Blender Visualization Tutorial WS2013-14 III

CELLmicrocosmos Cell Modeling Project WS2013-14,
Björn Sommer, Bielefeld University,
Version 28.11.2013

Forum:
http://www.cellvisualization.org

Direct link to this forum entry:
http://www.cellmicrocosmos.org/Cmforum/viewtopic.php?f=21&t=737

Actual Version of Blender:
http://www.blender.org

Here, Blender 2.67b is used.

Target

This tutorial describes how to add a stereo camera to an environment and how to extend this camera for multiple purposes.

Abbreviation

RMB Right Mouse Button

LMB Left Mouse Button

! For using most of the shortcuts discussed in this tutorial, you have to be sure that the mouse cursor is WITHIN the view port of the 3D View !

Base

Please use the landscape project (grass, hills, sky etc.) described in the previous two lectures. See the forum for the tutorials:

http://www.cellmicrocosmos.org/Cmforum/viewtopic.php?f=21&t=737

Download and Install

Download the Stereoscopic Camera plugin from:
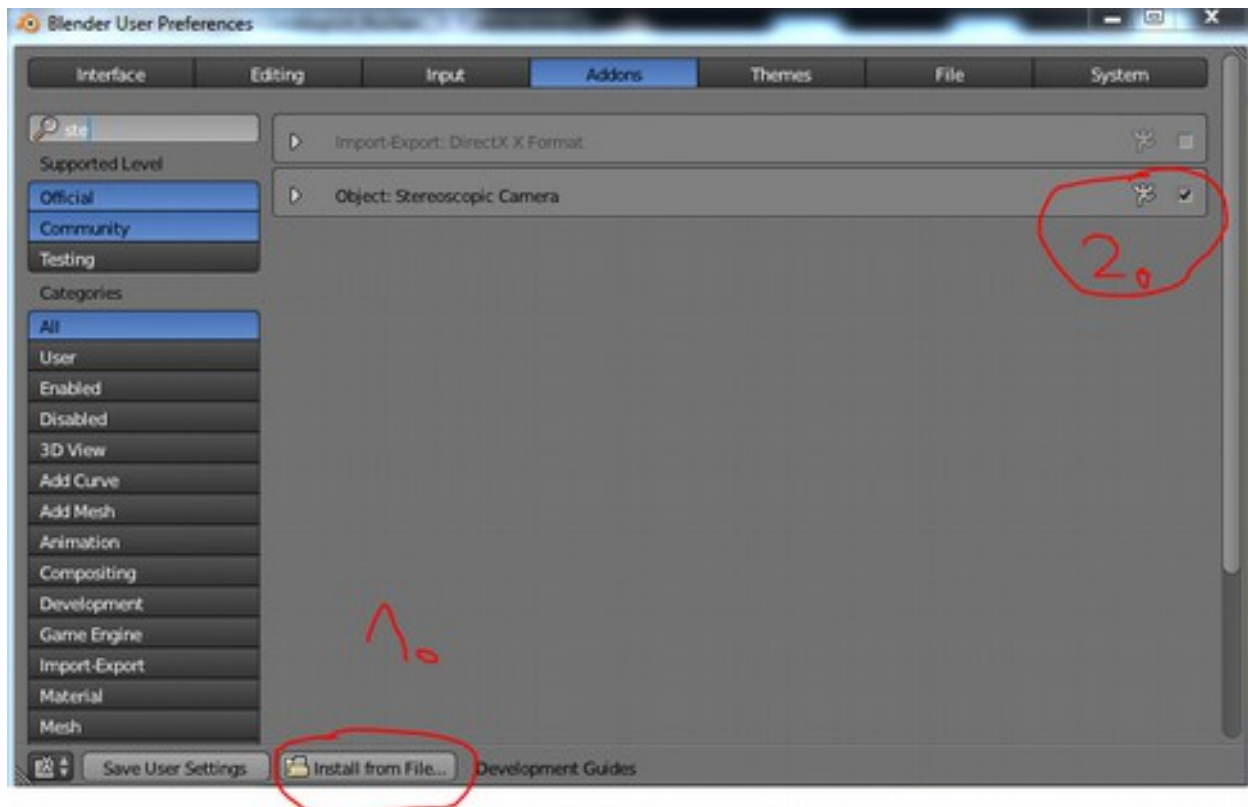
http://www.noeol.de/s3d/

Download for Blender <= 2.6.6 Version 1.6.7
Download for Blender <= 2.6.7 Version 1.6.8
(I just fixed the new version and sent it to Sebastian Schneider. It is now also available from his website.)

