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## Multiple Live Video Inputs

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*by Montgomery Martin*

Prior to this tutorial, you may wish to review **Tutorial 4: Live Video Input\*** to familiarize yourself with the basics of working with a single live video input source. (\*p.38 of the Isadora User Manual accessed via Isadora's menu bar: **Help > Isadora Manual...**)

Combining video captured from multiple camera angles in real time allows you to create stunning visual environments or compose compelling footage with contrasting perspectives.

Isadora can process video from up to **four** live sources simultaneously. In this tutorial, you will learn how to configure Isadora to facilitate live video input from two, three, or four video inputs or cameras.

### Part 1: Choosing the Right Hardware

You may already be familiar with connecting a single video input device to your computer, so in this section we will discuss how working with two or more video inputs simultaneously may require some additional hardware considerations.

Just as with a single live video input, your computer must have capture hardware that allows Isadora to “see” the incoming video. For many years, the FireWire input was the most ubiquitous way to input video. However, FireWire ports are no longer provided on many current-generation Mac and PC computers, having been replaced with USB 3.0, HDMI, and/ or Thunderbolt ports. Today, USB offers similar ubiquitous functionality, and webcams such as the Logitech C920 are a popular and inexpensive option for multiple live inputs. Blackmagic Design, AJA Video, and others manufacture devices which can capture live video from professional video camcorders, DSLR cameras, and other high-definition video sources.

Many of these devices can be used with Isadora as long as you have installed drivers that allow them to be seen by QuickTime. When using a video capture card or other external video capture hardware, the installation procedures may vary depending on the manufacturer. Follow their instructions to install the video input hardware on your system.

The Logitech C920 USB webcam is a popular and inexpensive hardware option for live video.

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#### Blackmagic Capture Hardware

External capture devices such as the Blackmagic Intensity connect via USB 3.0 or Thunderbolt, and capture video from a camera through SDI, HDMI, or even an analog source.

Bear in mind that not all pieces of hardware have the same input capabilities. It is important to thoroughly research the capture devices you plan on using, particularly if you wish to work with professional camcorders. In addition, an important consideration with multiple video input devices is planning how you will connect all of your devices to your machine simultaneously. Many laptops can easily accommodate two live video inputs at a time without additional hardware through their USB ports. However, not every machine has the throughput — or even enough physical ports — to connect to three or four devices at the same time. Allow sufficient time to research your hardware so that you can plan accordingly if you wish to work with three or four live input devices.\*\*

*Tip: The throughput of your computer refers to its maximum performance: the largest amount of data your computer is capable of processing. All the components of your machine are a contributing factor when working with Isadora to capture and process live video: graphics card, processor, RAM,*

and storage.

## Part 2: Configuring Live Capture Settings

Before we can start working in our patch, we will need to configure Isadora's **Live Capture Settings**, and assign a **Channel** to each of your [Live Video Input Devices](#). We will then use this **Channel** number to direct the "Video In Watcher" actor to the device we want to use.

- Connect all your live video input devices (cameras, capture cards, etc) to your computer while Isadora is not running. **Remember, many video capture devices may require installation of additional drivers to work with your machine.** Once you have connected all your devices to your computer, you may wish to verify the connectivity by using QuickTime or the software provided by the manufacturer.
- Once you have verified the connections on all your devices, launch Isadora and start a new patch.
- Now we will configure our live video sources. From the menu bar, select **Input > Live Capture Settings**. The following dialog box appears:

Live Capture Settings

Here we will assign each live input device to a video input **Channel**. This assignment allows the **Video In Watcher** actor to know which device we want to use video from in our patch.

