

Building A Scene

Summary

This facilitation guide is intended to guide the instructor through the introduction of the Alice virtual world concepts and skills, provide exercise options for participants to apply the scene editing skills, and provide assessment and debriefing options for the end of the lesson. This should be one of the early lessons in any Alice curriculum. Scene building in Alice is a key step in the process of creating any animation or interactive project. This lesson can be offered as a stand-alone lesson in scene building, where the product of this lesson does not carry forward to the next lessons. It can also be used to kick off a longer project-based curriculum, where the scene built during this lesson is later used as a starting point for building upon in later lessons. On the [web page for this lesson](#), there are suggested exercises and projects. This lesson and supporting materials cover most of the Scene Editor functions, but not all. We selected a set that we thought would be a solid basis for upcoming lessons and scene customization. You can modify this lesson to be shorter by removing some of the later Scene Editor skills such as camera manipulation, or you can extend the lesson by adding in more advanced skills found on Alice.org, such as setting vehicle properties or scene properties.

Learning Objectives

Programming Objectives

- Understand the definition of a Virtual World

Alice Objectives

- Understand the components of an Alice scene
- Become familiar with the components of the Scene Editor
- Understand the definition of a 3D object in Alice
- Understand how to add an object to a scene
- Understand how to position and orient an object in a scene
- Understand how to manipulate subparts of an object
- Understand how to move the camera in a scene

- Understand the use of Camera Markers
- Know where to locate additional resources for the Scene Editor

Lesson Overview

- Introduction
- Lesson on the Alice Scene Editor
- Student Work Session
 - OR Step-by-Step Work Session
 - OR Guided Student Work Session
- Assessment
- Debrief / Students Share Work

Skills Overview

This project was developed for use with Alice 3. The following Alice 3 skills will be learned through the lesson and additional resources related to the skills can be accessed in the *How To* videos and the [tutorial exercise](#) for this lesson. *Optional educational activities can be incorporated based on their relevance to the required steps for the project.*

Alice Basics

Creating a New Scene

Switching Between the Editors

Saving a World

Object Manipulation

Adding Objects

Positioning Objects

Orienting Objects

Scaling Objects

Manipulating Sub Joints

Aligning Objects

Scene View Manipulation

Using Camera Controls

Changing Camera View

Using Camera Views

Using Camera Markers

Vocabulary

Programming and Modeling Terms

Class - The description or template that defines the behavior or functionality of objects of that class. In Alice, this means the class Alien defines how any alien object will look and behave.

Class Hierarchy - A programming taxonomy that defines the shared states and behaviors of other related classes that inherit them. In Alice, the class hierarchy is based on shared joint structures.

Joint - A point at which parts of a structure are joined. Joints in Alice are used to animate parts of the whole.

Orientation - The alignment of an object relative to its surroundings. In Alice, each object has its own orientation that determines the directions for move, turn and roll.

Pivot Point - The center point of a rotational system. In Alice, the pivot point defines where the objects will turn and roll around.

Scene - The highest level object in Alice that describes the environment and manages the other objects added to the scene. The Alice scene includes the ground texture, sky color, fog density and lighting.

Virtual World - A 3D simulated space where objects have height, width, and depth.

Alice Terms

Camera Controls - Arrows in the camera view that allow you to move the camera around the scene.

Camera Markers - Non-visible markers in the scene that can be used to easily move the camera to different locations in the scene.

Camera Viewpoint Menu - A drop down menu that allows you to view scene set-up views that are used for aligning objects in the scene. The supplied views are: top, left, front, scene set-up (isometric), and active camera view.

Gallery - The menu of all Alice classes that can be used to find and add objects to the scene.

Mouse Handles - The clickable representations that surround an object to aide you in manipulating the object. There are 4 different handle styles in Alice that help you move, turn, roll, and scale objects.

Object Tree - A list of all of the objects in the camera view that can be used to select objects.

One-shots - A menu that allows you to use program statements to manipulate objects in the Scene Editor.

Properties Panel - The interface for reviewing information about scene objects, including location, scale, color and other information that varies depending on the type of object.

