The Alice Scene Editor

(http://www.alice.org/resources/lessons/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. It 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 using a broad range of supplied exercises and projects around scene building. 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 them in later lessons. Look for specific exercises and projects that are designed to be used in this way. 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 extend the lesson by adding in more advanced skills found on Alice.org such as setting vehicle properties or scene properties.

Learning Objectives

- What is a virtual world / scene in Alice?
- What is a 3D object in Alice?
- Scene Editor Overview
- How to Add an Object to a Scene
- How to Position an Object in a Scene
- How to Orient an Object in a Scene
- How to Orient the Subparts of an Object
- How to Move the Camera in a Scene
Where to find additional resources for the scene editor and scene setup

**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 for them are linked to in the How to Resources section of the associated webpage for this guide and also linked to in the tutorial exercise again linked to on the webpage associated with this guide. 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 an Object to a Scene
Positioning an Object
Turning Objects
Scaling Objects
Manipulating Sub Joints (Object Parts)

Scene View Manipulation
Using the Camera Controls
Change the Camera View
Using Camera Views

**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 ppt 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... resources that accompany this lesson and are linked to on the webpage associated with this guide. This can be achieved by insuring they have access to the Alice.org website and can play the videos or by downloading and making the videos accessible in another way. You may also wish to download, print, and distribute the accompanying How To... quick reference guides that can be found on the relevant How to webpage. These materials can be downloaded in .doc format to combine several into one hand out.

**Software Requirements**
This lesson requires each computer to have Alice 3 installed and available.

**Time**
The lesson is designed to take 45m-90m, depending on:

- The inclusion of the lesson presentation
- Time spent on 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 skills components in this lesson.

**Option 1**
Run completely through the supplied power point slides to give an overview of the editor, the concepts, and the skills lessons. 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 skills details may be determined by how you plan to integrate the exercise component (see below), accessibility of the supporting materials to the whole class, and the skill level of your students.

**Exercise Facilitation**
There are several options for how to allow the participants to explore the scene builder and apply the new skills.

**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, assign them one (or several) of the provided challenge exercises (linked on website page associated with this lesson), or allow them to select an exercise or project from the list...
provided. Note that the guided tutorial exercise (Scene Building Tutorial) provides the most scaffolding for students that may need that level of support and direction. Additionally, you might want to provide them with access to the scene editor How To… materials to support them.

Option 2 (Guided Work Session – Directions)
For more structure, you may decide you want to assign the students the tutorial exercise for this lesson. The tutorial exercise provides step-by-step directions for guiding the participants through building a scene that points them to the correlating How To… materials at the appropriate points. This exercise also 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 exercise or print out the associated directions.

Option 3 (Guided Work Session – Instructor Led)
For the most structured and supported format, you may break the session up into smaller segments or Modules. Each module includes demonstrating more in depth each skill before having the participants apply them through the activity. This format also provides more break points to check in with participants. Detailed step-by-step guide provided below. You can approach this in two ways

- Play the more general How To… videos or demonstrate the skills and then allow participants to then follow the step-by-step directions for the module,
- Or demonstrate the exact steps from the exercise to the class and then have them do the step demonstrated.

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

**Module 1: Getting Started**
Step 1-3. Get everyone to open Alice, select a Scene template, and navigate to the scene editor.
Module 2: Adding an Object to the Scene
Step 4-5. Add objects from the Gallery. Ensure everyone has successfully used the different methods to add objects in the scene.

Module 3: Positioning an Object in the Scene
Step 6-11. 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 an Object in the Scene
Step 6-11. Turn the objects in the Scene using handles and one-shot procedures. Ensure everyone has successfully positioned objects in their scene.

Module 5: Camera Controls

Module 6: Aligning an Object in the Scene
Step 14-19. 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: Working with Object Joints and SubParts
Step 20-22. Manipulating the joints and subparts of an object and using 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

Interim 2016 CSTA K-12 CS Standards

Algorithms and Programs - 1B-A-2-1:
Apply collaboration strategies to support problem solving within the design cycle of a program

Algorithms and Programs - 2-A-2-1:
Solicit and integrate peer feedback as appropriate to develop or refine a program

K-12 Framework Integration
Lesson Material Talking Points

The Alice Virtual Environment
What is a virtual environment? Basic elements of an Alice scene.

Slide 3 The Alice Virtual Environment
- 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 worlds will have a **height**, a **width**, and a **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 Components of a Scene
- In Alice the 3D environment you build is called a Scene, and every Scene in Alice 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 including sky color, lighting and fog

Getting Started Loading Your Scene
Creating the starting scene. Opening the Scene Editor. Basic elements of the Scene Editor.

Slide 6 You can start your scene by choosing
- When Alice starts, or File -> New is selected, Alice presents this Dialog Box that allows you to select
- Besides Blank Slates and Starer Worlds, there are other tabs for opening worlds that have already been created.

