Title	Tutorial: 2. Spinning Circles (Generative Content)		
Product	Ai		
Date/Author	31/07/13	Marc Evans	Defining The Future
Level	Medium/Hard		www.avolitesmedia.com
Estimated Time	20 minutes		

Background:
This tutorial will show you how to create an animated circle shape

As well as being a powerful media server, Ai can be used to create your own generative content using the Salvation Engine. In the following tutorials, we will describe ways you can achieve your very own patches that can be used to create various different types of media, such as text logos, moving animations, etc.

To create your own patches, we recommend you load up Ai, and then close all the visible windows, e.g. main UI and Stage Patch. This helps to prevent any of your patching from interrupting the main Ai interface. It is also worth opening an *Inspector* module – this can be useful for tracing signal flow while you are patching. This can be found from the View menu at the top of the screen.

It is also worth mentioning the different colour ports and cables used within Salvation, as they allow us to carry different types of data around our patch.

Control Value / Vector Port

Routes control data between modules using 64-bit floating point values.

A control value port is commonly used to route a single numerical value from one module to another (such as rotation angles, brightness and contrast)

GL Render Port

Routes rendering streams from one module to another.

The drawing commands represented by a graphics stream are not executed unless the stream is connected to an on-screen window.
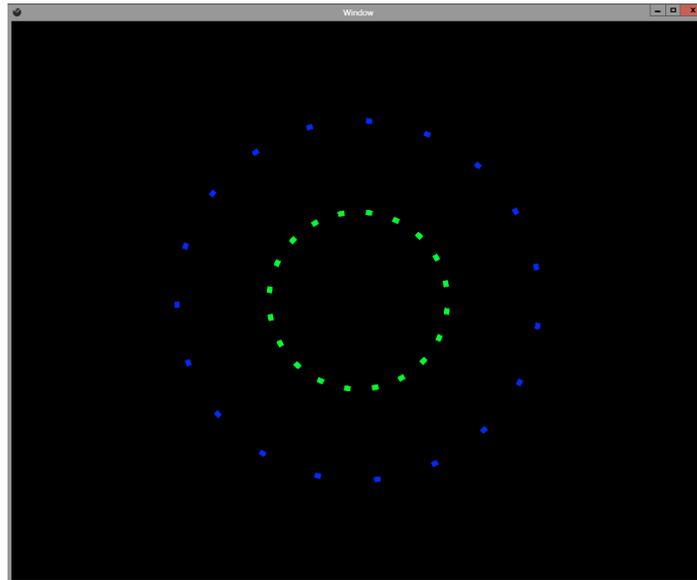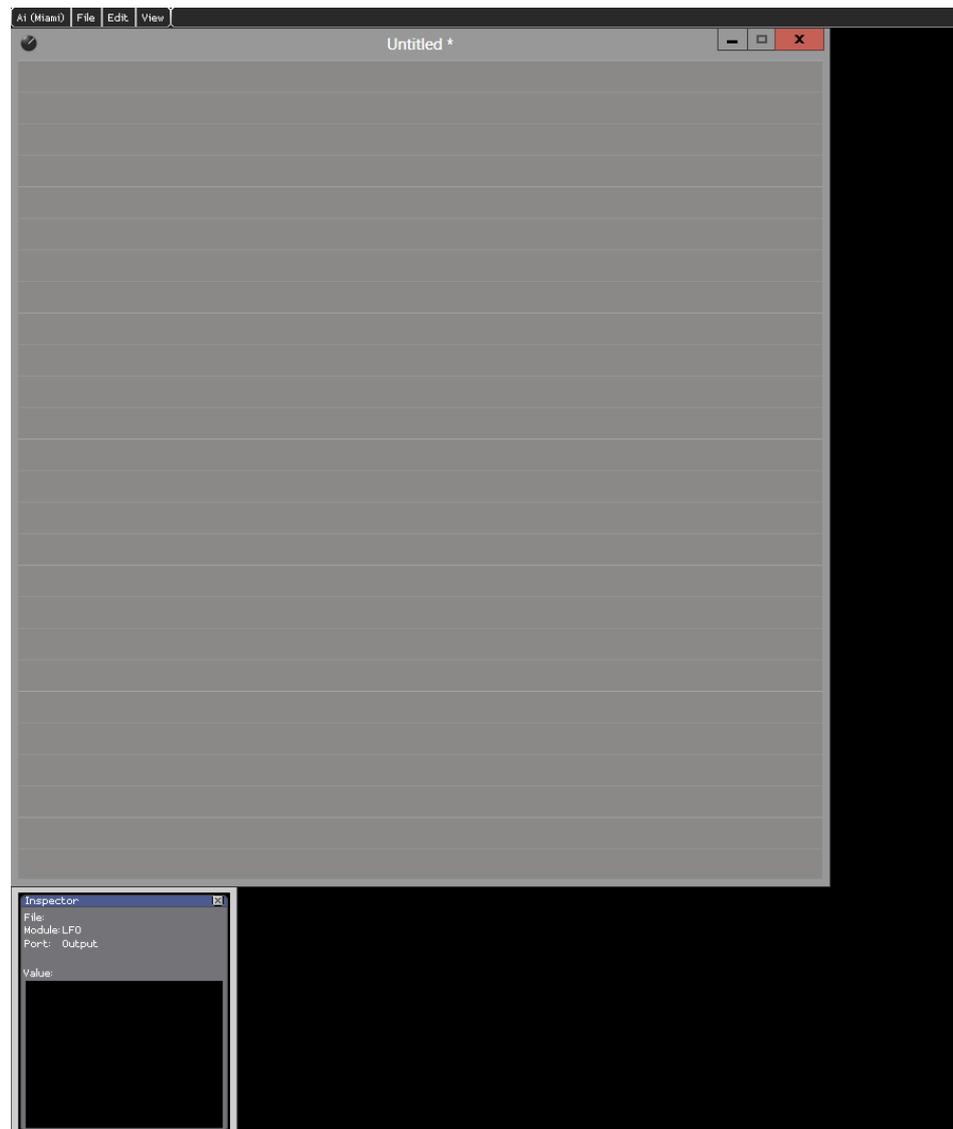
GL Texture Port