Start Blender, go to File → User Preferences and then choose

1. Install from File …

and navigate to the file you downloaded from the link stated above.

2. Activate the "Stereoscopic Camera" in the "Addons" Section

Now the camera is ready to be used. Remember, if you want to permanently activate this camera in Blender (after the next restart), then you have to press "Save User Settings". But be aware that your actual scene will be saved as the base scene loaded each time at startup.

Load the Environment

Now load your landscape project.

Theory of 3D Stereoscopy

The theory of 3D Stereoscopy was discussed in detail in our Interdisciplinary Cell Visualization lectures III and IV. So please, if you are participant of this lecture, have a look at these files, this is the background knowledge for this topic:

http://www.cellmicrocosmos.org/Cmforum/viewtopic.php?f=49&t=718

InterZellVis SS2013 Lecture III 3D Stereoscopy: Techniques

InterZellVis SS2013 Lecture IV 3D Stereoscopy: Applications

Especially lecture IV discusses also the camera we will use now. For all those who do not participate in this lecture, there is enough information found throughout the web!

Create a 3D Stereoscopic Camera

After the installation, just select your camera object (if you do not have a camera by now, just create one by using Add → Camera).

Navigate now to the Camera Tab. The last entry section is called "Stereoscopic Camera" and – believe it or not – this is the tab we are working with now.

All you have to do to create a stereoscopic camera, just click on "Set Stereo Camera"
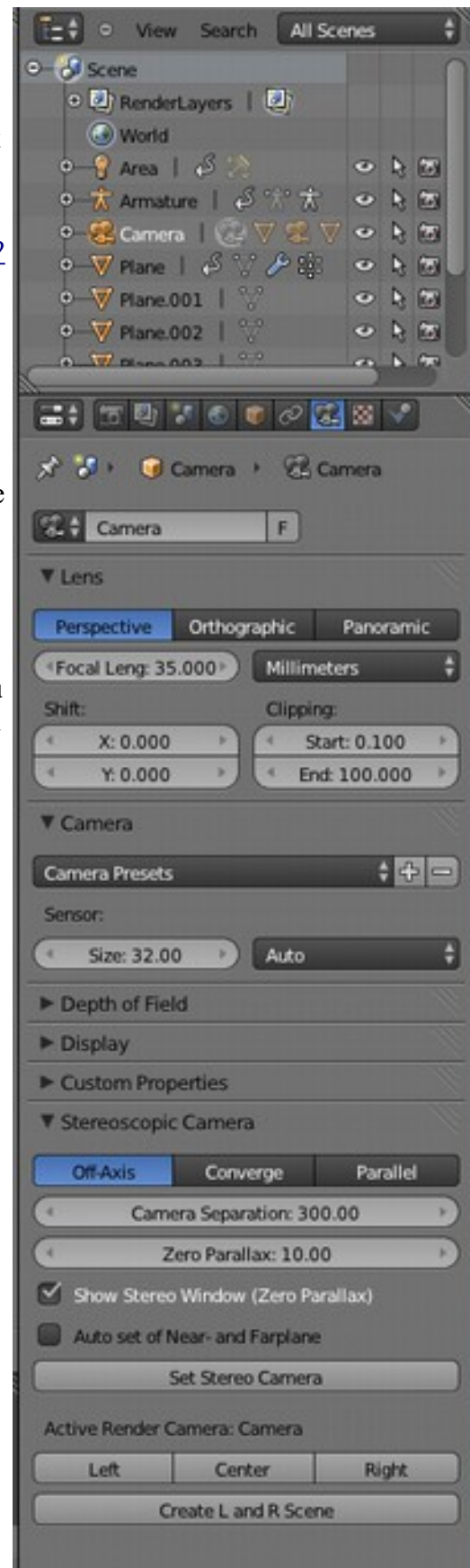
The Stereoscopic Camera Properties

A short overview of functions of the Stereoscopic Camera follow:

The image shows at the bottom 3 cameras:

- left: left eye camera

- center: center/cyclope eye camera

- right: right eye camera

These cameras have to be activated for rendering by pressing in the section "Active Render Camera" the corresponding entry (see previous page). If then an image or a movie is rendered, the selected camera will be used.

