

Getting Started with Java Using Alice

Use Keyboard Controls

Objectives

This lesson covers the following objectives:

- Use keyboard controls to manipulate an animation

Event Handling

When an animation is playing, a computer program is running. Many computer programs request user interaction. These interactive programs allow a user to influence the order of actions that occur in the program.

To program this type of interactivity into an animation, you create event listeners that look for and respond to the interactivity (the user input events) of the user.

This is often referred to as event handling.

What Is An Event?

An event is any action initiated by the user that is designed to influence the program's execution during play.

Events may include:

- Pressing any key on the keyboard
- Clicking a mouse button
- Moving a joystick
- Touching the screen (on touch-enabled devices)

What Happens When an Event Occurs?

Typically, an event triggers (fires, or sets in motion) the execution of a procedure or function.

For example, when a user presses an up arrow key on the keyboard (event), it triggers a method that makes the object in the animation move up (event handling method).

Keyboard Controls

Inserting keyboard controls into a program allows the user to control one or more objects while the animation is running.

The user can press a key on the keyboard, or click the mouse, to control the next programming action.

Keyboard Controls

With keyboard controls, you can:

- Create scenes where the user controls an object that interacts with other objects.
- Create animations that execute conditionally, based on a key press or mouse click.
- Create games where the user is required to control an object to win the game.

Keyboard Controls Example

In Alice 3, you can assign procedures to keys on your keyboard. When the animation viewer clicks a certain keyboard key, the procedure assigned to the keyboard key is executed. For example, clicking the right-arrow key on the keyboard turns the submarine to the right.

In programming, keystrokes and mouse clicks are events. Coding events to handle each procedure is referred to as event handling.



Event Listeners

Event listeners are procedures in the Scene class that listen for keyboard input while the animation is running.

Keyboard keys can be programmed to:

- Move an object up or down when certain keys are pressed.
- Move an object forward, backward, left, and right using the arrow keys.
- Make an object perform an action, such as speak or disappear.

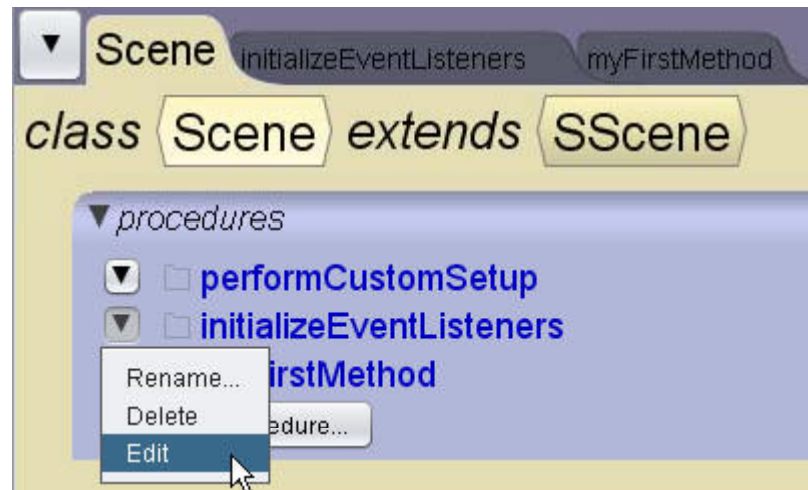
Types of Event Listeners

While this topic focuses on keyboard listeners, there are four types of event listeners available in Alice 3:

- Scene Activation/Time
- Keyboard
- Mouse
- Position/Orientation

Steps to Access Event Listeners

1. In the Code editor, click the Scene tab.
2. Click the button next to initializeEventListeners and choose Edit.



View Event Listeners

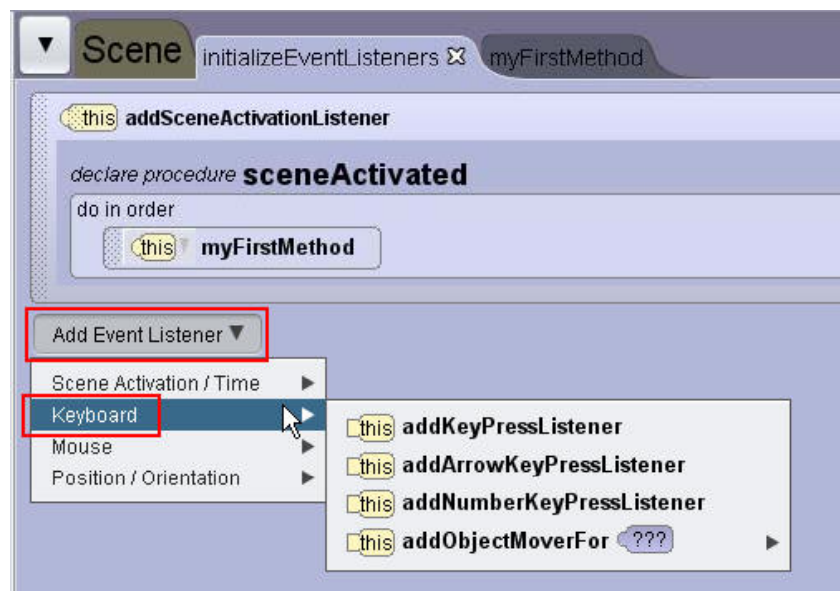
View the initializeEventListeners tab. You will Add an event listener to this tab.



Keyboard Listeners

Keyboard listeners:

- Are found in the Add Event Listener drop-down menu.
- Listen for, and react to, a keyboard keystroke that you specify.



Types of Keyboard Listeners

Data Type	Description
<code>addKeyPressListener()</code>	<ul style="list-style-type: none">• This listener lets you program procedures for the keyboard key(s) you specify.
<code>addArrowKeyPressListener()</code>	<ul style="list-style-type: none">• This listener lets you program procedures for the arrow key(s) you specify.
<code>addNumberKeyPressListener()</code>	<ul style="list-style-type: none">• This listener lets you program procedures for the number key(s) you specify.
<code>addObjectMoverFor(???)</code>	<ul style="list-style-type: none">• This listener lets you program the user-defined movement for a specified object.

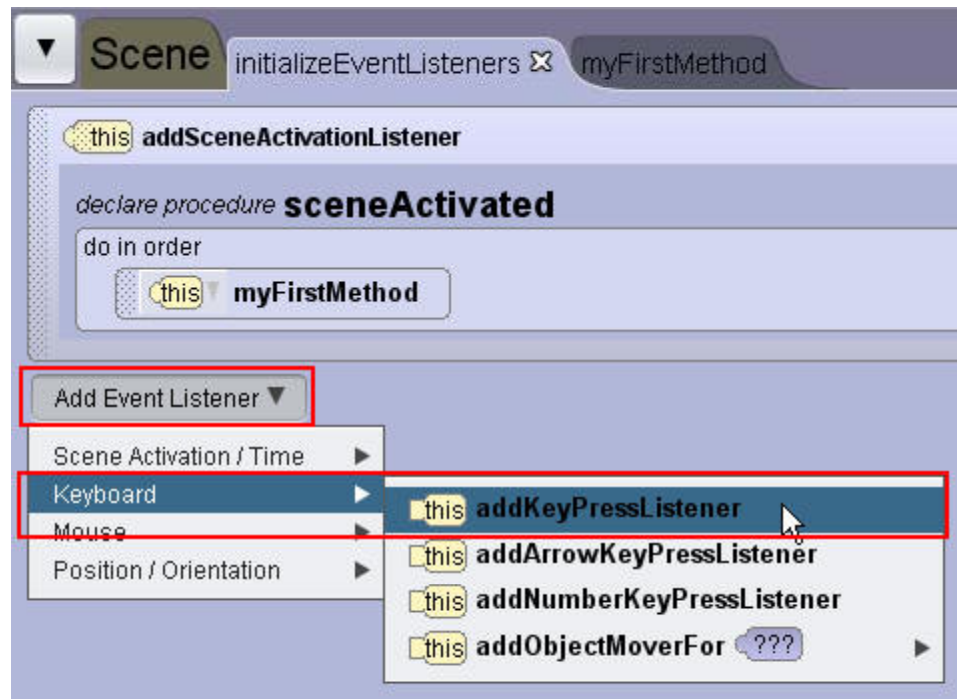
Program Keyboard Event Listeners

For example, we will program keyboard event listeners to command the submarine to move up and down using the A and B keys, and move left, right, forward and backward using the arrow keys.