Shares image data stored as openGL textures between modules.

Typically a 2 dimensional image file (.jpg, .tga, .png, etc) or a video file (.mov)

Spinning Circles

Select *New* from the file menu and you will be greeted with a blank Salvation patching area.

If you right-click in a blank area of the patch window, you will bring up a menu that will allow us to add modules to create a patch. The first module we should bring in is a GL Window – this will allow us to see the graphics that are output by our final patch. The GL Window is found by right-clicking and choosing *Insert Module/GL/Window.* Place this module near the bottom of your empty patch and click on the Window button to bring up a preview window.
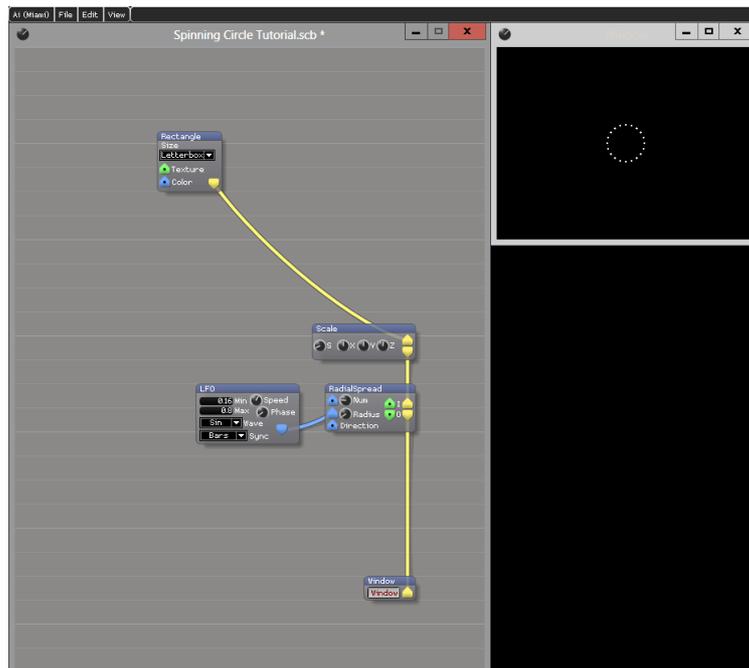