Scene Editor - The interface in Alice where you build the virtual environment by adding objects to the scene.

Prep + Materials

Classroom Resources

Computer Access

Each participant should have his or her own computer for the duration of the project. It is also possible to allow pairs of students to work together at a shared computer.

Presentation + Lecturing

Ideally, you should be able to present the lesson slides in front of the class. Depending on your approach, you may also want to be able to show Alice and be able to demonstrate and guide the class through the exercise. You can also print and distribute these materials if needed.

Supporting Materials

You may want students to have access to the [How To videos](#) that accompany this lesson. This can be achieved by ensuring they have access to and can play videos on Alice.org. You may also wish to download, print, and distribute the accompanying Quick Reference

Guides associated with the *How To* videos. These materials can be downloaded in .doc format to combine several into one handout, or accessed as google docs to be shared with students or added to your personal drive and manipulated.

Software Requirements

This lesson requires each computer to have Alice 3 installed and accessible.

Time

The lesson is designed to take 45-90 minutes, depending on:

- The inclusion of the lesson presentation
- Time spent going over skills training
- Time spent on optional learning activities
- Complexity of exercises or projects assigned
- Time spent debriefing

Suggested Process

Introduction

Tell the students that they will be shown how to create a virtual 3D scene in the Alice development environment. Describe the class activity and discuss the skills they will acquire in the process. Optionally, you can show them a constructed Alice scene.

Virtual Environment and Alice Scene Editor Lesson (optional)

For this lesson, you can present the lesson materials in a couple different ways due to the inclusion of a lot of Alice skill components.

Option 1:

Run completely through the supplied presentation slides to give an overview of the editor, the concepts, and the skills. More detailed talking points are provided below for highlighting key concepts while giving the presentation.

Option 2:

Integrate application demos or the more in depth *How To* videos into the presentation at the relevant topic moments. The level of detail and time spent on the skill details may be

determined by how you plan to integrate the exercise component (see below), the accessibility of the supporting materials to the whole class, and the skill level of your students.

Exercise Facilitation

There are several options to allow the participants to explore the Scene Builder and apply the new skills. Here are some options, from open exploration to most guided:

Option 1 (Open Student Work Session)

With groups that do well independently, you may choose to have them build a scene of their own design. Note that the Scene Building tutorial provides the most scaffolding for students that may need that level of support and direction. Additionally, you might want to provide access to the Building A Scene *How To* videos to provide additional support.

Option 2 (Guided Work Session – Independent)

For slightly more structure, you may decide you want to assign the students the Scene Building tutorial exercise and let them work through the whole exercise at their own pace. The Scene Building tutorial provides step-by-step directions that guide participants through building a scene. The tutorial also points them to the correlating *How To* videos at the appropriate points for students that may need some support. This exercise guarantees that they will explore all the different methods that can be used for each skill in the process of completing the exercise. You can point the students to the web page for the tutorial or print out the associated directions.

Option 3 (Guided Work Session – Instructor Led)

For the most structure, you may want to guide the students through the Scene Building tutorial exercise. The Scene Building tutorial provides step-by-step directions that guide participants through building a scene. Guiding the students through the tutorial, you will break the session into smaller modules. Each module includes an in-depth demonstration of each skill, before having the participants apply newly acquired skills in the activity. This format also provides more break points to check students' level of understanding. There is a detailed step-by-step guide provided below. You can approach this in two ways:

- Play the more general *How To* videos and then allow participants to follow the step-by-step directions for the module.
- Demonstrate the exact steps from the tutorial to the class and then have them complete the demonstrated steps.

A guided facilitation guide is provided below with more details and supporting talking points. The session would follow this basic flow:

Module 1: Setting Up the Scene

Steps 1-5. Get everyone to open Alice, select a scene template, and navigate to the Scene Editor.

Module 2: Adding Objects

Steps 6-7. Add objects from the Gallery. Ensure everyone has successfully used the different methods to add objects in the scene.

