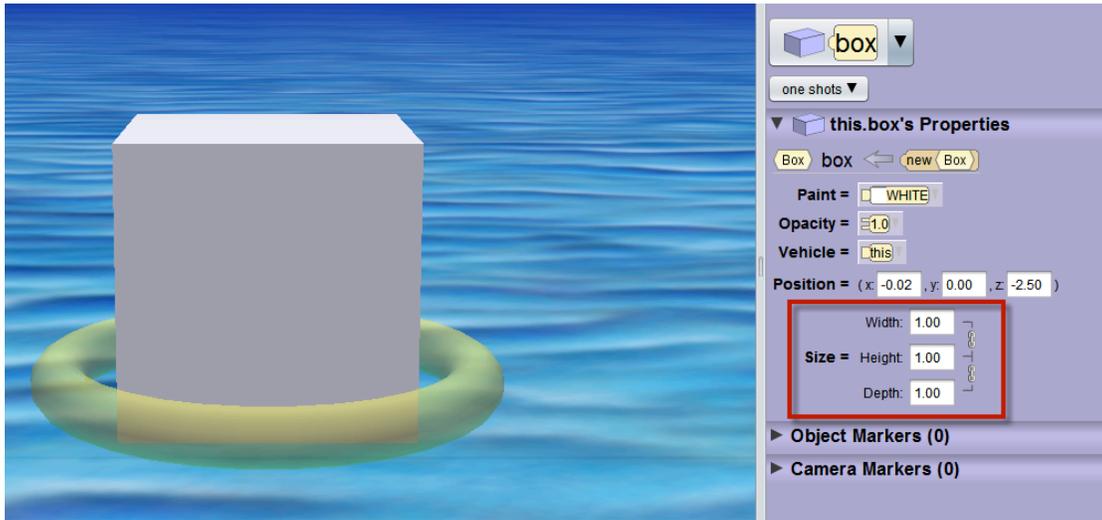


Figure 7.8 Dimensions of a new box object

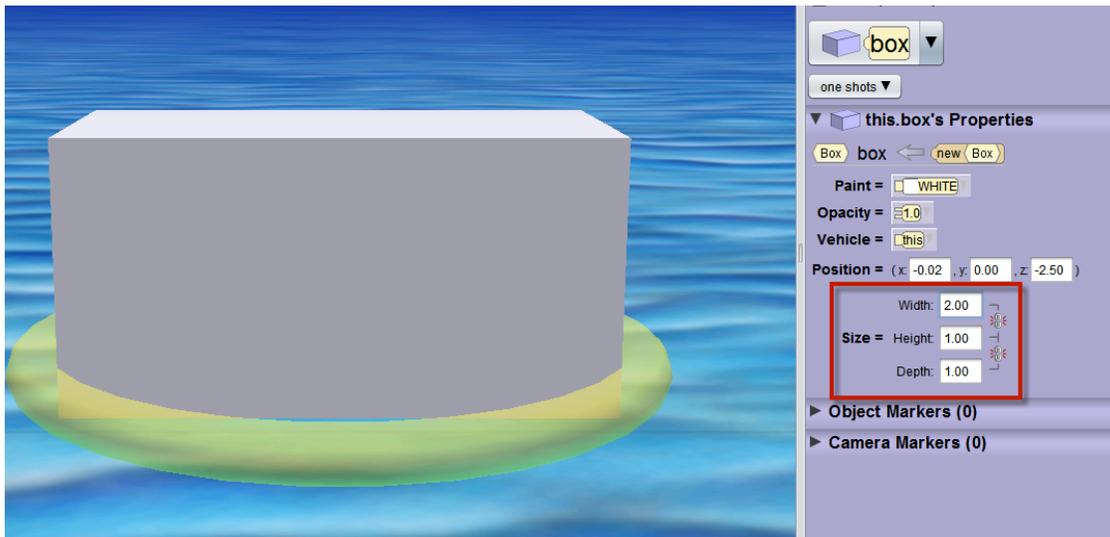


Figure 7.9 Resized in one dimension, only

8. HOW TO SET ATMOSPHERIC PROPERTIES IN A SCENE

The purpose of this section is to illustrate how to modify a scene using the scene's atmospheric properties: atmosphere color, lighting, and fog.

Example

To illustrate atmosphere, light and fog property changes, we created a world with a brown ogre (of the Ogre class) in a green grass, blue sky scene, as shown in Figure 8.1. The rock and hedge objects are from the Props collection in the Gallery. We selected this scene in the Object tree, as shown in Figure 8.2.



Figure 8.1 Example scene to illustrate special effects

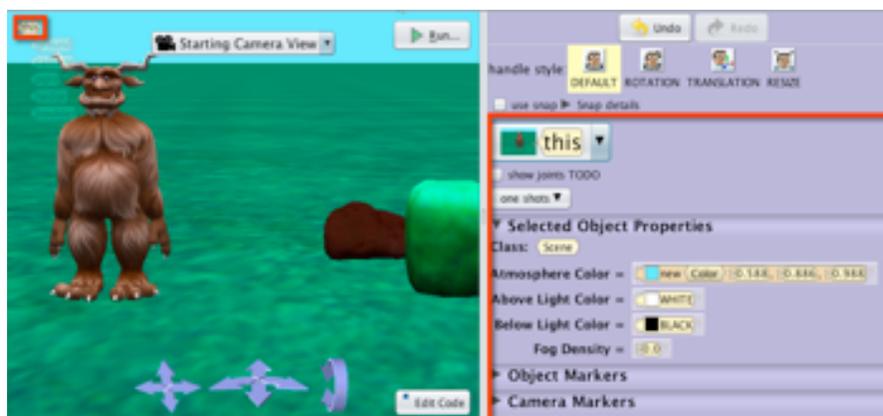


Figure 8.2 Select 'this' scene in the Object tree

The default settings of Atmosphere, Above Light Color, Below Light Color, and Fog Density in a green-grass, blue-sky template world are shown in the Setup Panel in Figure 8.3. Note that

the Atmosphere color sets the color of the sky, above and below colors provide for lighting effects, and fog density simulates mist in the air.

(NOTE: Examples of resetting these values are shown below in a progressive manner below. That is, each change carries over to the next so that the final result is cumulative.)

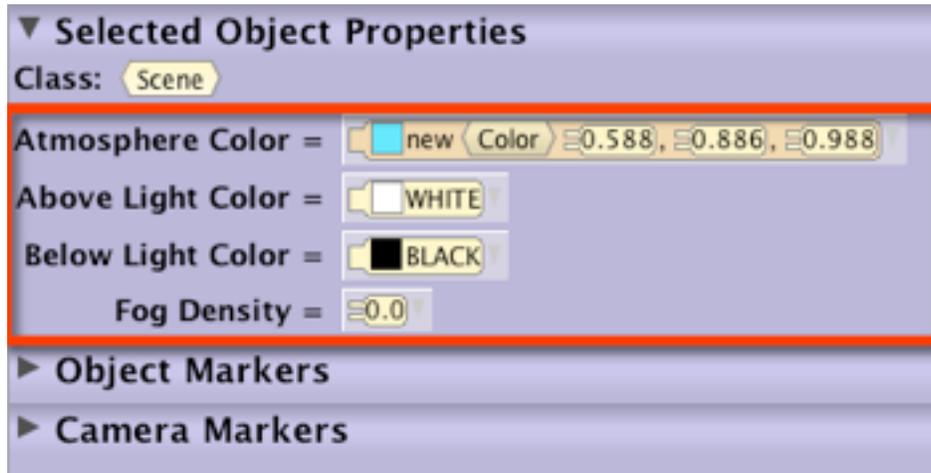


Figure 8.3 Default settings for lighting and fog in this scene

Set atmosphere color

To set the sky to a different color, click the button for Atmosphere Color and select a color from the drop-down menu, as shown in Figure 8.4. We selected dark blue, and the result is shown in the screen capture on the left of Figure 8.4.

The pull-down menu for color also provides a Custom Color option. When Custom Color is selected, a dialog box is displayed where you can select from a grid of color swatches or use HSB or RGB color codes, as shown in Figure 8.5.



Figure 8.4 Set the color of the sky (atmosphere) to a bright blue

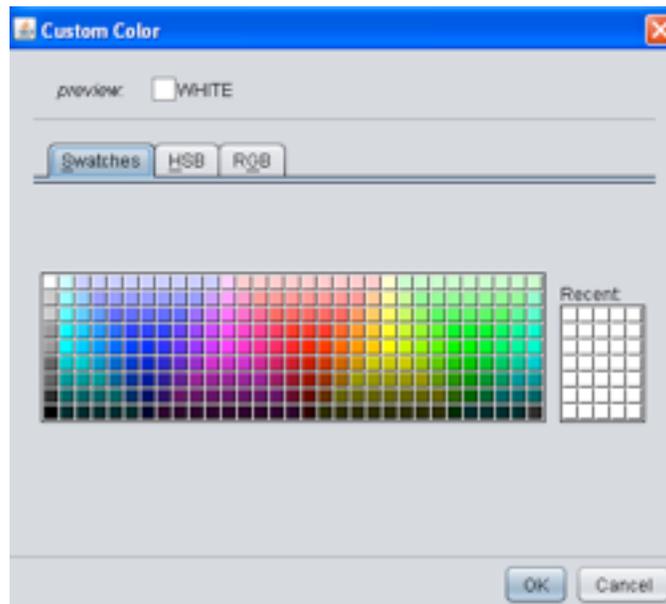


Figure 8.5 Custom color options

Set Above Light Color

The lighting in a scene is projected from above the scene. By default, the lighting above the scene has a setting of WHITE, which looks like a clear day when the sun is shining. To change the lighting to other settings, click the Above Light Color button and select a color, as shown in

Figure 8.6. In this example, we selected GRAY and the result (similar to a cloudy day) is shown in the screen capture at the left.



Figure 8.6 Above Light Color is set to GRAY

Set Below Light Color

In addition to light being projected from above the scene, it is also possible to project light from below. By default, the Below Light Color is set to BLACK, which is the equivalent of no lighting from below. To turn on lighting from below, click the Below Light Color button and select a color, as shown in Figure 8.7. In this example, we selected RED for a fiery effect and the result is shown in the screen capture at the left.