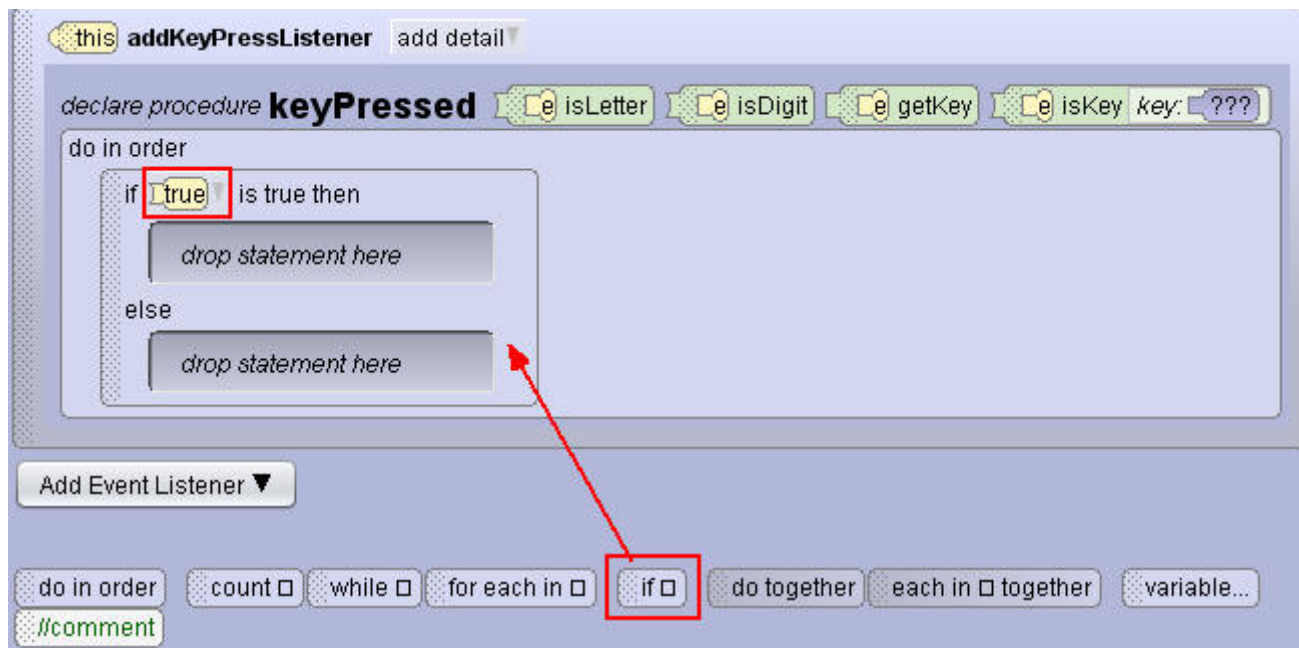
Steps to Add Keyboard Event Listener

1. Select the Add Event Listener drop-down list.
2. Select Keyboard.
3. Select addKeyPressListener.



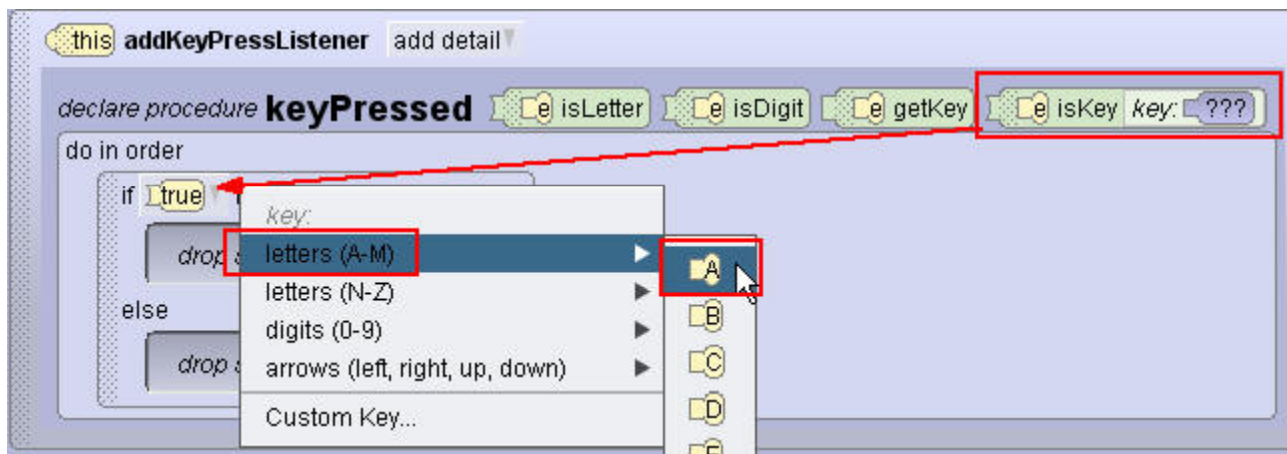
Steps to Program the IF Control Structure

1. Drag the IF control structure into addKeyPressListener.