Module 3: Positioning Objects

Steps 8-10. Position objects in the scene using handles, x, y, z position coordinates, and hot-keys. Ensure everyone has successfully positioned objects in their scene.

Module 4: Orienting Objects

Steps 11-13. Turn the objects in the scene using handles and one-shot procedures. Ensure everyone has successfully positioned objects in their scene.

Module 5: Using Camera Controls

Steps 14-15. Operate camera. Optional: Set a camera marker for the camera viewpoint. Ensure everyone has successfully positioned the camera.

Module 6: Aligning Objects

Steps 16-21. Position the objects in the scene using handles, one-shots, and the camera viewpoints menu. Ensure everyone has successfully aligned objects in the scene.

Module 7: Manipulating Sub Joints

Steps 22-24. Manipulate the joints and subparts of an object and use one-shots. Ensure everyone has successfully manipulated subjoints.

Assessment (Optional)

You can use the supplied bank of assessment questions, challenges, and exercises to quiz your students on the retention of their new skills. These materials are provided in a separate document that can be downloaded from the webpage associated with this guide. A word document has been provided to allow you to customize as needed.

Class Regroup + Summary

We recommend regrouping as a class to discuss challenges and successes, and to offer feedback, both among the participants and about the curriculum itself. There are provided reflection questions found below.

Standards and Integration

Standards mapping is under development check back for updates.

Lesson Material Talking Points

These talking points are designed as a resource to use with the Building A Scene presentation slides.

One: The Alice Virtual World

Slide 3 A 3D Virtual Environment

- What is a virtual environment? Basic elements of an Alice scene.
- Learning to program in Alice means you are going to create 3D (three-dimensional) worlds. Three dimensions (3D) means that these worlds and objects in the world will have a *height*, *width*, and *depth*.
- The environments created for games, animations, and simulations created in 3D are called virtual environments because they allow the user to believe that they are present in that environment. This *presence* allows them to experience and interact with the different objects that make up that world.

Slide 4 Core Components of an Alice Scene

- In Alice, the 3D environment you build is called a scene, and every scene begins with a ground surface (or *texture*) and camera. The camera can be manipulated to provide different points of view in the scene.
- Other objects (characters, scenery, and props) will be added to the scene to create the animation.
- In Alice, a scene also has properties that allow you to change the atmosphere of the scene by adjusting the sky color, lightning, and fog.

Two: The Alice Scene Editor

Creating the starting scene. Opening the Scene Editor. Basic elements of the Scene Editor.

Slide 6 Scene Templates

- When Alice starts, or File -> New is selected, Alice presents this Dialog Box that allows you to select a scene template.
- You can choose a Blank Slate or a Starter World. OR you can choose a scene you have already created under My Projects.

Slide 7 Scene Editor Access

- Alice has two editors, the Code Editor, and the Scene Editor.
- Alice will always open to the Code Editor when starting or opening a project.
- The Setup Scene button opens the Alice Scene Editor.
- In the Scene Editor, there is a button, Edit Code, that will bring you back to the Code Editor.

Slide 8 Scene Editor Overview

The Scene Editor has three main panels:

- The **Camera View** will display the scene as it is being built. It contains the camera controls and camera view menu to allow different perspectives of the scene as it is being built. The objects you add to the scene can be manipulated directly in this window.
- The **Properties Panel** provides options for:
 - Changing settings for the camera window
 - Selecting objects and changing their positioning, size, color, etc.
 - Adding and manipulating unique camera and object markers
- The **Gallery** contains collections of 3D models that can be used to build a scene.

Three: An Alice 3D Object

Organizing classes of objects in the Gallery

Slide 10 Virtual Representations

- Alice objects are 3D representations of a range of real world objects and characters.

Slide 11 Move, Turn, and Roll

- All Alice objects have a *location*, which is defined by their *orientation*, and their *position* in the environment.
- All Alice objects are self-centric – in other words, when they move, turn, or roll in a direction, it is based on their orientation, not the viewpoint of the camera or the user.
- *Orientation* means that every object has its own sense of up, down, left, right, forward and backward.
- Typically, when Alice objects move, their position changes, but not their orientation.
- Typically, when Alice objects turn or roll, their orientation changes, but not their position.