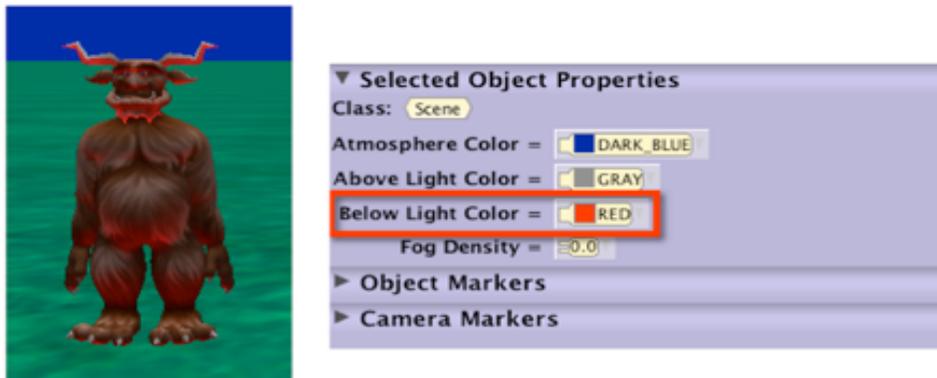


Figure 8.7 Below Light Color set to RED

Set Fog Density

Fog is used to create a misty effect in the scene, as shown in Figure 8.8. Fog can be used to allow objects to move into a scene from the back, gradually becoming more and more visible. By default, the fog density is set at 0.0, meaning that there is no fog. A fog density setting of 1 is the most fog that is possible for the scene (only the atmosphere is visible). To set the fog, click the Fog Density button and select a density value from the pull-down menu of values (in the range of 0.0 – 1.0). In this example, we selected 0.3 (approximately 30%) for a mild fog effect and the result is shown at the left in Figure 8.8.

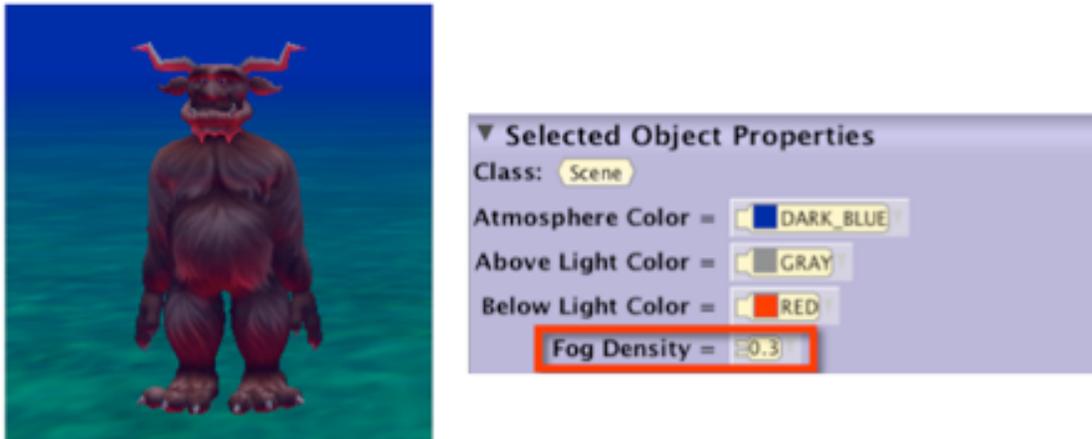


Figure 8.8 Fog Density set at 0.3

9. MARKING AND CHANGING THE CAMERA'S POSITION

Video: Camera Markers

The purpose of this section is to illustrate how to change the camera's position in a scene using marked **viewpoints**. A viewpoint is the camera's position and orientation in a virtual world. Alice also allows you to create your own viewpoints with the use of markers.

(Note: Alice has five pre-set camera viewpoints, as described in Section 13 of this How-To guide.)

Marking the camera's position

Alice has only one camera in a scene. The camera is moved around and repositioned for different viewpoints. This is similar to the use of a camera in a Hollywood studio, where a single camera film-style production technique is often followed. Each scene and camera angle is setup and rehearsed until the director is happy with the arrangements. The camera viewpoints (location and orientation) are marked before any actual filming begins.

In Alice, a camera marker is an object that remembers the position and orientation of the camera at the time the marker was created. The camera can then be moved or rotated to a different location and orientation, but the marker stays where it was originally created. A marker object is visible in the Scene editor. There is no need to worry, however, about camera markers cluttering up a scene at runtime. When the user clicks the Run button to play an animation, markers are not visible in the scene. (The markers are still remembered but are just not made visible to the viewer of the animation.)

Markers section of the Setup panel

The Setup panel in the Scene editor has a section for markers, located immediately beneath the list of properties for an object, as shown in Figure 9.0. To view the Camera Markers section, click on the arrow next to the Camera Markers label at the bottom of the panel, as shown in Figure 9.1. The Camera Markers section should expand to show buttons for creating camera markers. Notice that the Camera Markers section has three buttons -- two small buttons having a dark gray camera icon and a question symbol and one button labeled Add Camera Marker

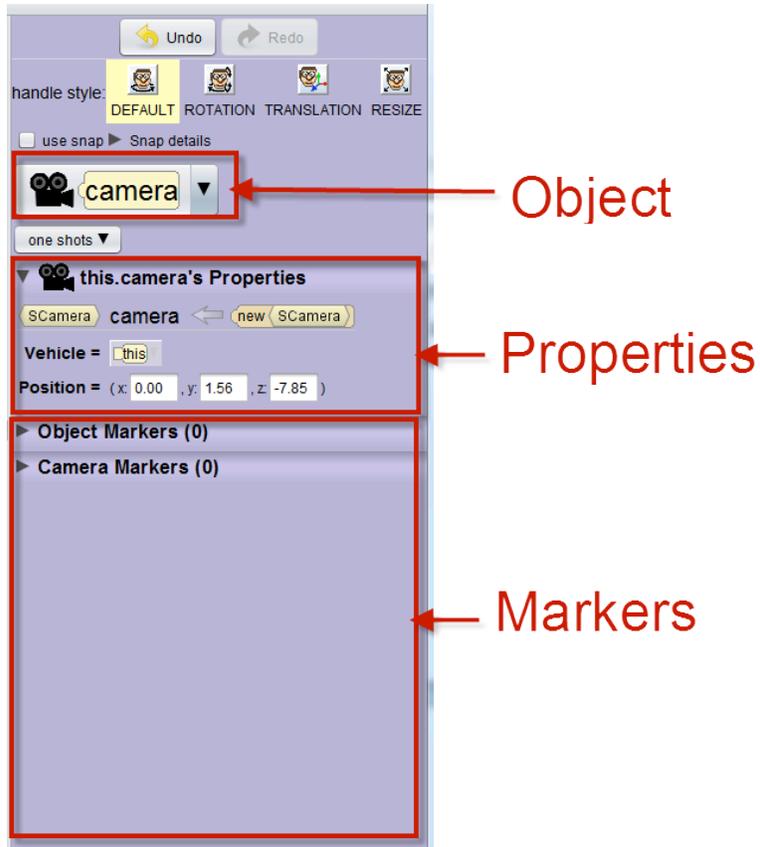


Figure 9.0 Setup panel in the Scene editor



Figure 9.1 Collapsed (left) and Expanded (right) Camera Marker section

Creating a camera marker at the starting position

We recommend marking the starting location of the camera before moving the camera around in the scene. The camera can then be moved freely around the scene and can always be returned to its original position, using the marker.

To create a starting location camera marker click on the Add Camera Marker... button, as shown in Figure 9.2. A dialog box will pop up, as shown in Figure 9.3. Enter a meaningful name for the marker, for example startPosition. When a name is entered, press the Enter key and Alice will automatically create a camera marker object at the current location of the camera. The marker remembers not only the location but also the camera's orientation (the direction and angle at which it is pointed). This information is commonly known as the camera's viewpoint.

If more than one camera marker is created, each successive marker is automatically assigned a different color (red, green, blue, etc.). As shown in Figure 9.4, we created two camera markers. One is red (startPosition) and the other is green (overheadPosition). In addition, the name of each camera marker is displayed in a matching color in the Markers section of the Setup panel.

(**Note:** We pulled the camera way back in this scene in order to obtain a screenshot showing both markers for Figure 9.4. So, it may not look exactly the same on your monitor if you are following along with the instructions given here.)



Figure 9.2 Click Add Camera Marker ...

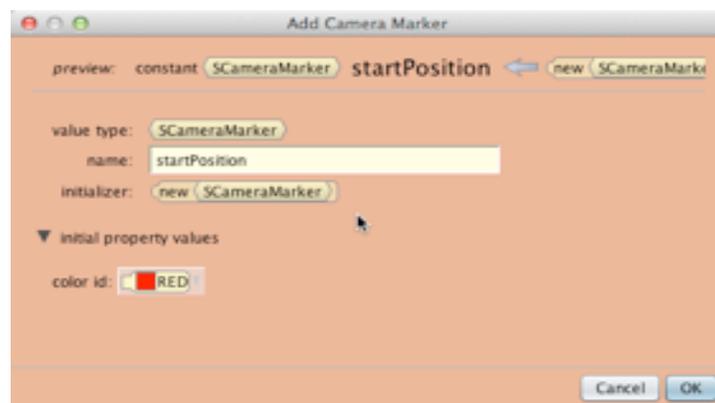


Figure 9.3 Enter a meaningful name for the camera marker



Figure 9.4 Different markers have different colors

Moving and turning the camera using navigation controls

Video: Adding Objects to a Scene

At the bottom edge of the scene view are three sets of camera navigation controls, as shown in Figure 9.5. The most common use of navigation controls is to set the camera's initial point of view for best effect in animation.

A click-and-hold on an arrow will move or turn the camera as implied by the arrow-icon. Clicking and dragging in the direction of the arrow will speed up move or turn action. You can also click and drag in a direction between two arrows, which will combine the actions of the two navigation arrows. The actions of specific navigation arrows are described below.

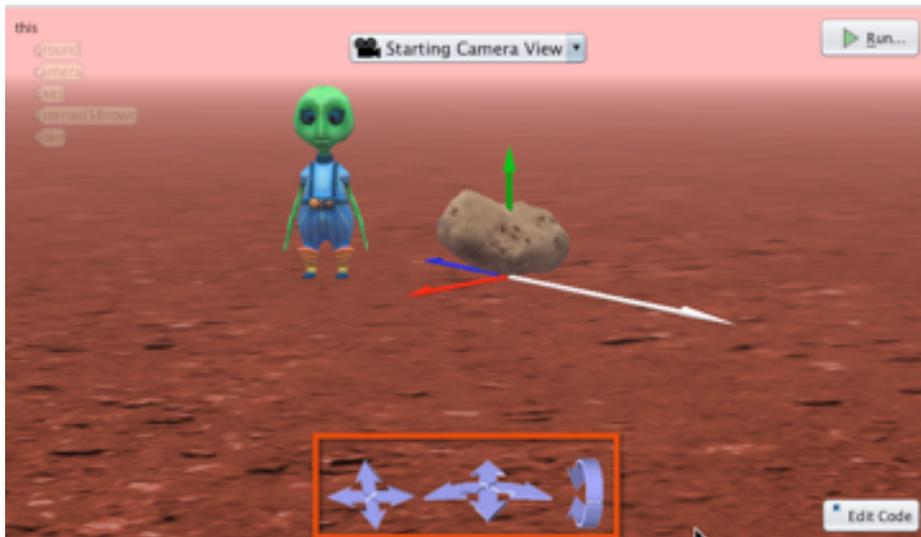


Figure 9.5 Three sets of camera navigation controls

Move camera up/down/left/right

The set of four arrows on the left, as shown in Figure 9.6, move the camera up or down (vertically), or left or right (horizontally), from the camera's point of view. As with any move action in Alice, these arrows change the location of the camera in the scene, but not its orientation (the direction the camera is facing). Professional videographers refer to these actions as the camera being ped (up and down) or tracked (side to side).