GL Window

We are going to create our circle by using a Generator module – strangely we shall use a rectangle to create our circle! So, right-click in a blank area of our patching window and choose *Insert Module/Generator/Rectangle* and place this near the top of your patch. If you connect the yellow output from the rectangle to our Window module, you will see a boring white rectangle! How are we going to turn this into a spinning circle?

First, we need to scale our rectangle down a bit to make it more useable. Right-click and *Insert Module/GL/Scale* and patch this in between the Rectangle module and the Window. Then if you drag the knob marked "S" to the left you should see the rectangle get smaller – a setting of around 0.06 should be fine. Also, set the X and Y knobs to be about 0.16.
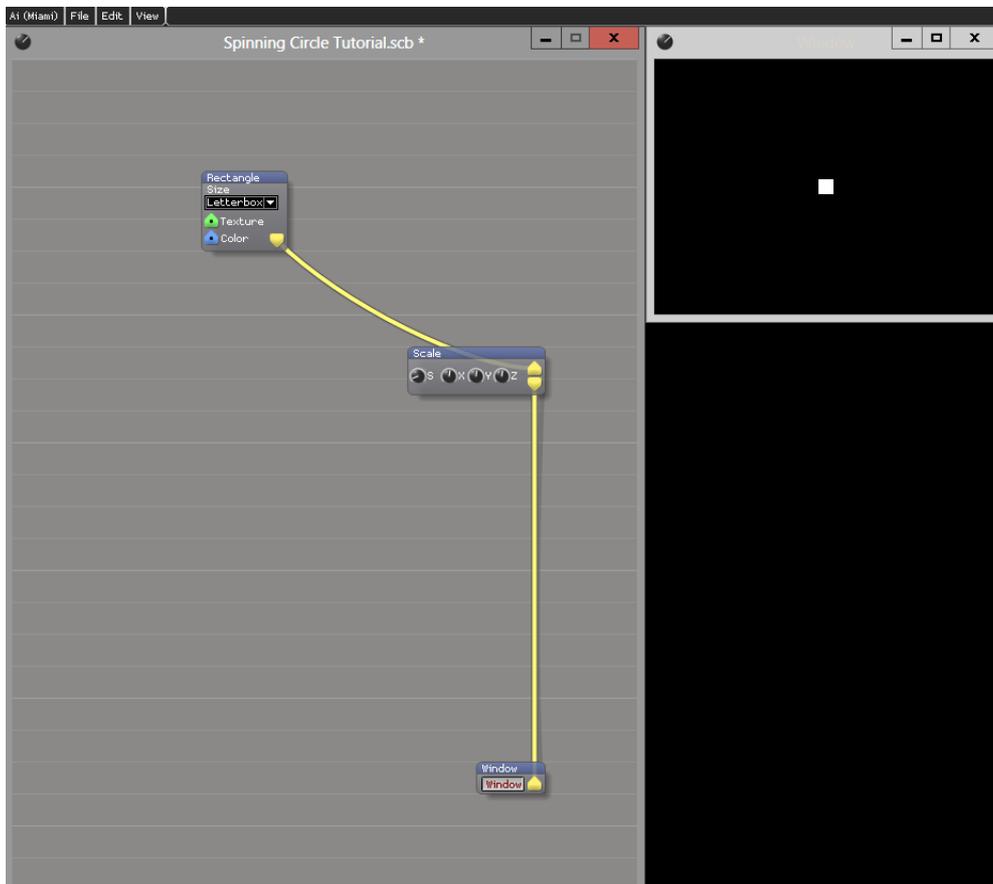

Now, we need to bring another module that will turn our white rectangle into a circle. Right-click and *Insert Module/Effects/Radial Spread* and connect this between the Scale module and the Window. Start moving the knob marked "Num" to the right, and you should start to see your white square turn into many white squares in a circular formation. A setting of about 20.00 should be fine for now. Try twisting the knob marked "Radius" and you will see the circle expands and contracts. Let's add an LFO to control the radius over time.