Slide 12 Pivot Points

- Every object has a pivot point around which it turns and rotates.
- For most objects the pivot point is at the center of where the object intersects with the ground.
- Bipedes turn and roll around a point in the center of their body located at their feet. It makes sense that they would lean forward and backward with their whole body.
- A bird or fish will turn and roll around the center of their body because when they move they generally change direction around their center mass.

Slide 13 Internal Joints

- Objects usually (not always) have internal joints or skeletons that control subparts of the model.

- A joint connects the subpart of the body to the rest of the body.
- Joints have a different orientation than the whole object, which determines how roll and turn will control them.
- The white axis points forward, red to the right, green up, blue backward.

Slide 14 The Gallery

- All the objects that can be used in Alice are found in the Gallery.
 - All objects that are going to be used in a program must be added to the Scene Editor (even if they are hidden in some way) before the program is running. It is not possible to add objects while a program is running.
- The Gallery has several different tabs that will allow you to access the models by class hierarchy, by theme, or group.
- There is a tab for searching the Gallery.
- There are also tabs for shapes and other classes that students have modified or wish to import.

Slide 15 What is a Class

- In Alice, a class is a plan for constructing a new object in an Alice scene (how it looks) and the actions that an object of that class can perform (what it can do).
- It is possible to have more than one object from a class in the scene.

Slide 16 Class Hierarchy

- Alice classes are organized by how they move around (or do not move).
- *Bipeds* walk on two legs, *Quadrupeds* walk on 4 legs, *Swimmers* swim, *Flyers* fly, *Transports* are different types of vehicles, *Props* traditionally do not move.
- There may be sub-classes or categories; i.e. *Swimmers* can be either *Fish* or *Marine Mammals* – they both swim, but they differ in how they swim.

Four: Adding Objects in Alice

Slide 18 Adding Objects

- It is also possible to copy an object in a scene to create a duplicate by using *alt+mouse click+drag* for Windows (control+mouse click+drag for Mac OS X) on an object in the scene.

Slide 19 Naming Objects

- The dialog box will appear whenever an object is double clicked or dragged into the scene.
- Predefined names are suggestions by Alice.
- Multiple objects of the same class will be differentiated by numbers at the end of the name (for example *queenOfHearts*, *queenOfHearts2*, *queenOfHearts3*, etc.) unless the user provides more useful names, which we would suggest.
- Rule #2, *camelCase*, is not a rule of the Alice language. *camelCase* is the convention of writing compound words or phrases with no spaces and an initial

lowercase letter, with each remaining word element beginning with an uppercase letter.

Slide 20 (Selected Object)

- Whenever an object is added to the scene, the name of that object appears in the object tree. It will generally be the selected object in the scene as shown by the default handle ring which surrounds it in the scene.
- It will also be the selected object in the object menu, and its properties will be displayed in the properties panel.

Slide 21 (Selected Object Properties)

- In the object panel, the selected objects x, y, z coordinate location will be displayed, as well as its size values.
- The object position can be changed by manipulating the x (right – left of the object), y (up and down of the object), and z (forward – backward) values.
- The object size can be changed, almost always proportionally, by changing the width, height, and depth (front to back) values.

Five: Positioning An Object

Slide 23 Position with Mouse

- For more details on these options, see the How To videos on *Positioning Objects*, *Rotating Objects*, and *Resizing Objects*.

Slide 24 Position with Coordinates

- Clicking and dragging in a 3D environment can be deceiving, particularly when trying to align objects. Using coordinates allows the object to be positioned at a specific location.
- The coordinate axes are based on the orientation of the scene (ground). For example, when the camera is looking directly at the center of the ground, the coordinates are (0, 0, 0).
- Positive x is to the left as seen by the camera, and negative x is to the right as seen by the camera.
- Positive y is up as seen by the camera, and negative y is down as seen by the camera.
- Positive z is away from the camera, and negative z is toward the camera.