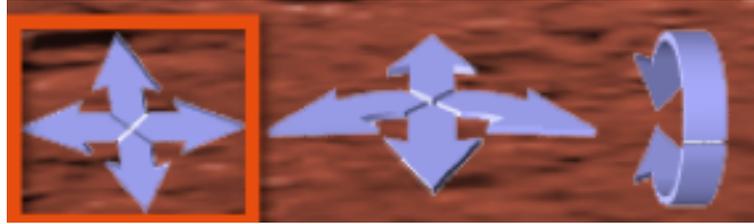


Figure 9.6 Move the camera up, down, left, or right

Move camera forward/backward

For purpose of clarity, the set of four arrows in the center are described here in two subsets. The two arrows pointing forward and backward (horizontally), as outlined in yellow in Figure 9.7, move the camera forward or backward (as seen by the camera). We refer to this action as the camera is zooming in or out relative to an object in a scene. Although professional videographers often use the term ‘zoom’ for changing the focal length of the camera’s lens to give the illusion of moving the camera, in Alice the camera is actually moved (no lens change occurs).



Figure 9.7 Move the camera forward or backward

Turn camera left/right

The other two arrows in the center set, as outlined in yellow in Figure 9.8, turn the camera to the left or right, as seen by the camera. As with any turn action in Alice, a turn changes the orientation of the camera in the scene, but not the location of the camera. Professional videographers refer to this action as panning the scene.



Figure 9.8 Turn the camera left or right

Turn the camera forward/backward

The set of arrows on the right, as outlined in red in Figure 9.9, turn the camera forward or backward (a tilting action) in the scene. As with any turn action in Alice, a turn changes the orientation of the camera in the scene, but not the location of the camera. Professional videographers refer to this action as tilting.

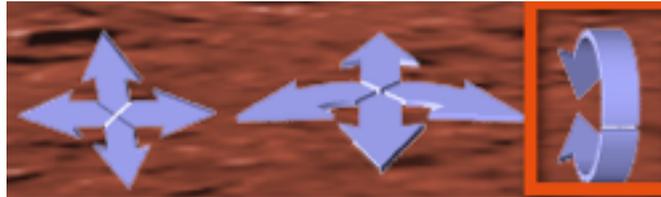


Figure 9.9 Turn the camera forward or backward

How to position the camera at a marker

Let's assume that we have used the camera navigation controls to move the camera around the scene and it is no longer at the starting position. Now, we can take advantage of the camera markers we created earlier.

First, select (from the list of camera markers) a marker to which the camera will be moved. In Figure 9.10, the overheadPosition marker has been selected. Notice that the question symbols in the two camera marker buttons have been replaced with green camera icons because the overheadPosition camera marker in this example is green.

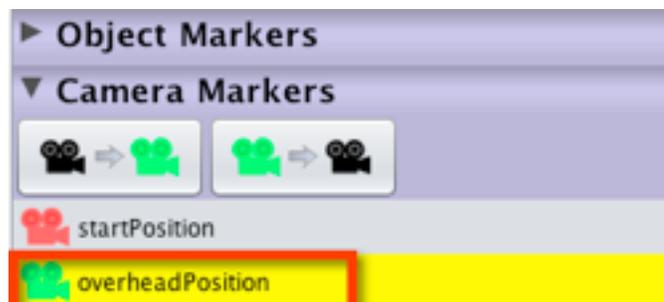


Figure 9.10 Step 1: Select the targeted marker

Secondly, click the camera => marker button (left of the two small buttons), as shown in Figure 9.11 to move the camera to the selected marker. The camera will immediately move and orient to the targeted marker.



Figure 9.11 Step 2: Click camera => marker button (left)

Repositioning a camera marker

Once in a while, a marker may have been created in the wrong place. Rather than deleting the marker and creating a new one, the existing marker can be repositioned. To reposition a marker, first position the camera in the desired new location and orientation. Then, select the marker to be repositioned in the list of camera markers. In the example shown in Figure 20.12, we selected startPosition (a red camera marker). Notice that the two small buttons now show the dark camera icon (current camera position) and a red camera icon (the selected marker).

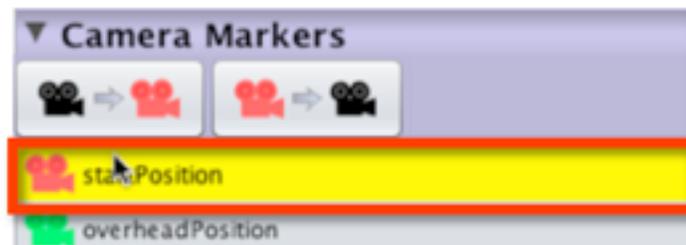


Figure 9.12 Select the marker to be repositioned

Now, click on the marker => camera button (outlined on the right in Figure 9.13). Alice repositions the selected marker to the current camera position.

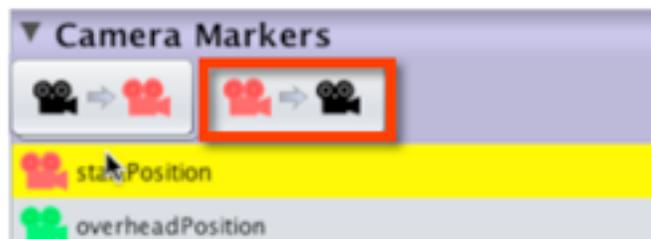


Figure 9.13 Click the marker => camera button (right)

10. POSITIONING OBJECTS WITH MARKERS

[Video: Object Markers](#)

In the previous section of this guide, we introduced camera markers. . The purpose of this section is to introduce object markers that remember the position and orientation of other kinds of objects.

Markers

To better understand object markers, consider an analogy: a bookmark in a web browser (e.g., Firefox, Safari, IE, Chrome, or some other). To make it easy to find a favorite web site, a bookmark is created. Later, to return to that favorite web site, the bookmark in the browser is used to return to that website on the Internet. Object markers in Alice do a similar kind of thing. Markers are used to remember the position and orientation of an object at the time the marker was created. Then, later, after the object has moved or rotated to a different position, the object can be repositioned at the marker.

Example

To illustrate object markers in this section, we have created a scene with the alien and an asteroid boulder in the Mars scene, as shown in Figure 10.1.



Figure 10.1 Example scene

Open Markers in Setup

To open the Object Markers section of Setup in the Scene editor, click on the arrow next to the label Object Markers at the bottom of the panel, as illustrated in Figure 10.2 (left). The Object Markers section should expand to show buttons for creating object markers, as illustrated in Figure 10.2 (right).



Figure 10.2 Collapsed (left) and Expanded (right) Object Marker section in Setup

Create an object marker

To create an object marker, first position the object in the desired location and orientation in the scene. Next, click on the Add Object Marker ... button. In the example shown in Figure 10.3, the object is the alien.

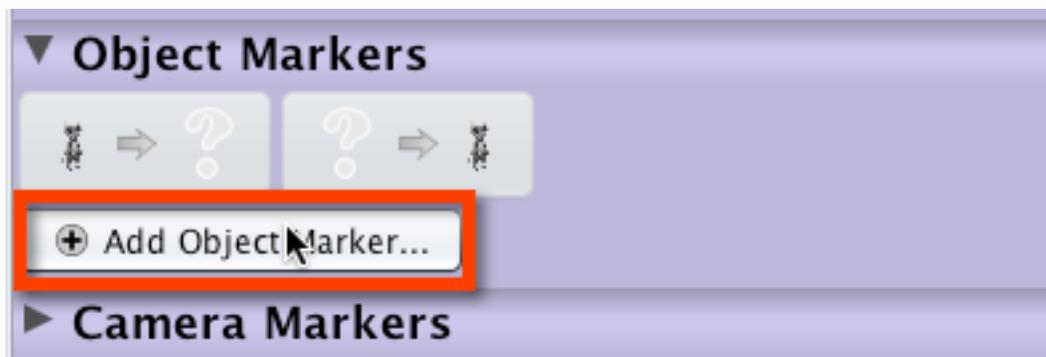


Figure 10.3 Add Object Marker ...

A pop-up dialog box provides an opportunity to give the marker a meaningful name, such as firstPosition as shown in Figure 10.4.



Figure 10.4 Enter a meaningful name for the object marker

When the name is entered, press the Enter key. Alice creates a set of axes to represent the object marker. The axes marker is automatically positioned at the pivot point of the object, as shown in Figure 10.5. The object marker automatically has the same orientation as the object.



Figure 10.5 An axes object represents an object marker

Moving an object to a marker in the Scene editor

In this example, we created a second marker at the top of the asteroid, as shown in Figure 10.6. To move an object from its current position to a marked position, first select (from the list of object markers) the marker to which the object will move. In Figure 10.6, the topOfAsteroid

marker has been selected. Notice that the question symbols in the two object marker buttons have been replaced with an object (in this example, an alien) and an axes icons.



Figure 10.6 Step 1: Select the targeted marker

Secondly, click the object => marker button (left of the two small buttons), as shown in Figure 10.7, to move the object to the selected marker.

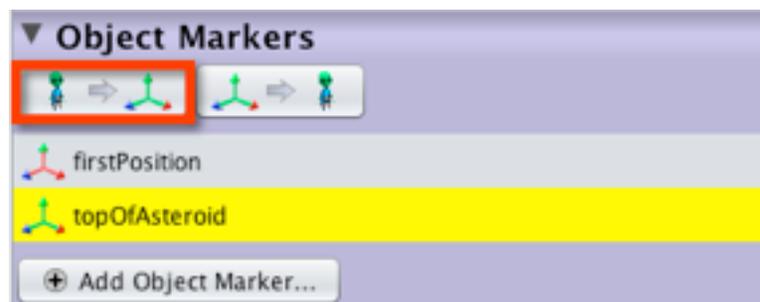


Figure 10.7 Step 2: Click object => marker button (left)

The object will immediately move and orient to the targeted marker. In this example, the alien moved to the top of the asteroid, as shown in Figure 10.8.



Figure 10.8 Result of moving an object to an object marker

NOTE: *The Undo button can be used to reverse an action with a marker, if necessary.*

Repositioning an object marker

To reposition an object marker from its current position to the current location of an object, first select (from the list of object markers) the marker to be repositioned. In Figure 10.9, the firstPosition marker in the list has been selected. Then, click on the marker => object button to move the marker to the selected object, as shown in Figure 10.10.