Right-click and *Insert Module/Controller/LFO* and place this to the left of the Radial Spread module, then connect the blue output port from the LFO to the input port next to the Radius knob. Set the Min to 0.16, the Max to 0.8 and the Speed to about 0.60. You should then see your circle pulsing, growing larger and smaller over time.


Now let's make the circle spin around while it is expanding and contracting. For this we need another module, so right-click and *Insert Module/GL/Rotate* and patch this in between the Radial Spread and the GL Window. If you twist the knob marked "Angle", you will see that our circle spins around – we shall animate this using another LFO module. Drop the LFO module in to the left of the Rotate module and connect it's output to the blue input on the Rotate module marked "AMod". Initially, nothing seems to happen until you turn up the AMod knob, then it will start to spin – set it to around 0.41. On your LFO, set the Min to 0, the Max to 360 and set the Wave to Saw. Also, right click on the Speed knob and choose *Set Value*, and set this to 0.125 – this should give you a nice smooth spinning circle.
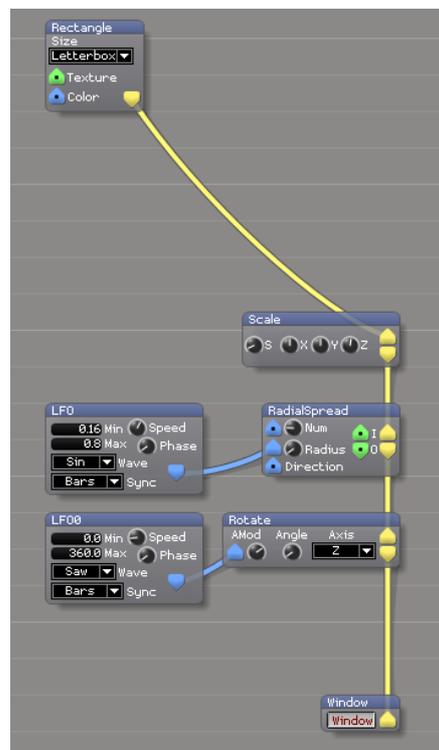
Okay, so we have our circle animated, but it could also do with some colourisation to make it look a bit more interesting. To do this we need to add a Colour module – right-click and *Insert Module/Color/HSBA*. This will bring in a module with a familiar colour wheel. Connect the blue output from the Colour module to the blue input on the Rectangle module. Once connected, it will make your circle disappear until you drag up the long slider on the Colour module. You can then move the colour wheel around and you should see your circle's colour change accordingly. However, it would be cool to animate this with an LFO so the colour was constantly moving, but there doesn't seem to be an input on the Colour module we can connect an LFO to. How will we achieve this?