Slide 25 Position with One Shots

- Selecting a procedure from the one-shots menu gives the user more control in setting up the environment.
- It allows the user to set up the relative positions and distances of one object to another when creating animations (to avoid collisions, for example).

Slide 26 Manipulate Object Subparts

- For more details on these options, see the How To [videos](#) on *Manipulating Object Joints*.

Six: The Alice Camera

Slide 28 Camera Overview

- There is only one scene camera used in Alice.
- Different camera views are obtained by moving the camera around the scene, not by changing to a different camera.
- The camera controllers move and turn the camera.

Slide 29 Camera Controls

- Clicking and holding an arrow will manipulate the location of the camera.
- Clicking and dragging in the direction of the arrow will speed up the camera movement.
- Clicking and dragging in between two arrows will combine the camera manipulations.
- For more information on Camera Controllers, see the videos on *Using Camera Controls to Change Camera Views*.

Slide 30 What is a Camera Marker

- It is a good idea to set up a camera marker for the initial camera position when starting to set up a scene. Students will often move the camera around as they are setting up the scene and may get “lost” in the 3D virtual world. This marker serves as a point of reference when this occurs.
- Markers are also useful for providing more interesting animations with multiple markers providing different viewpoints in the scene.
- For more information on Camera Markers, see the video, *Setting Up and Using Camera Markers*.

Slide 31-32 Scene Building Viewpoints

- Clicking and dragging in a 3D environment can be deceiving, particularly when trying to align objects. The Camera View menu is another tool to allow an object to be aligned with other objects.
- Only the Starting Camera View viewpoint is accessible in the Code Editor.
- For more information on Camera View Menu, see the video, *Changing and Using Different Camera Views*.

Slide 33 Four Scene Editor Views

- There are camera controllers for each viewpoint.
- It is also possible to click and drag objects around in the other scene views.
- The camera (and markers) may also be visible in these different views. Moving the camera object will change the starting camera position.

Seven: Tips and Tricks

Slide 34 Save Often

- Emphasize the importance of frequently saving projects, using a versioning naming system.
- Projects can become corrupt while students are working on them, for a wide variety of factors. Students will not have to restart a program from the beginning if they have earlier versions of the project saved.

Slides 35 Undo / Redo

- Useful Keyboard commands:
 - Windows: Control+Z, Control+Y
 - Mac OS X: Command+Z, Command+Y

Slide 36 Return to Default Handle Style

- Beginner Alice users often forget to return to the default handle style when they go to work on another object.

Slide 37 Object Manipulation Hotkeys

- When using the mouse to manipulate objects in the scene editor you can:
 - Hold down shift and drag the mouse to move the object vertically (up and down)
 - Hold down ctrl (windows) or option (mac) and drag the mouse to turn the object.

Slide 38 Shape Objects and Billboards

- Shapes can be used to create generic objects
Billboards can have image textures added to them and they can be used for backgrounds or directions.
3D text can be manipulated through code for dynamic text

Exercise Facilitation Step-by-Step

These step-by-step directions are for the Guided Work Session Option 1 that uses the Scene Building tutorial as a basis for the hands-on experience for the session. These steps can be followed in addition to having first gone through the whole slideshow lesson.

Module 1: Setting up the Scene

Goal – Complete Steps 1-5 of [Tutorial Exercise](#)

Students will be able to open Alice, select a template, save a project, navigate to the scene editor, and set up a starting camera marker.

Media

- Play the *How To: Scene Editor Overview*.
 - OR Demonstrate selecting a template and navigating to the Scene Editor.
- Play the *How To: Using Camera Markers*.
 - OR Demonstrate setting up a camera marker.

Talking Points

- A scene is created in Alice by selecting a template, either a Blank Slate or a Starter World from the Select Template Dialog box.
- Be sure to save your project early so that if something happens you can always go back to the most recent save or autosave.
- Setting up a camera marker at the beginning of your project will allow you to easily return to the starting view if you move the camera around to help set up your world.

Module 2: Adding an Object to the Scene

Goal – Complete Steps 6-7 of [Tutorial Exercise](#)

Students will be able to add an object to the scene.