Figure 10.9 Select marker to be repositioned

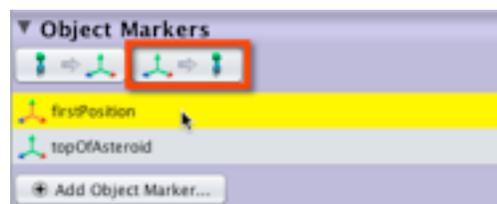


Figure 10.10 Click marker => object button (right)

11. HOW TO POSITION, ORIENT, AND RESIZE AN OBJECT

Video: Using Handles to Position Objects

The purpose of this section is to illustrate the use of handles (ring and arrow mouse controls) and also to introduce the Scene editor's Undo and Redo buttons. Ring and arrow handles are controls used to interactively position and orient an object in a scene. An additional arrow handle is used for resizing an object.

Note: We recommend using a mouse for working with ring and arrow handles in the Scene editor. A touchpad on a laptop is usable, but takes much more patience.

Position and Orientation

Video: Object Movement and Rotation

An object's position in a virtual world is tracked as an (x, y, z) location, relative to the center of the virtual world (0, 0, 0). Position, however, is not the only important factor needed to describe an object's location in a 3D world. Each object also has orientation. That is, an object lives in 3D space and thereby has a sense of direction in three dimensions. An object's senses of up and forward are used to define its **orientation**.

In Figure 11.1, an axes object has been embedded in the hare to illustrate the hare's sense of direction. The green arrow points upward, the white arrow is forward, the blue arrow backward, and the red arrow right, from the point of view of the hare. Although we described the orientation as though there were four separate arrows, this is not really true. The forward and backward arrows are actually just one continuous arrow but the two portions of the arrow are painted different colors to provide a better visual perspective.



Figure 11.1 Orientation is defined by an object's sense of up and forward directions

Orientation is important for an Alice object because motions such as move, turn, and roll are specified in terms of direction. For example, the hare may be told to move forward or move up. When an object performs a motion statement, it does so relative to its own orientation. In this example, if harry is told to move left he will move to his left. To be clear, in the scene shown in Figure 11.1 above, harry would move to his left which is to the right of the scene as seen by the camera. As a rule of thumb, an object's motion is generally performed in a self-centric manner.

Undo and Redo buttons

A sense of "freedom to play" when setting up a scene is provided by two buttons, Undo and Redo, in the upper right corner of the Scene editor, as shown in Figure 11.2.

Undo provides the ability to "make a mistake" and fix it. A click on the Undo button backtracks the most recent action and the state of the scene backs up one step, removing it. It is possible to click Undo repeatedly, backtracking all the way to the initial state of the project when it was first opened in this session (but not into previous sessions that were saved and later reopened). Redo provides the ability to "change your mind." Click the Redo button to reverse the action of an Undo. Redo also provides the ability to repeat an action.



Figure 11.2 Undo and Redo buttons in the Scene editor

Hint: Use the Undo and Redo buttons make it easier to set up a scene ... without tension or fear of breaking something.

Handles: Rings and arrows

By default, the mouse can be used to click and drag an object forward/backward and left/right on the horizontal plane in a scene. Handle style controls create rings and arrows that can be used to modify the mouse's drag action in the Scene editor. Each handle action is summarized in Figure 11.3.



Figure 11.3 Handles change the drag action of a mouse on an object

Single ring

When an object is first added to a scene, the Handle style displayed is usually a single rotation ring around the pivot point of the object, as shown in Figure 11.4. Using the mouse to click on the ring and drag the ring in a clockwise or counterclockwise direction causes the object to mimic the mouse action, rotating in the same direction as the ring is being turned.

Rotating an object with the single ring handle changes the orientation of the object by changing the forward and backward directions. (It is possible, however, for the object to end up facing in the same direction it was originally facing. In this case, the orientation is returned to its original value.)

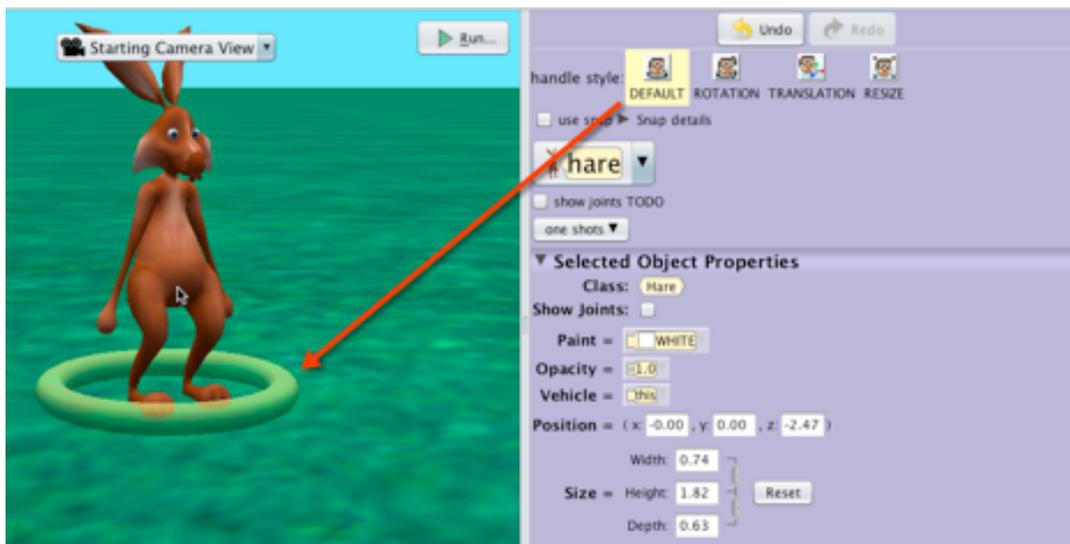


Figure 11.4 One ring to rotate an object left/right

Three rings

The three rings handle is used to turn an object left/right (turn around), turn an object forward/backward (tilt), or roll an object left/right (similar to a door knob), as shown in Figure 11.5. Rotating an object with any of the rings changes the orientation of an object. The turn ring changes the forward direction. The tilt ring changes the forward and up directions. The roll ring changes the up direction. (Once again, it is possible to rotate in such a way that the orientation returns to its original value.)

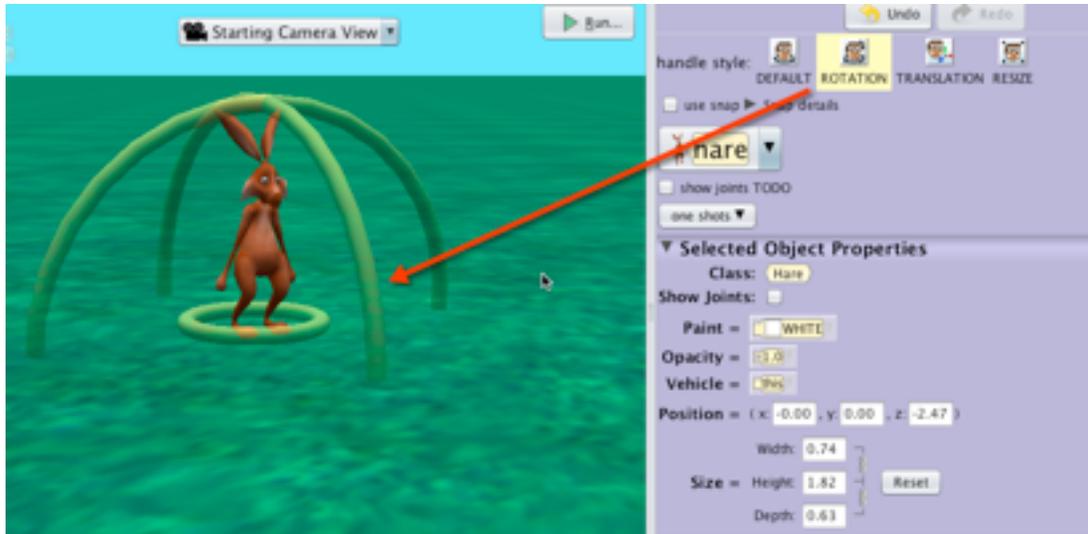


Figure 11.5 Three rings to turn or roll

As a short example of the usefulness of the ring handles, in Figure 11.6 we added a 3D text object to the scene. Note that the text is somewhat dark. The lighting in a scene is directly overhead. To get better lighting on the text, the text can be tilted slightly backward.



Figure 11.6 A Text object, "Hello. World!"

Look closely at the text object and the rotation handle button shown in Figure 11.7. When the rotation button is clicked, three rings are displayed around the pivot point of the text object.



Figure 11.7 Three-ringed handle for rotating an object

The forward/back ring was used to tilt the text string slightly backward (toward the back of the scene). The text object appears brighter, as shown in Figure 11.8.



Figure 11.8 3D Text has better lighting

Three arrows

The third handle button displays translation arrows (rather than rotation rings), as shown in Figure 11.9. The translation arrows can be used to move an object in any of six directions (up, down, left, right, forward, or backward). The three translation arrows change an object's (x, y, z) coordinate location in the virtual world. However, the orientation of the object remains the same. (As with orientation, it is possible to move an object in such a way that it returns to its original location.)

(Note: The direction of motion for the translation arrow handles perform “as seen by the camera” instead of “as seen by the object.”)

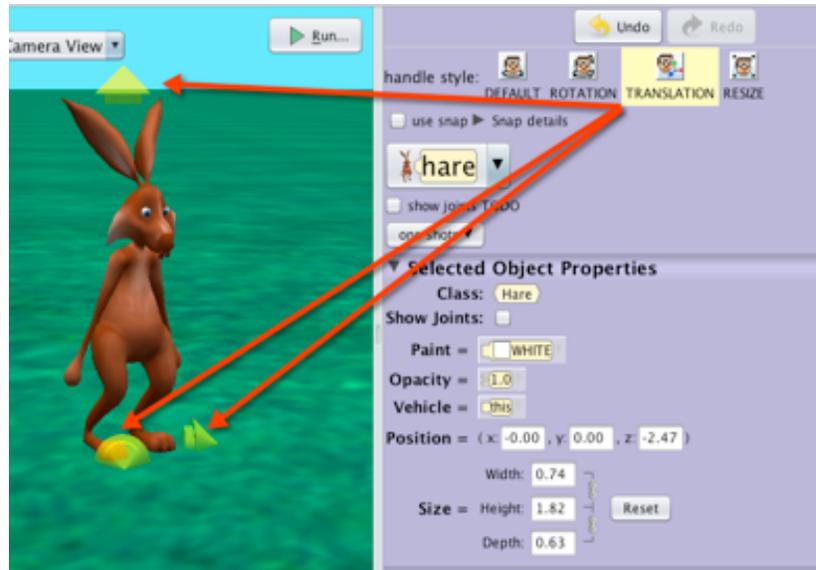


Figure 11.9 Three arrows to move an object as seen by the camera

The fourth handle style button displays a single arrow handle that can be used to resize an object, as shown in Figure 11.10. The single arrow changes the object's size in all directions, proportionately. The single arrow handle offers a more free-styling control for resizing as compared to the specific accuracy of the Position (Width, Height, and Depth) property boxes in the Setup. The single resize arrow does NOT change the orientation of the object.