2. Select the true condition.



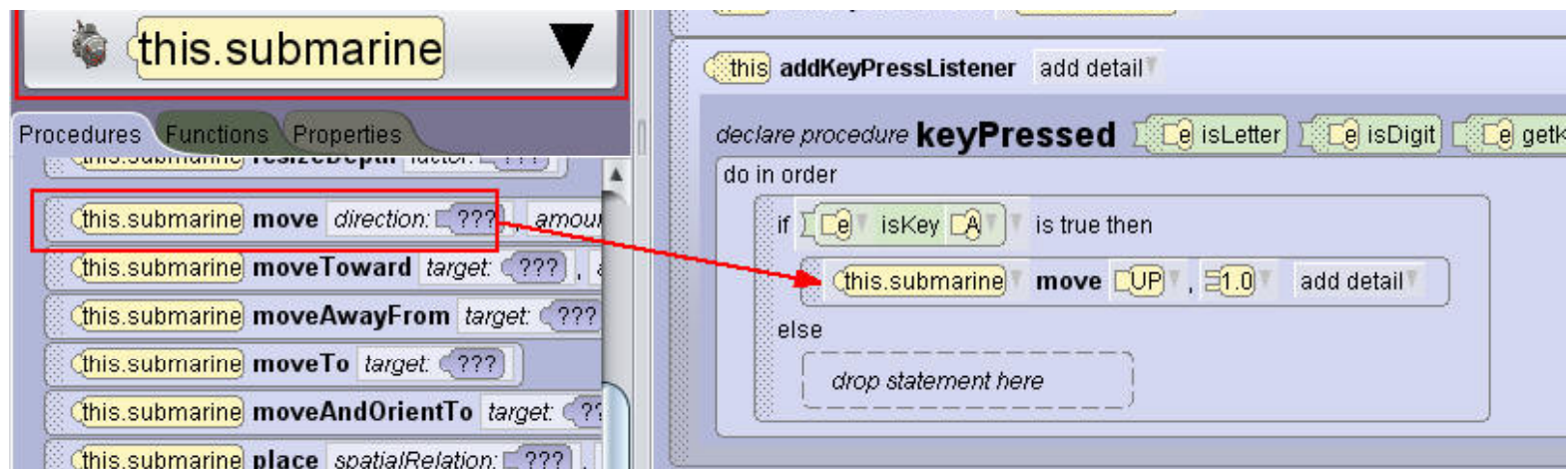
Steps to Select the Keyboard Key to Activate an Object's Motion

1. Drag the isKey ??? tile onto the true condition.
2. A key menu appears. From the drop-down menu, select the keyboard key that you want to use to control the motion.