Media

- Play the *How To: Adding Objects*.
 - OR
- Demonstrate opening and adding an object from the Gallery.

Talking Points

- An object can be dragged and placed in the scene from the Gallery.
- OR click on the thumbnail image, and the object will be added to a predefined location in the scene (0,0,0).
- A dialog box to name the object will appear when the thumbnail image is clicked or dragged into the scene.
- Predefined names are suggestions by Alice.
 - Multiple objects of the same class will be differentiated by numbers at the end of the name (for example queenOfHearts, queenOfHearts2, queenOfHearts3, etc.) unless the user provides more useful names, which we would suggest.
 - camelCase, is not a rule of the Alice language. camelCase is the convention of writing compound words or phrases with no spaces and an initial lowercase or uppercase letter, with each remaining word element beginning with an uppercase letter.
- Whenever an object is added to the scene, the name of that object appears in the object tree.
 - It will generally be the active object in the scene, as shown by the default handle ring which surrounds it in the scene.
 - It will be the selected object in the object menu.
 - Its properties will be displayed in the properties panel.
- In the object panel, the selected object's x, y, z coordinate location in the scene will be displayed, as well as its size values.

Module 3: Positioning an Object in the Scene

Goal - Complete Steps 8-10 of Tutorial Exercise

Students will be able to move and change the orientation of an object in a scene by using the mouse handles, (x, y, z) coordinates, and one-shots.

Media

- Play the *How To: Positioning Objects*
OR
- Demonstrate the different techniques for moving and turning an object in the scene.

Talking Points

- Alice 3 provides mouse handles for repositioning and reorienting objects in a scene
 - In the Properties Panel, the Default handle style can be used for changing an object's position or turning the object horizontally.
 - The Translation handle style can be used for changing an object's position
 - In the Properties Panel the Default and Translation handle styles can be used for changing an object's position
 - The Rotation handle style can be used for changing an object's orientation
- Using the Position x, y, z coordinates in the Properties Panel supports more precise positioning and alignment of objects
 - Clicking and dragging in a 3D environment can be deceiving, particularly when trying to align objects.
 - Understand that the coordinate axis is based on orientation of the scene (ground).
 - If the camera is looking directly at the center of the ground (0, 0, 0):
 - Positive x is to the left as seen by the camera, and negative x is to the right as seen by the camera.
 - Positive y is up as seen by the camera, and negative y is down as seen by the camera,
 - Positive z is away from the camera, and negative z is toward the camera.
- Using the one-shots menu also supports more precise positioning and alignment of objects
 - Select object name from object menu
 - Select procedures from one-shot menu

Module 4: Orienting an Object in the Scene

Goal - Complete Steps 11-13 of Tutorial Exercise

Students will be able to reorient objects by using turn and roll handles and one shot procedures.

Media

- Play the *How To: Rotating Objects*
OR
- Demonstrate the different techniques for turning an object in the scene.

Talking Points

- All Alice objects have an orientation (forward, backward, left, right, up, down)
 - When they move, turn, or roll in a direction, it is based on their orientation, not the viewpoint of the camera or the user.
- Every object has a pivot point (around which it moves and rotates).
 - The pivot point of an object is usually where it stands on the ground
- Moving an object in Alice means changing its position in the scene
 - Moving objects typically does not change the orientation of an object
- Turning and rolling an object in Alice means changing its orientation in the scene
 - Turning or rolling objects typically does not change the position of an object

Module 5: Camera Controls

Goal - Complete Steps 14-15 of Tutorial Exercise

Students will be able to use the camera controls to set the location or point of view of the camera when setting up a scene.

Media

- Play the *How To: Moving The Camera* and *How To: Using Camera Markers*sws.
OR
- Demonstrate the different techniques for positioning a camera in the scene.