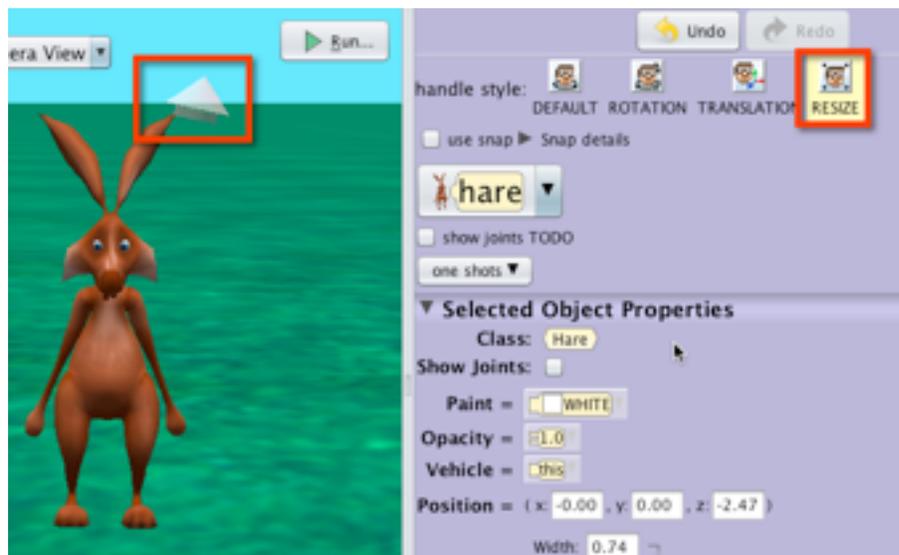


Figure 11.10 Single arrow resizes proportionately in all dimensions

A geometric shape has the additional capability of resizing in a single dimension. For example, the box shape has four resize arrows, as shown in Figure 11.11. The upward arrow resizes the cone's height without affecting its width or depth. The magenta arrow at the base resizes the cone's width without affecting its height and depth. The aqua arrow resizes depth without affecting its height or width. The pink arrow (diagonally off to the upper right side) resizes proportionately in all directions.

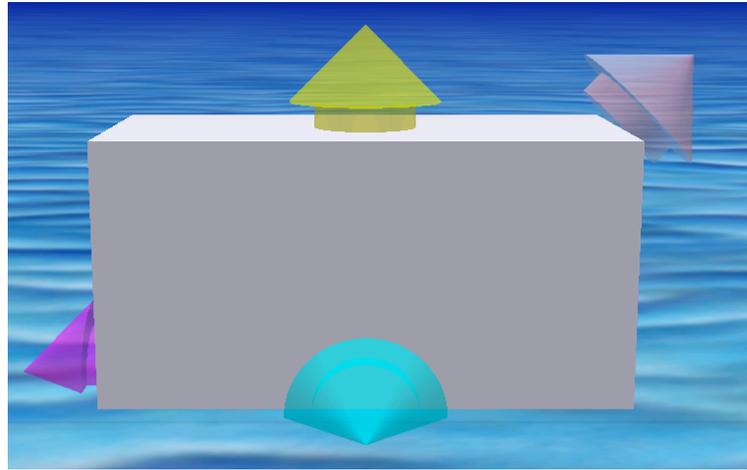


Figure 11.11 Four resize buttons for a geometric shape

12. POSITIONING SUB-PARTS IN SCENE EDITOR

[Video: Working with the Joints of an Object in Alice 3](#)

The purpose of this section is to illustrate how to position sub-parts of an object while setting up a scene in the Scene editor. In Alice 3, the 3D model classes define objects having an internal skeletal system consisting of joints. Sub-parts (for example an object's head, arms, legs, tail, and other parts) are connected to one another and to the body by these joints. Therefore, a sub-part of an object is positioned by rotating the joints of the skeletal system.

How to view the skeletal joints

In the real world, joints in an entity's skeletal system are usually hidden within the body. For example, a human has shoulder joints and elbow joints but these skeletal joints are enclosed within the body's skin and muscular tissue. The joints can only be seen by taking an X-ray or by some other medical procedure.

Similarly, Alice object joints can only be seen by using an X-ray-like view. To view the joint positions of an object, select an object in the Object tree and then check the box for the Show Joints option in the Setup. Next, reduce the object's opacity property to a low value such as 0.5. Figure 12.1 illustrates an example X-ray-like view of the skeletal system.

In Figure 1.21, notice that the location of each joint is marked with a small axes object. The axes object is for the purpose of showing the location and orientation of each joint. White is forward, red is right, and green is up (as seen by the joint at that position).

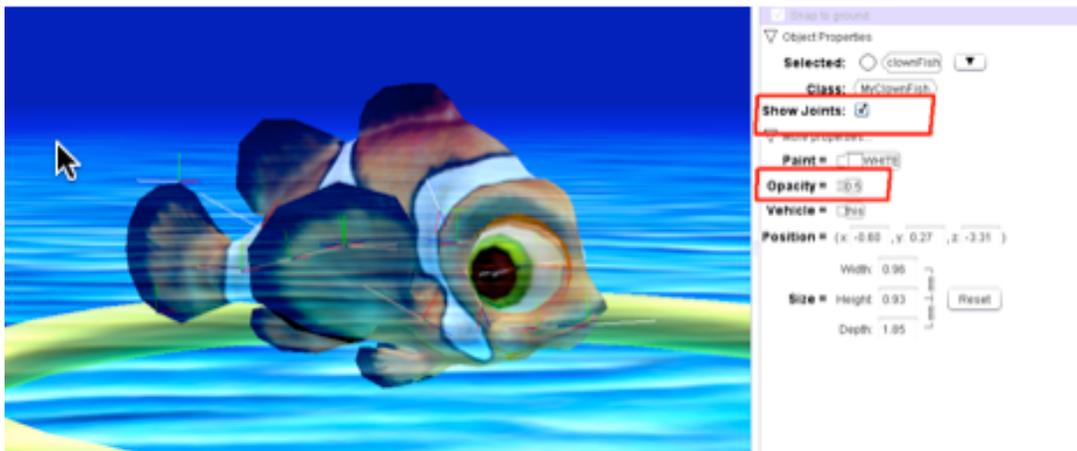


Figure 12.1 An X-ray-like view of the skeletal joint system

For each skeletal joint, its orientation is usually consistent with the functioning of an attached sub-part. For example, Figure 12.2 shows a close-up view of the fish's right eye. The important

thing to understand is that this fish's eyes face outward (to the side of the fish). The eye's joint axes object has a white axis pointing in the direction the eye is "facing" (which is forward as seen by the eye), the green axis is the upright position of the eye within the fish's body (up), and the red axis is to the right of the eye (as seen by the eye).

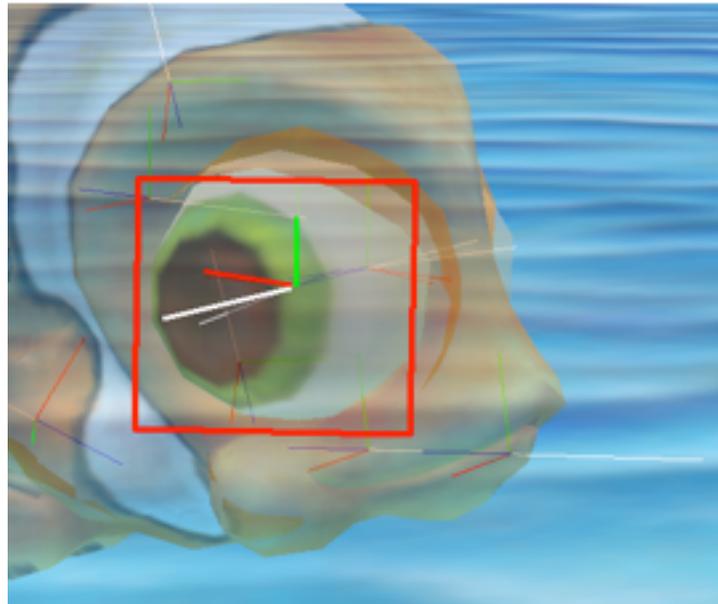


Figure 12.2 Orientation is consistent with the action of an attached sub-part

Some skeletal joints are located in an extended limb (for example, an arm, leg, wing, fin, or flipper). A limb often contains numerous joints that must share the same orientation. For example, Figure 12.3 shows a close-up view of the fish's tail. The tail is a limb that is "facing" outward (similar to the fish's eye). The tail is one sub-part but has three joints to provide some flexibility for animation. The three joints share the same orientation, as seen in the axes at each joint. The white axis of each joint is facing outward (forward for the tail), the green axis is the upright position of the tail sub-part as attached to the fish's body (up), and the red axis is the right of the tail, as seen by the tail.

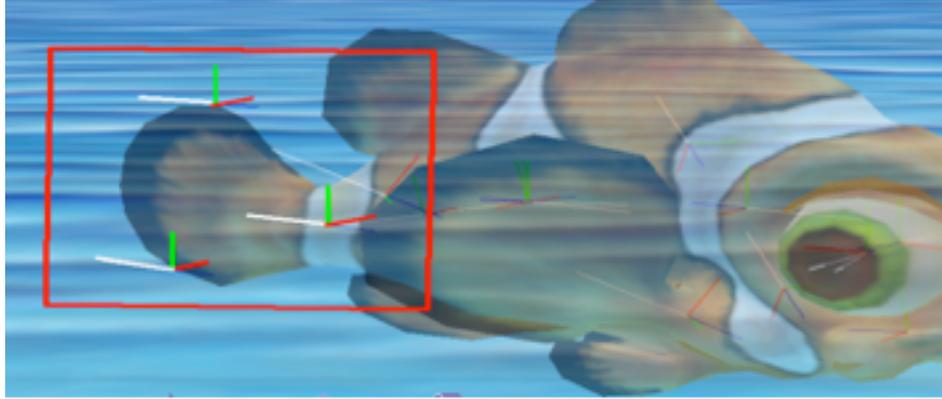


Figure 12.3 Multiple joints in a limb have consistent orientation, facing away from the body

How to select a skeletal joint

Sub-parts of an object can be positioned by selecting the appropriate joint from the Object Parts menu and then rotating the joint. To view the Object Parts menu, click the selected tile in the Setup panel, select the object in the list of objects and pull the mouse cursor over the right arrow to open a cascading menu of joints, as shown in Figure 12.4. In this example, the tail was selected for a clownFish object.



Figure 12.4 Selecting a joint/part of an object

When a joint is selected, Alice automatically displays three rotation ring handles around the selected joint. In this example, the rings are displayed with the fish's tail joint as the pivot point of the tail, as shown in Figure 12.5.