Steps to Program Motions Activated by Key Press

1. From the Instance drop-down menu, select the object controlled by the keyboard key.
2. Drag the procedure that should be activated by the keyboard key into the IF control structure and select the arguments. You could drag multiple procedures and control structures into the IF control structure. For example, when the A key is pressed, the submarine moves and then turns.



Program Additional Listener Actions

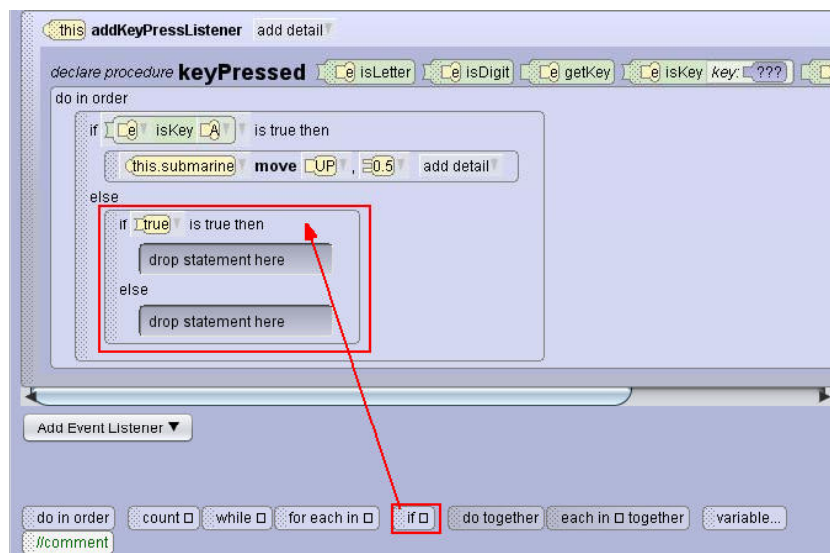
To program the `KeyPressListener` to listen for more than one keyboard key, add additional IF control structures to the listener structure. There are two ways to do this:

- Add a series of IF control structures one after another and always leave the ELSE condition empty.
- Nest additional IF control structures in the ELSE condition.

Both methods execute in the same manner. The following steps use the second method, nesting IF control structures in the ELSE condition, to save display space.

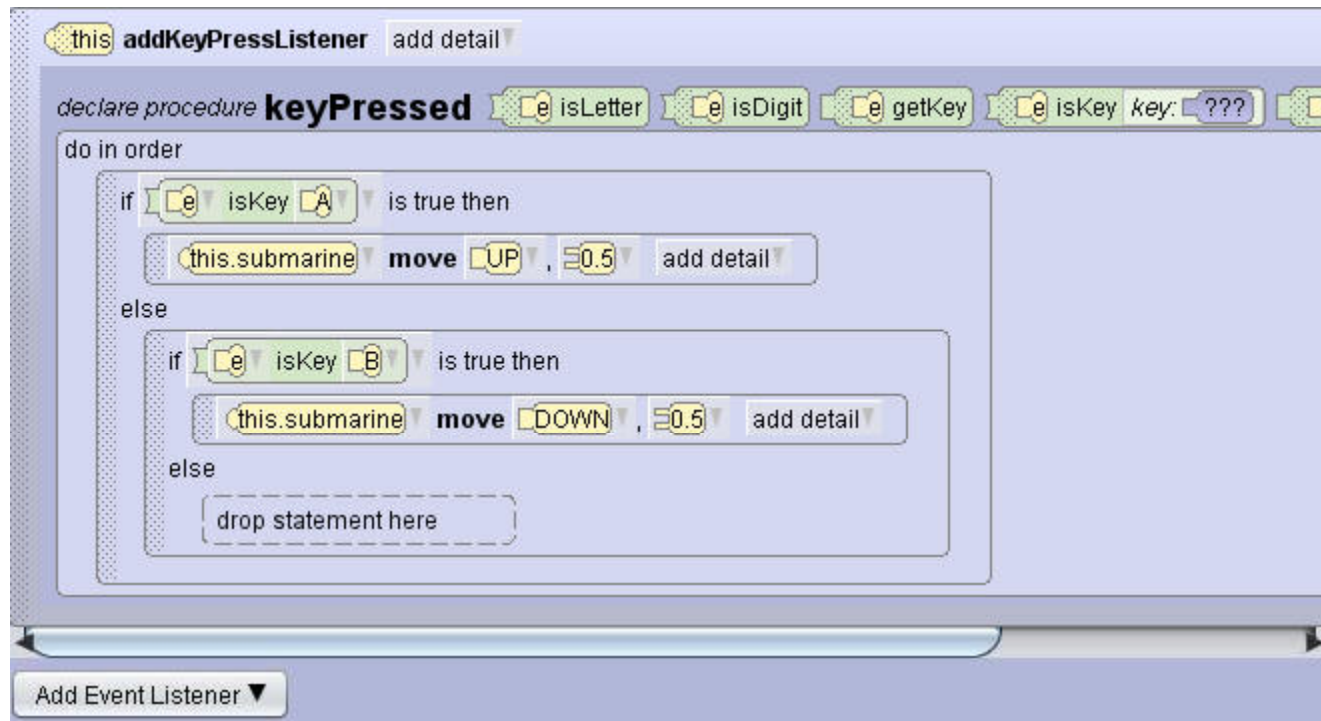
Steps to Program Additional Listener Actions