Hover your mouse over the bottom edge of the Colour module until your mouse cursor turns into an up/down arrow, and drag the box down to make some space under the colour wheel. Now we need to expose one of the colour wheel's hidden ports – right-click in the blank area on the colour module and choose *Show Port/Hue Input*.
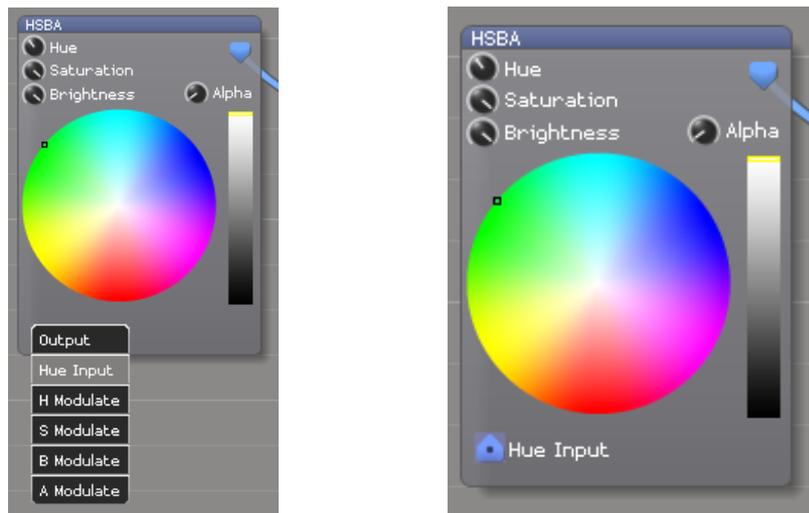

With the port exposed, we can now bring in another LFO and connect this to the Hue Input. Set the LFO Min to be 0 and the Max to be 1, and also set the Wave to be Saw. You should see the dot in the colour wheel spinning around happily by itself now, and should also see your circle changing colour in the preview window.

Okay, so we have our spinning circle looking great, but we could add another circle into the mix to add further interest.