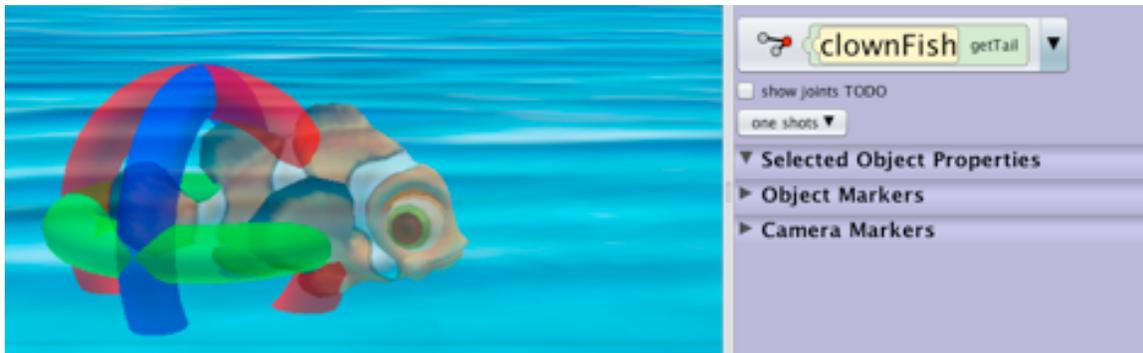


Figure 12.5 Three rings for rotating the tail joint

Now the rings can be used to rotate the tail into the desired location, as shown in Figure 12.6. The same process can be used to position other joints (and associated sub-parts) in the object.



Figure 12.6 Using a ring handle to rotate the tail

13. RELATIVE POSITIONING WITH CAMERA VIEWPOINTS

Video: Using Camera Views

The purpose of this section is to demonstrate how to position two or more objects at locations relative to one another in a scene. Alice provides five pre-set multiple camera viewpoints for relative positioning.

Example

To illustrate, we added a hare (harry), a Cheshire cat (chessy), a tiger (tiggerrr), a tea tray, and a teapot to the example scene shown in Figure 13.1. In this example, the goal is to put the teapot on the center of the tea tray.



Figure 13.1 Tea tray and teapot, in original positions

Camera viewpoints

Positioning the teapot on the center of the tray looks simple. Just drag the teapot onto the center of the tray, as shown in Figure 13.2. However, the actual position of one object relative to another object can be deceptive because our view of the scene is only what we see through the

camera's lens (the camera viewpoint). In this example, the camera viewpoint is from the front of the scene and it is difficult to see whether the teapot is actually at the center of the tray.



Figure 13.2 Teapot is on the tray, but is it in the center?

A Camera viewpoints menu is located at the top center of the scene view. To open the Camera viewpoints menu, click on the down-arrow at the right edge of the button. The menu should drop down to show a list of pre-set camera viewpoints, as illustrated in Figure 13.3.



Figure 13.3 Camera viewpoint pull-down menu

When an item in the menu is selected, Alice automatically takes care of positioning the camera at the selected viewpoint. The Layout Scene View positions the camera upward and at an angle, as shown in Figure 13.4. From this viewpoint, it is easy to see that the teapot is not quite on the center of the tea tray.



Figure 13.4 Layout Scene View

As shown in Figure 13.5, all the handle style tools and the camera navigation controls are available in this view and can be used to reposition objects in the scene.

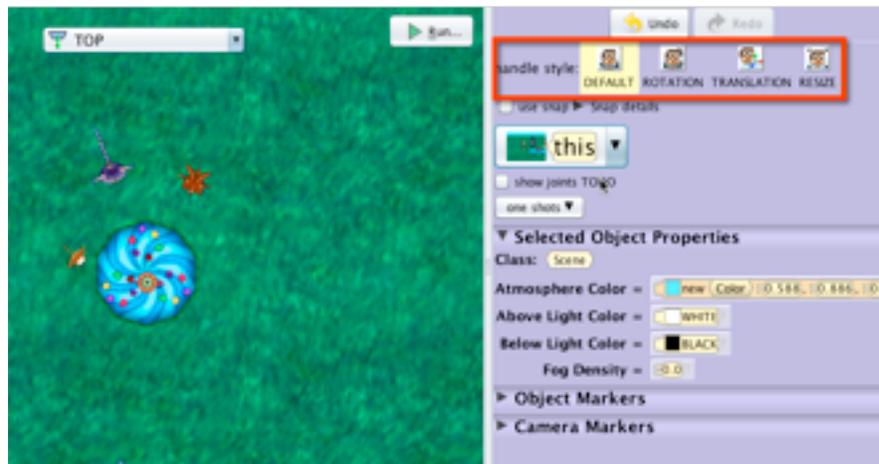


Figure 13.5 Camera navigation tools and handles can be used to reposition objects

Figure 13.6 shows the result of using the mouse to carefully position the teapot on the center of the tray. Use the Camera Viewpoints menu to put the camera back to the Starting viewpoint.



Figure 13.6 The teapot is now on top and at center of the tea tray

Other Camera viewpoints

In the example above, the Layout Scene view is all that was needed. However, the camera viewpoints menu offers other options:

TOP view

The TOP view presents an overhead view of a scene, as shown in Figure 13.7. The camera is hovering over the scene and is pointing straight toward the ground in the scene.



Figure 13.7 TOP view

In the TOP view, the camera navigation arrows are limited to those used for moving the camera (forward, backward, left, right, up and down), as shown in Figure 13.8. The four navigation arrows to the left in Figure 13.8 allow the camera to be moved left, right, up, and down, as seen by the camera. The two arrows on the right move the camera forward and backward, as seen by the camera. The SIDE and FRONT views, as described below, also have this limitation on available camera navigation arrows.



Figure 13.8 Camera navigation arrows in TOP, SIDE, and FRONT views

Note: *The motion of the camera that results from using camera navigation arrows is always “as seen by the camera.” This can be surprising when the camera is in TOP, SIDE, or FRONT view. For example, in TOP view, the camera’s “forward” orientation is looking straight down toward the ground. So, moving the camera forward in TOP view actually zooms in closer to the ground.*

SIDE view

The **SIDE** view presents a camera viewpoint that faces the center point of the ground, from the ground's right side, as shown in Figure 13.9. All the handles are available. The camera navigation arrows allow moving the camera forward, backward, left, and right, up and down. But it is not possible to turn the camera to the left or right, forward or backward.



Figure 13.9 SIDE view

FRONT view

In the **FRONT** view the camera viewpoint faces the center point of the ground, as shown in Figure 13.10. The camera navigation arrows allow moving the camera forward, backward, left, and right, up and down. But it is not possible to turn the camera.



Figure 13.10 FRONT view

The black shape (highlighted in a red box) in Figure 13.10 above, is a starting camera marker (used internally by Alice to remember the starting position for the camera). The camera marker can often be seen in the other camera viewpoints as well, and the camera marker can be moved, turned, rolled and oriented in the same way as any other Alice object in a scene. Remember, however, that changing Alice's internal camera marker will change the Starting Camera View.

***Note:** It must be emphasized that the Camera viewpoints menu is only available in the Scene editor, for convenience in setting up a scene. The Camera viewpoints listed in the viewpoints menu are not available in the Code editor and cannot be used for creating program code.*

14. HOW TO ALIGN OBJECTS USING A SNAP GRID

The purpose of this section is to demonstrate how to align two or more objects. Alice provides a grid and one shot methods for alignment and positioning.

Example

To illustrate, we will continue with the scene created in the previous section where the teapot was positioned on the center of the tea tray. The current state of this example scene is shown in Figure 14.1. In this continuing example, the goal is to position tiggerrr, chessy, and harry all in a straight line behind the tray.



Figure 14.1 Current state of example scene

To align objects in a scene, activate the Snap grid in the Setup Panel, as shown in Figure 14.2. The Snap grid option displays a grid on the ground or water surface in a scene. By default, the grid is set to display grid blocks that are 0.5 meters on a side. In addition, using the mouse to drag-and-drop an object will cause the object to snap into position at the nearest grid point. Rotating an object will cause the object to snap into position at the nearest 30 degree angle. The grid and angle snap values may be set to other values.

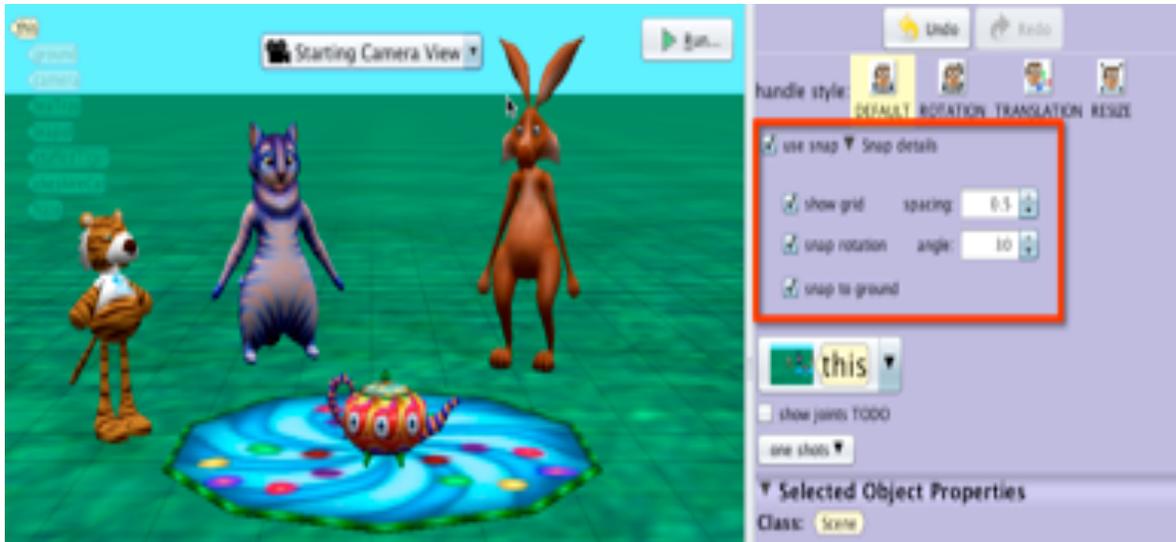


Figure 14.2 Grid is displayed and snap is active

To use the grid for positioning an object, click and drag the object with the mouse. Alice automatically creates extended, highlighted grid lines for the clicked object, as shown in Figure 14.3.