Talking Points

- Alice is a single-camera system
- At the bottom center of the Scene Editor view are three camera controllers.
 - The most common use of these controllers is to set the camera's point of view.
- Clicking and holding an arrow will manipulate the location of the camera appropriately.
 - Clicking and dragging in the direction of the arrow will speed up the camera movement.
 - Clicking and dragging in between two arrows will combine the camera manipulations.
- The left-hand controller moves the camera up, down, left or right using the camera's point of view.
 - Changes the position of the camera in the scene, but not its orientation

- The middle arrow controller allows you to turn the camera left or right or move the camera forward or backwards.
 - The turn right or left controls change the orientation of the camera in the scene, but not the position of the camera.
- The right controller turns the camera forward or backward.
 - Again, this changes the orientation of the camera in the scene, but not its position.
- The Camera Marker section of the Properties Panel creates reference points for camera viewpoints when the camera is moved around in the scene.
 - Click on Add Camera Marker button to add a marker at the current position of the camera.
 -  button returns the camera to the marker
 -  button repositions the marker to the current camera position

Module 6: Aligning an Object in a Scene

Goal - Complete Steps 16-21 of Tutorial Exercise

Students will be able to use handles, coordinates, one-shots, and the camera view menu for better alignment of objects in a scene.

Media

- Play the *How To: Using Camera Views*
OR
- Demonstrate the different techniques for turning an object in the scene.

Talking Points

- Alice is a virtual 3D environment, and it may seem that objects are in alignment (left to right, front to back, bottom and top), when in fact they are not aligned at all.
- Camera view drop-down menu at the top of the Scene View Panel provides different viewpoints for the Scene Editor.
 - The Starting Camera View represents the camera viewpoint that will be used when running the program.

- The Layout Scene View attempts to give a view of the scene with a better perspective of the objects in the scene and their relationship to each other.
- The TOP view presents an overhead view of the scene.
- The SIDE view presents a camera viewpoint that faces the center point of the ground, from the ground's right side.
- The FRONT view the camera viewpoint faces the center point of the ground, from the ground's front.
- Appropriate camera controls are available in each of the viewpoints, allowing the view to be modified as needed.
 - Changing the camera position in each viewpoint has no effect on the starting camera view settings.
 - While viewing the scene from the other camera views you can still manipulate objects as you could from the starting camera view
 - When using the other viewpoints, the starting scene camera is visible as an object in the scene.
 - *It is now possible to move the starting camera similarly to any other object in Alice. Be careful not to do so by accident.*

Module 7: Working with Object Joints and SubParts

Goal - Complete Steps 22-24 of Tutorial Exercise

Students will be able to change the orientation of an object's joints and subparts in a scene by using the mouse handles and one-shots

Media

- Play the *How To: Manipulating Object Joints*
- OR
- Demonstrate the different techniques for manipulating an objects joints and subparts.

Talking Points

- A 3D model class defines objects having an internal skeletal system consisting of joints.
 - These joints are connected to one another by the subparts (for example an object's head, arms, and legs)s
 - Therefore, a sub-part of an object is positioned and moved by rotating the joints of the skeletal system.

- The joints of objects have their own orientation, and they will move, turn and roll based on that orientation.
 - The joint acts as its pivot point for rotation of the subpart.
 - Two kinds of rotational motion:
 - Turn: forward, backward, left, right
 - Roll: left, right
 - It is possible to move a joint,
 - Does not disconnect the subpart from the object
 - Causes a distortion (which might be interesting)
 - The orientation of a joint will often not have the same orientation as the object.
 - The limb of an object (a leg, for example) often contains numerous joints, which will have the same orientation.
- Sub-parts of an object can be positioned in the Scene Editor by selecting the appropriate joint from the Object menu.
 - Select the object in the Object Menu
 - Pull the mouse cursor over the right arrow to open a cascading menu of joints.
 - Alice automatically displays the rotation handles around the selected joint.
- It is also possible to use the one-shots menu to manipulate the joints of an object

Reflection Questions

These questions can be used to discuss the experience and think about what was learned in this lesson.

What do you think a virtual world is?

How would you describe the experience of building a 3D scene?

What was easy or difficult about setting up a scene?

What tools were your favorite for manipulating the objects?

What is the difference between move, turn, and roll?

Congratulations! You have completed Lesson 01: Building A Scene.