First, make your patching window bigger so you have enough space to copy the modules we have already. Lasso around all the modules except the GL Window, then CTRL + C to copy and then CTRL + V to paste. Currently, all our values are exactly the same so we need to reverse the values that are in the Min and Max boxes of the LFO's, else the second circle will animate in the same place as our first one. For example, with the LFO that is controlling the Colour Wheel, change the Min from 0.0 to 1.0 and the Max from 1.0 to 0.0.
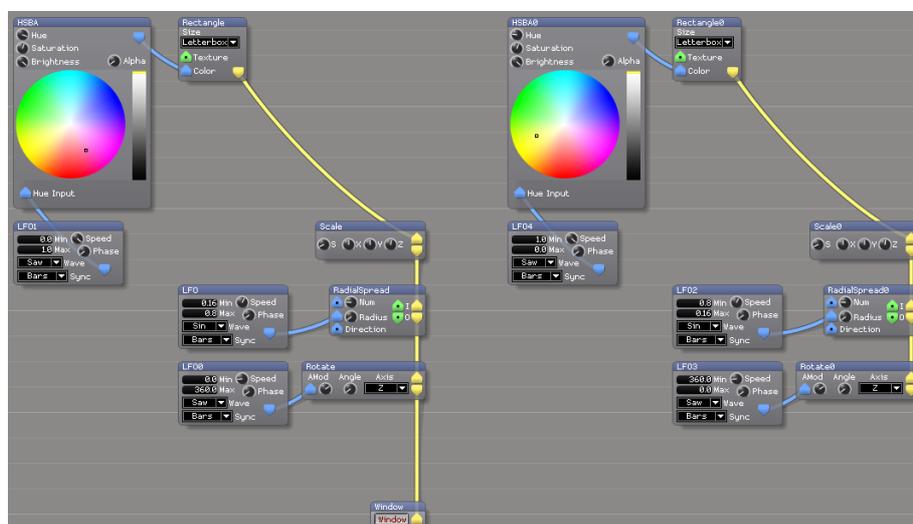
So we have a second circle ready to go, but we can't see it at the moment, because we need to mix the graphics streams together. To achieve this we need to add a couple of further modules. First, right-click and *Insert Module/ GL/Render Merge* and place this near the bottom of your patch. Next, right-click again and *Insert Module/GL/BlendMode* and place this under the Render Merge. Take the output of your first circle and patch this into the input marked "0" on the Render Merge, and take the output of the second circle and connect this to the input marked "1" and press the button. Now connect the output of the Render Merge into the input of the Blend Mode module. Finally, take the output from the Render Merge and connect this to your GL Window. Initially, you will see nothing in the preview window – we need to set the top blend mode to "GL_SRC_COLOR" and the bottom one to "GL_1-SRC_COLOR". Congratulations if you made it this far - you should now see two circles of differing sizes spinning in the preview window!
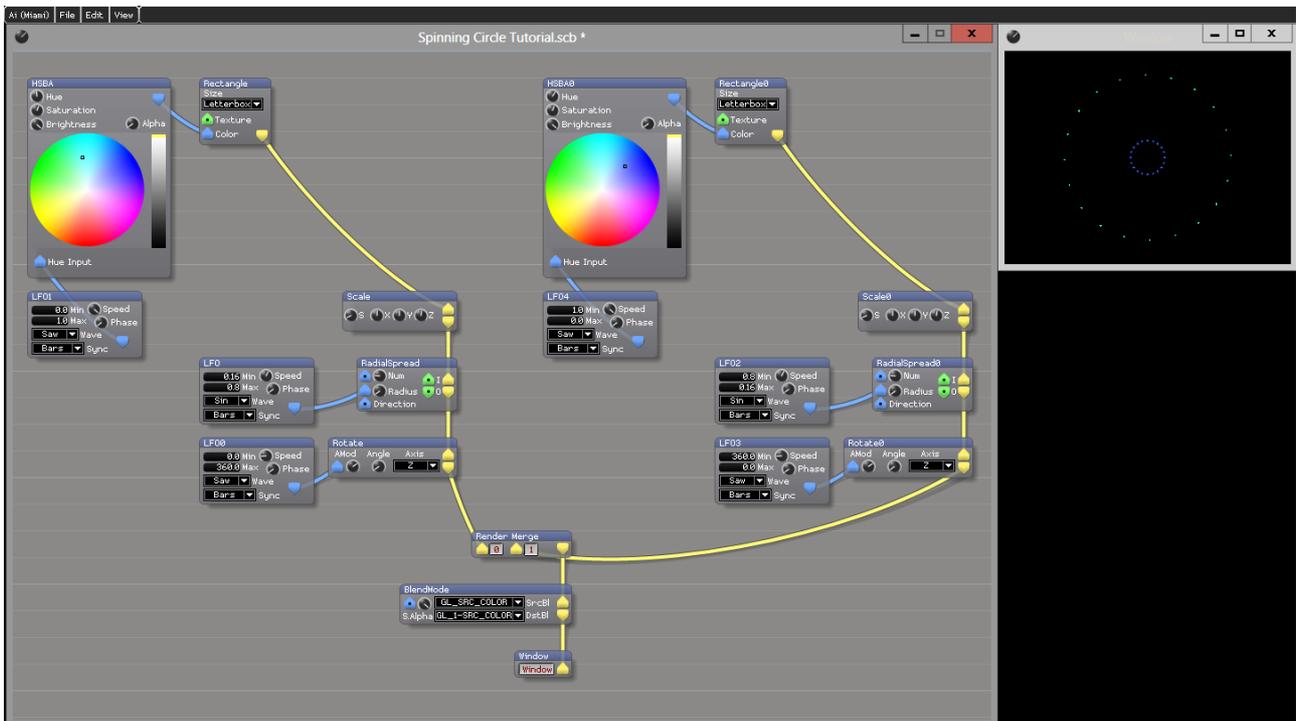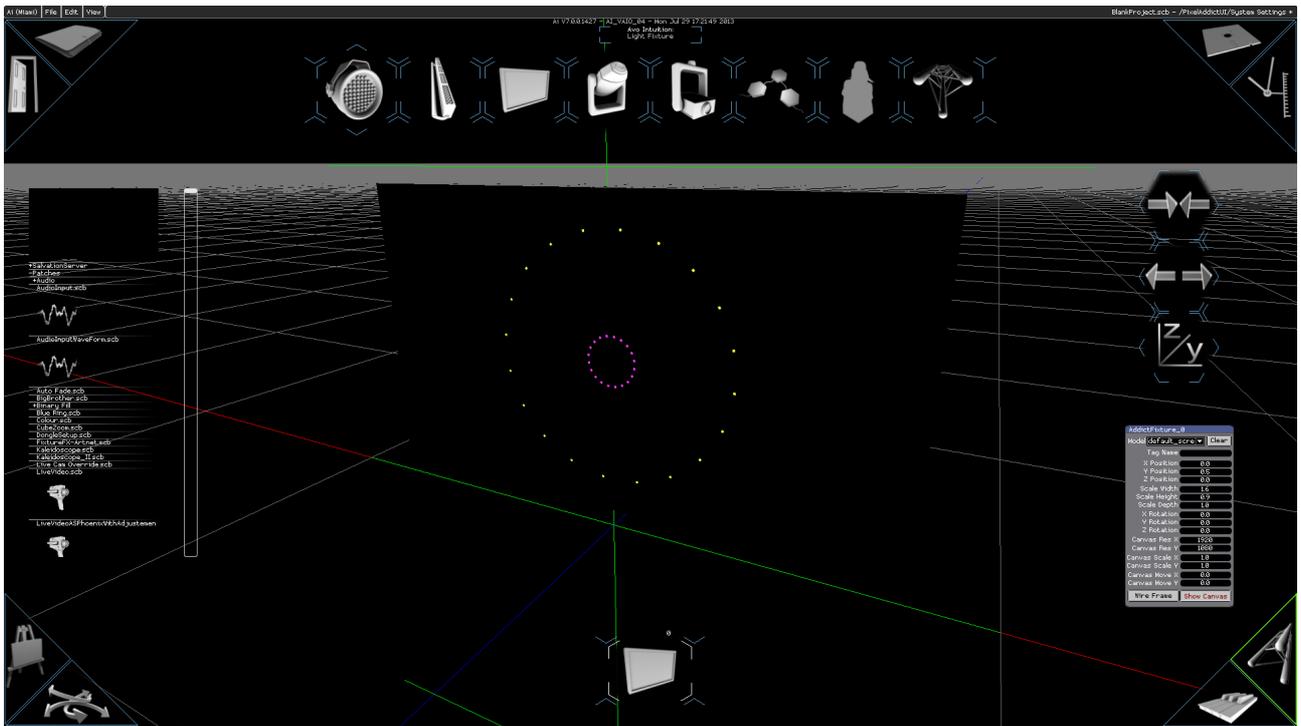