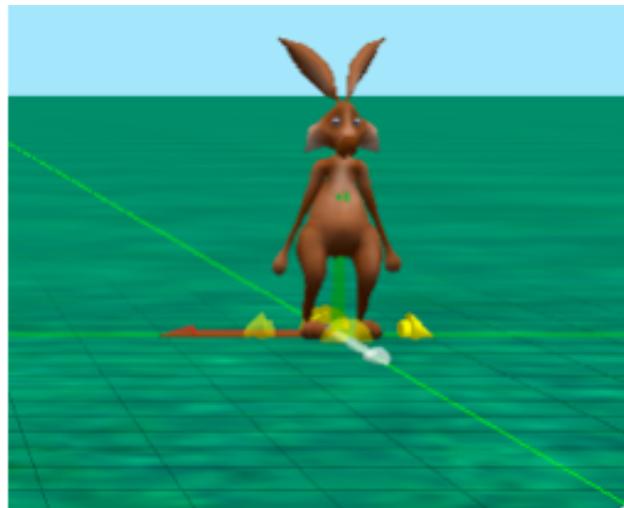


Figure 14.3 Highlighted grid lines for the selected object

To align the three objects along one line of the grid, click and drag each object so as to snap to a grid point along the same line, as shown in Figure 14.4.



Figure 14.4 Using Snap grid lines for alignment

15. PRECISE POSITIONING WITH ONE-SHOTS

Video: Using One-Shot Procedures

The purpose of this section is to illustrate how to use a one-shots menu for alignment and precise positioning of objects and object sub-parts in the Scene editor.

Example

To illustrate precise positioning of objects and sub-parts, we will use the scene shown in Figure 15.1. In this example scene, the alien is on a moon surface with his pet robot.

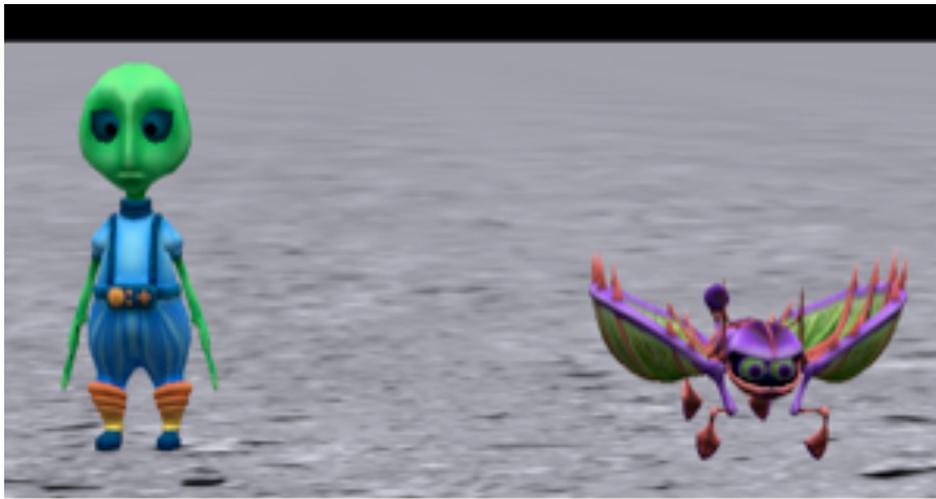


Figure 15.1 An alien and his pet robot

One-shot procedures

Procedures are methods that perform an action. One-shot procedures are listed in a drop-down menu in the Scene editor. A one-shot procedure is an action performed “right now” and only once (a “one-shot”) by an object in the scene. There are three techniques for opening a one-shot menu. One technique is to right-click on the name of an object in the Object tree, as shown in F in Figure 15.2, and then select the word “procedures” from the drop-down menu. ocedures.

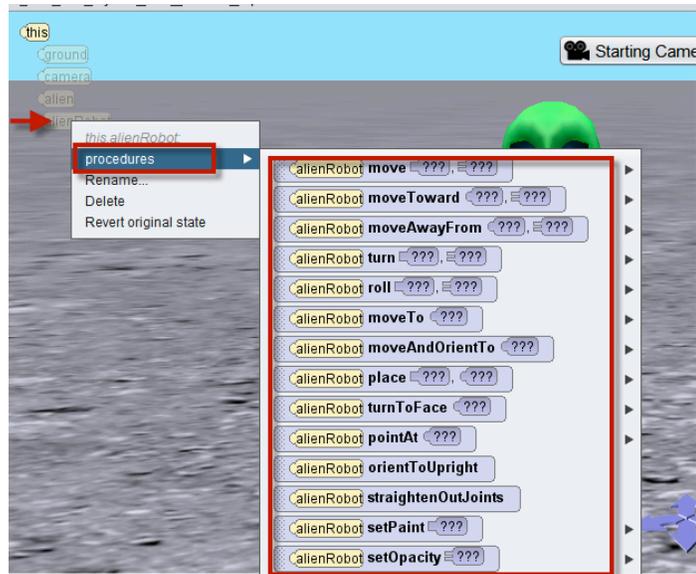


Figure 15.2 Opening one-shots menu by a right-click in the Objects tree

A second technique is to right-click on the object itself, as shown in Figure 15.3.

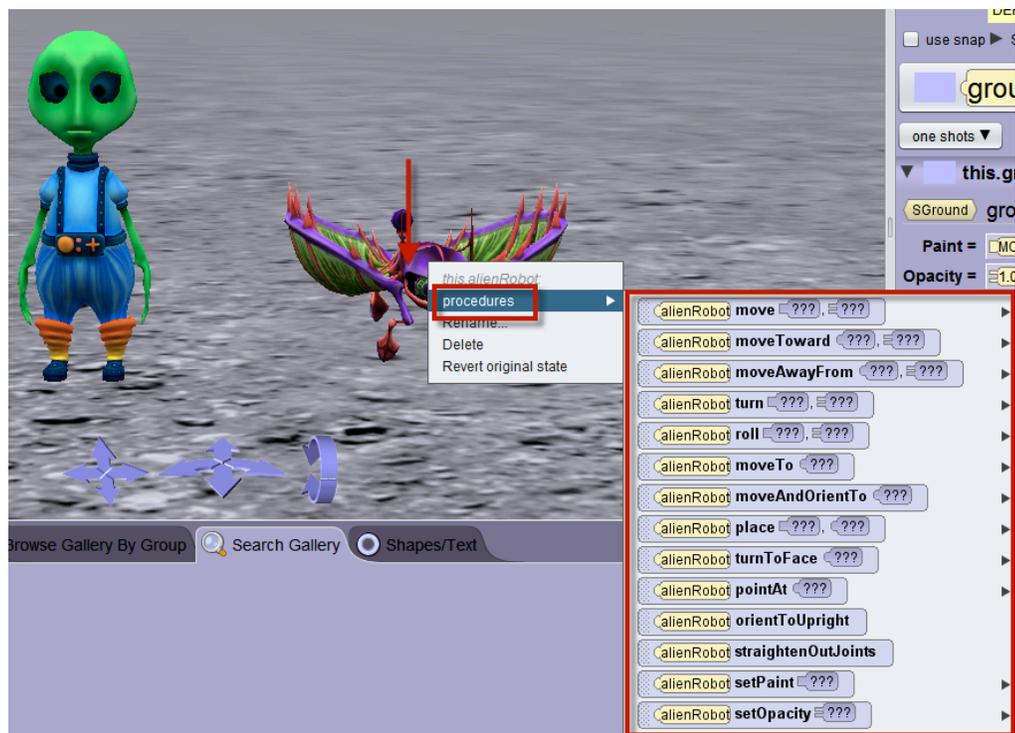


Figure 15.3 Opening the one-shots menu by right-clicking on the object

The third technique is to left-click on the pull-down menu button in the Setup, as shown in Figure 15.4. Notice that the pull-down menu cascades beyond the right of the Alice 3 window (the monitor's wallpaper can be seen in the background). On computer systems where the monitor is not wide enough, the menu will wrap to the left instead.

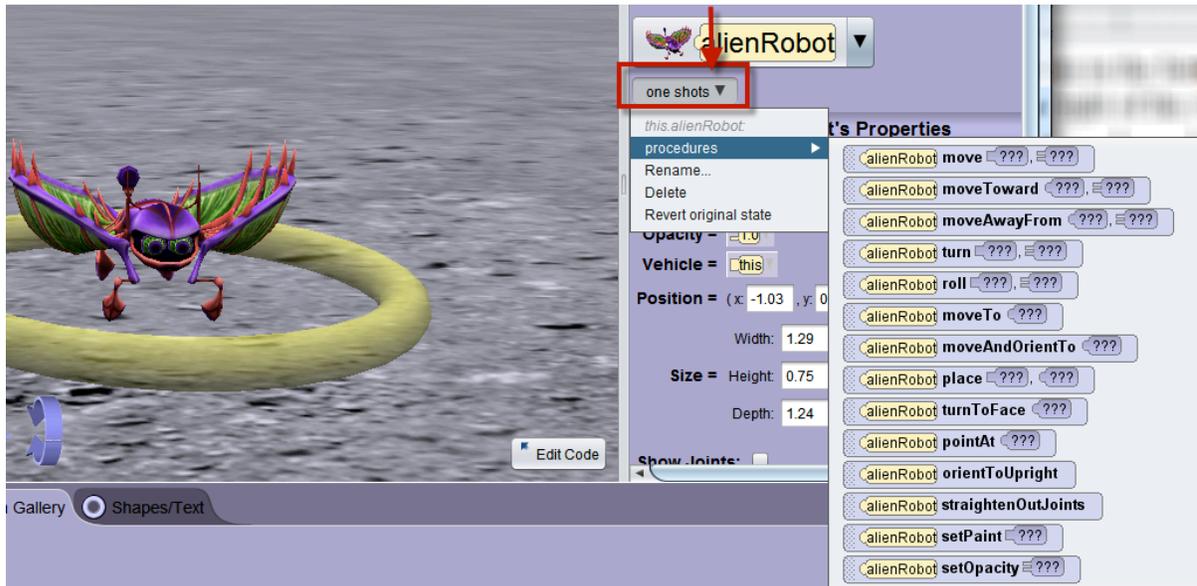


Figure 15.4 Opening the one-shots menu by clicking a button in Setup

As an illustration of using one-shots, let's walk through the steps of precisely positioning alien and the alienRobot exactly 2 meters apart. The first step is to position the two objects in the exact same location and orientation. Right click on the alien in the Object tree, select procedures, and then select the moveAndOrientTo tile as shown in Figure 15.5. In this example, we selected buddy as the target object.