Slide 7 Toggle to Scene Editor
- 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 Gallery contains collections of 3D models that can be used to build a scene.
- The Properties Panel provides buttons for changing settings for the camera window, selecting objects and changing their positioning, size, color, and other properties, and for adding and manipulating unique camera and object markers

What is an Object?
Classes and Objects. How Alice uses the Gallery to organize the classes that can be used in a virtual environment

**Slide 10 What is an Alice 3D object**
- Alice objects are 3D representation of a range of real world objects and characters

**Slide 11 Object Orientation**
- 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 Point**
- This pivot point marks the position of an Alice object in an environment
- This can be seen by the x, y, z coordinates in the Position section of the Properties Panel

**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 by group.
- There is a tab for searching the Gallery.
• There are also tabs for special classes of models such as shapes, and for classes that students have modified or wish to import.

_Slide 15 What is a Class_
• In Alice a class defines a plan for constructing a new object in an Alice scene and the actions that an object of that class can perform
• 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 (or do not move) around
• Bipeds walk on two legs, Quadrupeds walk on 4 legs, Swimmers swim, Flyers fly, Transport 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

Adding Objects in Alice

_Slide 18 Add an Object to a Scene_
• 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 Name the Object_
• The dialog box will appear whether 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.
• 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 in the scene will be displayed, as well as its size values.
• The objects 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,
• its size can be changed, almost always proportionally, by changing the width, height, and depth (front to back) values.

Positioning An Object in the Scene

Slide 23 Position with Mouse
• For more details on these options, see the videos on Positioning Objects, Turning Objects, and Scaling Objects.

Slide 24 Positioning with Coordinates
• Clicking and dragging in a 3D environment can be deceiving, particularly when trying to align objects. Using coordinates allow the object to be positioned at a specific location.
• Understand that the coordinate axes is based on orientation of the Scene (ground).
• If the camera is looking directly at the center of the ground (0, 0, 0) in other words,
• 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 Positioning 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 Manipulating Object Subparts
• For more details on these options, see the videos on Manipulating SubJoints (Object Parts)

The Alice Camera Controls

Slide 28 Camera Overview
• There is only one scene camera used in Alice
• Different camera views are obtained not by changing to a different camera but by moving the one camera around the scene
• The Camera controllers move and turn the camera

Slide 29 Camera Controls
• 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.
• 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 Alternative 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 Views
- There are camera controllers for each viewpoint.
- It is also possible to click and drag objects around in the scene view.
- The camera (and markers) may also be visible in these different views, and it can also be moved in the scene. Do this cautiously as it is the Starting Camera View

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

Slides 35 Undo / Redo
- Keyboard command also works
- Windows: Control+Z, Control+Y
- Mac OS X: Command+Z, Command+Y

Slide 36 Return to Default Handle Style
- This is a common error for beginning Alice users, to select and use a handle style for one object, and forget to return to the default handle style when they go to work with another object.
Exercise Facilitation Step-by-Step

These step-by-step directions are for the guided facilitation option 3 that uses the Scene Editor Tutorial as a basis for the hands-on experience for the session. They can be followed in addition to having first gone through the whole ppt lesson.

Module 1: Setting up the Scene

Goal – Complete Steps 1-3 of Tutorial Exercise
Students will be able to open Alice, select a template, and navigate to the scene editor.

Media
- Play the video: Scene Editor Overview
- OR Demonstrate selecting a template and navigating to the Scene Editor

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.

Module 2: Adding an Object to the Scene

Goal – Complete Steps 4-5 of Tutorial Exercise
Students will be able to add an object to the Scene

Media
- Play the video: Adding an Object
- 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.
- A dialog box to name the object will appear whether 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.

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 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, and that
  - it will be the selected object in the object menu, and
  - its properties will be displayed in the properties panel.
- In the object panel, the selected objects 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 6-8 of Tutorial Exercise

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

Media

- Play the video: Moving Objects in the Scene Editor
- OR Demonstrate the different techniques for moving and turning an object in the Scene

Talking Points

- Alice 3 provides mouse handles for the repositioning and reorienting objects in a scene
  - In the Properties Panel the Default handle style can be used for changing an objects position or turn the object horizontally
  - The Translation handle style can be used for changing an objects position
  - In the Properties Panel the Default and Translation handle styles can be used for changing an objects 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
  o Clicking and dragging in a 3D environment can be deceiving, particularly when trying to align objects.
  o Understand that the coordinate axis is based on orientation of the Scene (ground).
  o 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
  o Select object name from object menu
  o Select procedures from one-shot menu

Module 4: Orienting an Object in the Scene

Goal - Complete Steps 9-11 of Tutorial Exercise

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

Media
• Play the video: Turning Objects in the Scene Editor
• 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)
  o 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).
  o 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 do 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 12-13 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 video: Using Camera Controls to Change Camera Views
- 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
- [Marker] button returns the camera to the marker
- [Marker] button repositions the marker to the current camera position

Module 6: Aligning an Object in a Scene

Goal - Complete Steps 14-19 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 video: Changing and Using Different 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.
Module 7: Working with Object Joints and SubParts
Goal - Complete Steps 20-22 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 video: Manipulating SubJoints (Object Parts)
- 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.)
  - 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