1. Drag an IF control structure into the ELSE condition of an existing IF control structure and select the true condition.
2. Drag the isKey ??? variable onto the true argument.
3. Specify the keyboard key to listen for.
4. Specify the programming statements to execute.



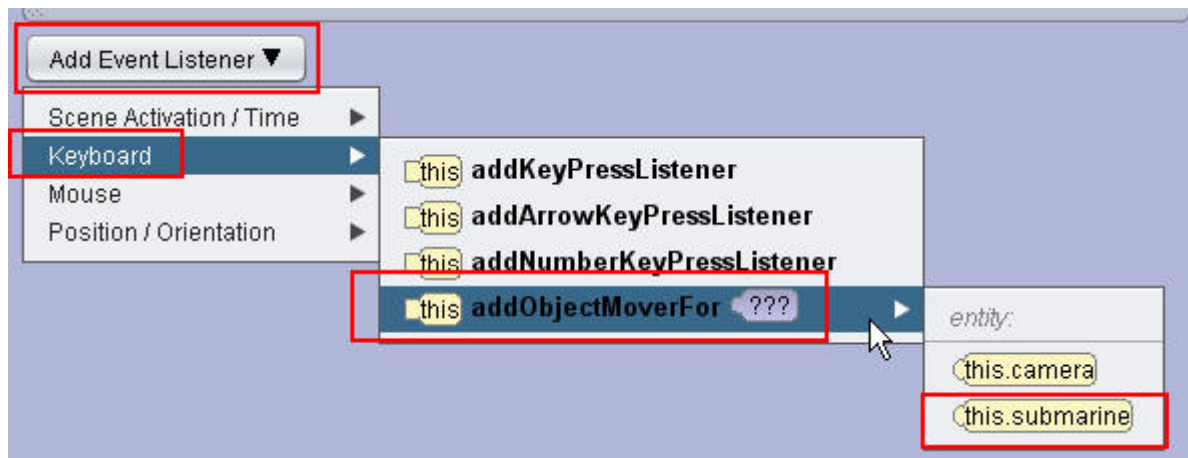
Completed Programming Instruction Example

Below is an example of a submarine programmed to move up and down using the A and B keyboard keys.



Steps to Move Objects Using Arrow Keys

1. Select the Add Event Listener drop-down menu.
2. Select Keyboard.
3. Select addObjectMoverFor.
4. Select the entity, or object, to control.



Steps to Test Event Listeners

1. Run the animation.
2. Click inside the animation window with your cursor.
3. Use the keyboard keys (specified in `addKeyPressListener`) to make the object perform the procedure (move up and down).
4. Use the arrow keys on your keyboard to move the object forward, backward, right, and left.



Summary

In this lesson, you should have learned how to:

- Use keyboard controls to manipulate an animation