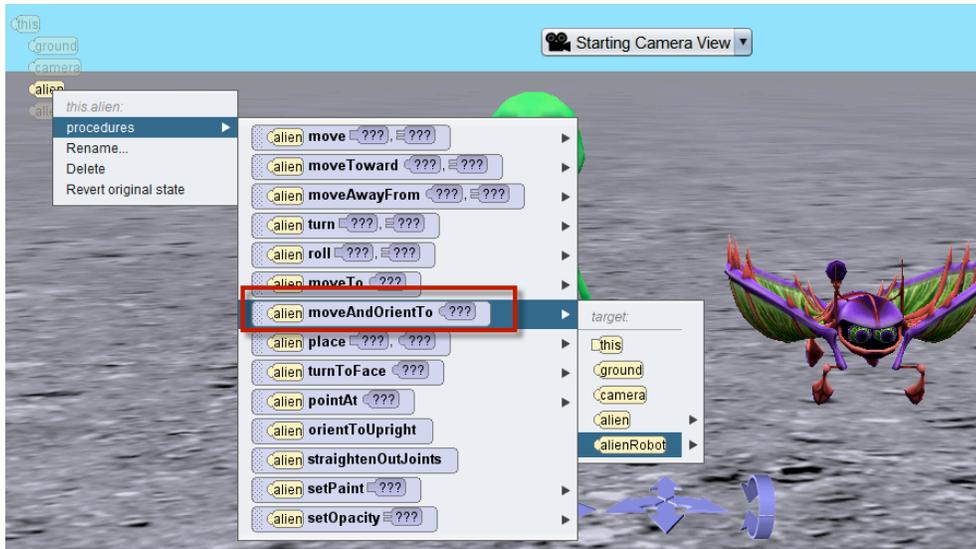


Figure 15.5 Select moveAndOrientTo

The alien will immediately move to the exact same location and orientation as the robot, as shown in Figure 15.6.



Figure 15.6 Two objects in same location and orientation

The second step is to select a one-shot to move the alien 2 meters to its right. In Figure 15.7, we right clicked on the alien tile in the Object tree, selected procedures, the *alien.move* tile, RIGHT as the direction, and 2.0 meters as the amount.

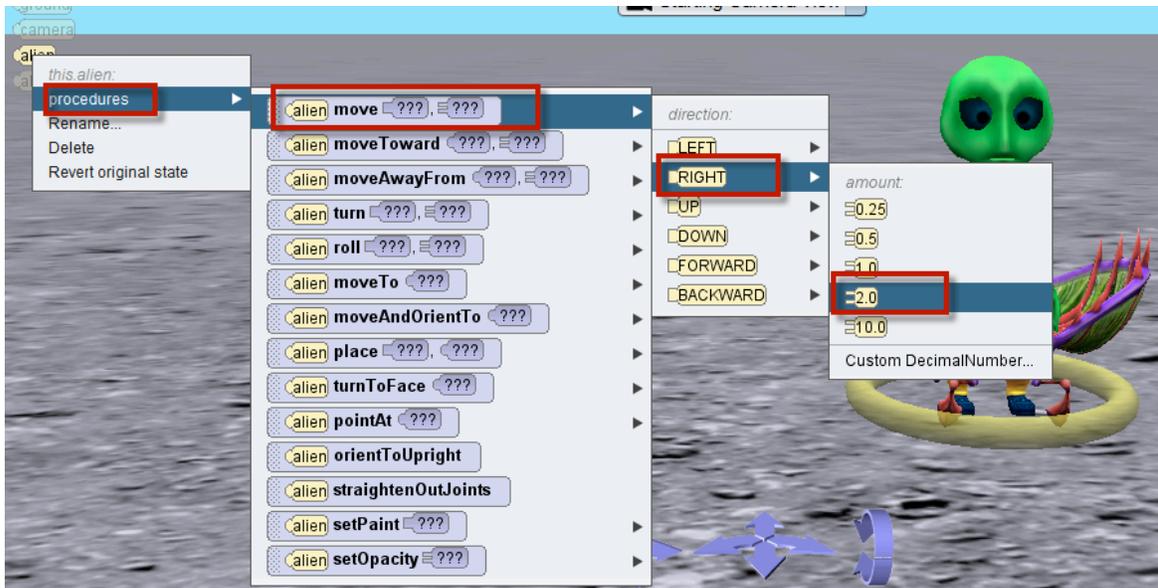


Figure 15.7 Positioning the alien exactly 2 meters from the robot

As seen in Figure 15.8, the alien and robot are now precisely 2.0 meters apart. It is important to note that the distance is measured as the shortest distance from the center of one object to the center of the other object. The center of an object is its pivot point as it moves, turns, and rolls in animations.

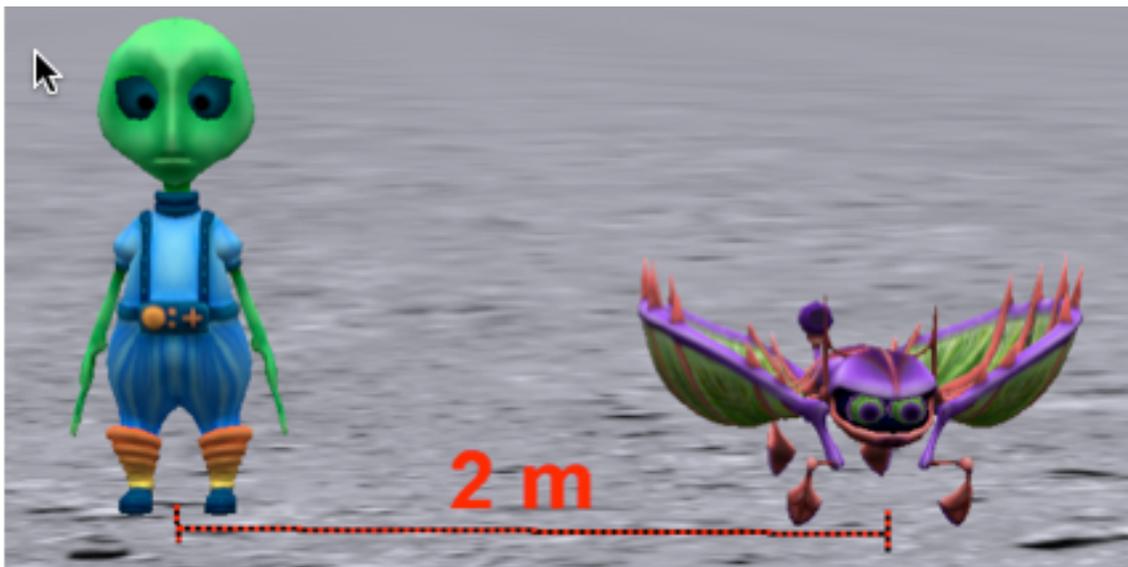


Figure 15.8 Distance is measured center to center

Using a one-shot for positioning an individual joint

[Video: Using One-shots for Positioning the Joint of an Object](#)

To illustrate using one-shots for positioning an individual joint, we selected the alien's right shoulder joint in the Setup, as shown in Figure 15.9.

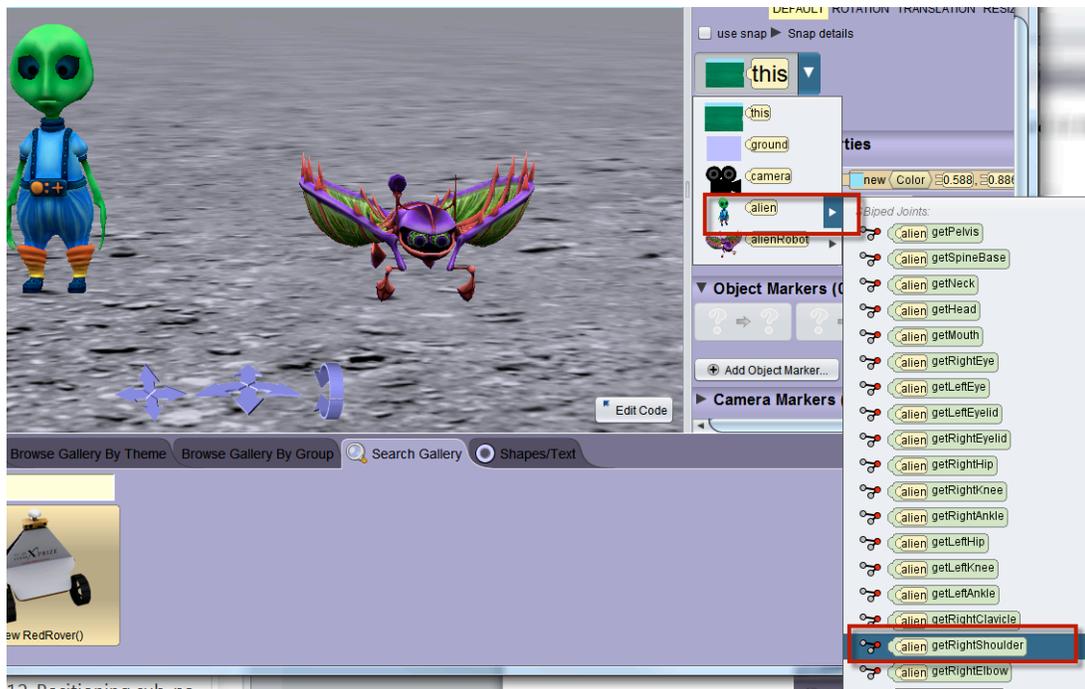


Figure 15.9 Select the alien's right shoulder joint

With an object's joint selected, the one-shots menu can be displayed by clicking the down-arrow immediately to the right of the selected joint name, as shown in Figure 15.10. Note that the one-shots menu for a joint has only five procedures. This is because an object's skeletal joints can be turned and rolled but cannot be "moved."



Figure 15.10 Opening one-shots menu for a skeletal joint

In this example, we selected a one-shot to turn the alien's right shoulder backward 0.125 revolutions, as shown in Figure 15.11.

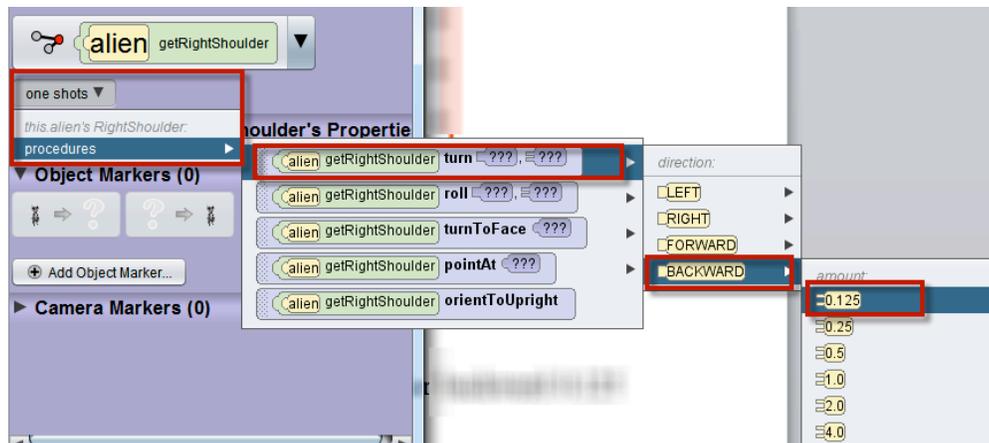


Figure 15.11 Turn the alien's right shoulder 0.125 revolutions backward

Turning, rolling, and orienting a skeletal joint has an effect on associated subparts of an object. Figure 15.12 shows the result of turning the right shoulder 0.125 revolutions (45 degrees).



Figure 15.12 Position of the alien's right arm after turning the right shoulder