So, we have our final patch ready to go, but you want to see it displayed in Ai on the Roller Cue as a regular piece of media. To achieve this we need to add two final modules. Right-click and choose *Insert System Patch/Ai Patch Output.scb.* Also, right-click and select *Patch IO* and place this underneath the Ai Patch Output. Take the yellow Output of the AI Patch Output and drag to a blank area of the Patch IO – you should see a new connection is made between the two modules. Repeat for the green Texture output of the AI Patch Output. Now, simply connect the yellow output on the Blend Mode module (that is currently going to our Window module) to the Input on the AI Patch Output.
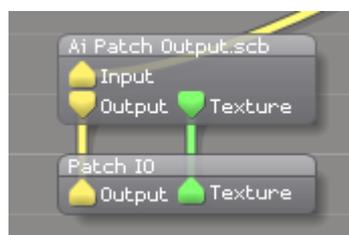
In our final patch, left click in a blank area and make sure a title is at the top of the window (it will probably say Untitled* at the moment) – then go to the Ai File menu and select Save As. Give your patch a name and save it to your hard drive. Our patch is now ready for use within Ai as a regular piece of content!

Now, close all your windows, go to the File menu and choose Open – navigate to the Ai Distrib folder and in the Projects folder choose Blank Project. Once Ai has loaded, go to the Performance Page and then open a Windows Browser where you saved your text patch to. Then you can simply drag and drop onto the Roller Cue. Please make sure you set your layer's blend mode to Additive, else the patch will not display correctly.

Our Spinning Circles within Ai.