1. To configure your first live input source, select "1" from the **Channel Enable/Select** drop-down menu.
2. Make sure the "Enable" check box is selected.
3. If you are using an external video capture device or internal video card such as a Blackmagic Intensity, you may wish to use the driver provided by the device manufacturer instead of Apple's default video drivers. This option can be changed from the **Driver** pop-up menu.
4. Under the **Video Input** heading, select the **Device** pop-up menu. A list of all the video input devices connected to your machine appears. By default, this is set to "None". Choose the input device from the list you wish to assign to Channel Many capture cards and devices support multiple capture modes. You will need to select the right one for your camera model. If you don't see your device in the list, click the "Scan for Devices" button at the top right hand side of the window. If the devices still do not appear, Quit Isadora, then check that your devices are securely connected to your machine and powered on. *NOTE: Remember, many capture devices, including USB webcams, may require you to install additional drivers to function Consult the user manual for these devices for troubleshooting information. You may want to ensure that the device functions with the included software.*
5. The **Resolution** pop-up menu is set to "Native" by default. You can use this menu to change the resolution of the live video input. Reducing the resolution of the live video input may improve performance. However, doing so reduces the quality of the incoming video. It is not always necessary to capture at the full native resolution of your device. Depending on the number of live video inputs you are using, the capabilities of your hardware, and the particulars of your design, you may wish to reduce the capture resolution of the video input source. Pay close attention to your video frame rate during live capture.  
*TIP: Think carefully about your output: for instance, if you are using a single standard definition projector, there is little purpose in capturing HD video since the output resolution is less than the input resolution.*
6. Note that once a device is assigned to a channel, it disappears from the list for all other channels. If you want to reassign a device to another channel, you have to set the current channel it is assigned to "none" or another device first.
7. To configure your second live input source, select "2" from the Channel Enable/ Select drop-down menu.

8. Repeat steps 2, 3, and 4 to configure your second live input source.
9. If you wish to use a third live video input source, select “3” from the Channel Enable/ Select drop down menu, and repeat steps 2, 3, and four.
10. Finally, if you want to configure a fourth live video input source, select “4” from the Channel Enable/ Select drop down menu, and repeat steps 2, 3, and four again.

We have now configured Isadora’s Live Capture Settings.

Now click the “**Start Live Capture**” button. After doing this, a thumbnail preview of the enabled live video streams should appear above the boxes labeled “Channel 1”, “Channel 2”, “Channel 3,” and “Channel 4”. These correspond to the channels you have enable and configured, but any channels that have not been enabled will remain empty.

Close the Live Capture Settings window to return to your patch.

*Tips:*

- *While working on a project, it is very helpful to physically label your cameras with their channel assignments for quick-and-easy reference.*
- *Remember to disable any live input channels you are not using!*
- *You don't need to open the Live Capture Settings window to start and stop live video capture. Instead, you can Start Live capture with the keyboard shortcut (Command+E) and stop Live Capture with (Command+.). You can also start and stop live capture from the menu by selecting **Input > Start Live Capture** Finally, you can enable capture of channels individually and interactively using the "Capture Control" actor.*

### Part 3: Setting up a Live Capture Scene

1. Drag a Video In Watcher actor and a Projector actor into the Scene Editor. Then connect the 'video out' output port of the Video In Watcher to the 'video In' input port of the Projector actor.  
Video In Watcher actor

2. Now we need to tell the Video In Watcher which live video input device to capture. Remember, we assigned the first live input device to Channel “1” in the previous section. By default, a newly-created Video In Watcher actor always has the Channel input property set to “1”. To change this channel, click in the box to the left of the “Channel” input in the Video In Watcher actor. The number will be highlighted, and the black box will become blue to let you know that you can type in a new value.
3. Create an additional Video In Watcher and Projector actor for each channel you have enabled in the Capture Settings. Connect each Video In Watcher to a *different* Projector actor.
4. Set the “Channel” property of each Video In Watcher actor to a different channel from the first one you created (from 1 to 4).

Your patch should look something like this:

## Live Video Input Scene

- *Tip: Note that this produces an output on your Stages where all four video streams are layered on top of each other! While this can produce some interesting visuals with the right camera shots, if you don't want to do this try reducing the **Zoom** property on each Projector actor to 25, and manipulating the Horizontal and Vertical position on each Projector actor until the video streams appear as a grid of four smaller images on your stage.*
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