Then, three layers are shown. The bottom layer here at the image is the "Near Plane" layer, the top layer is the "Far Plane" layer. These layers are shown, if "Auto set of Near- and Farplane" is activated (in this term a hint is hidden: the creater of this tool must have been a German guy!). This two planes mark the minimum and maximum position were an object is positioned for convenient stereo experience.

Finally, there is the plane in the center, which will be only shown if "Show Stereo Window (Zero Parallax)" is activated. At this layer, the stereo effect is neutral; the images rendered for each eye are the same. Moreover, the object positioned here (the cube here is only an example object!) is usually said to provide the optimal stereo experience.

Now, objects positioned between the Near Plane and the Stereo Window will appear *in front* of the screen after rendering, and objects positioned between the Stereo Window and the Far Plane will appear *behind* the screen.

But the Stereo Camera plugin provides even more features for the user. Changing the "Camera Separation" changes the distance between the virtual eyes (the left and right cameras, in 1/1000 Blender Units). Changing the Zero Parallax changes the distance between the virtual eyes and the Stereo Window (in Blender Units).

If "Auto set of Near- and Farplane" is activated, the user can change:

- the "Dist", the distance between the viewer and the projection screen,

- the "Angle", the maximal parallax angle in degree, and

- the "PPI", the Pixel per Inch on the projection screen.

Each of these settings affect only the Near and Far plane.

Another important setting is the differentiation of the camera modes "Off-Axis", "Converge" (Toe-In) and "Parallel". Please have a look to our InterZellVis lecture IV for explanations.
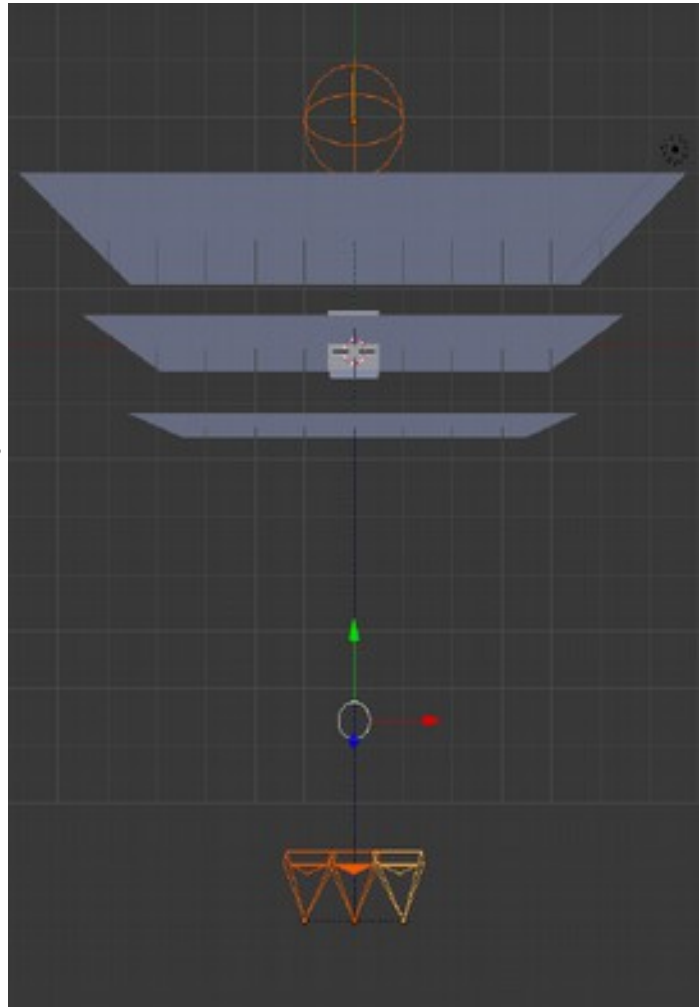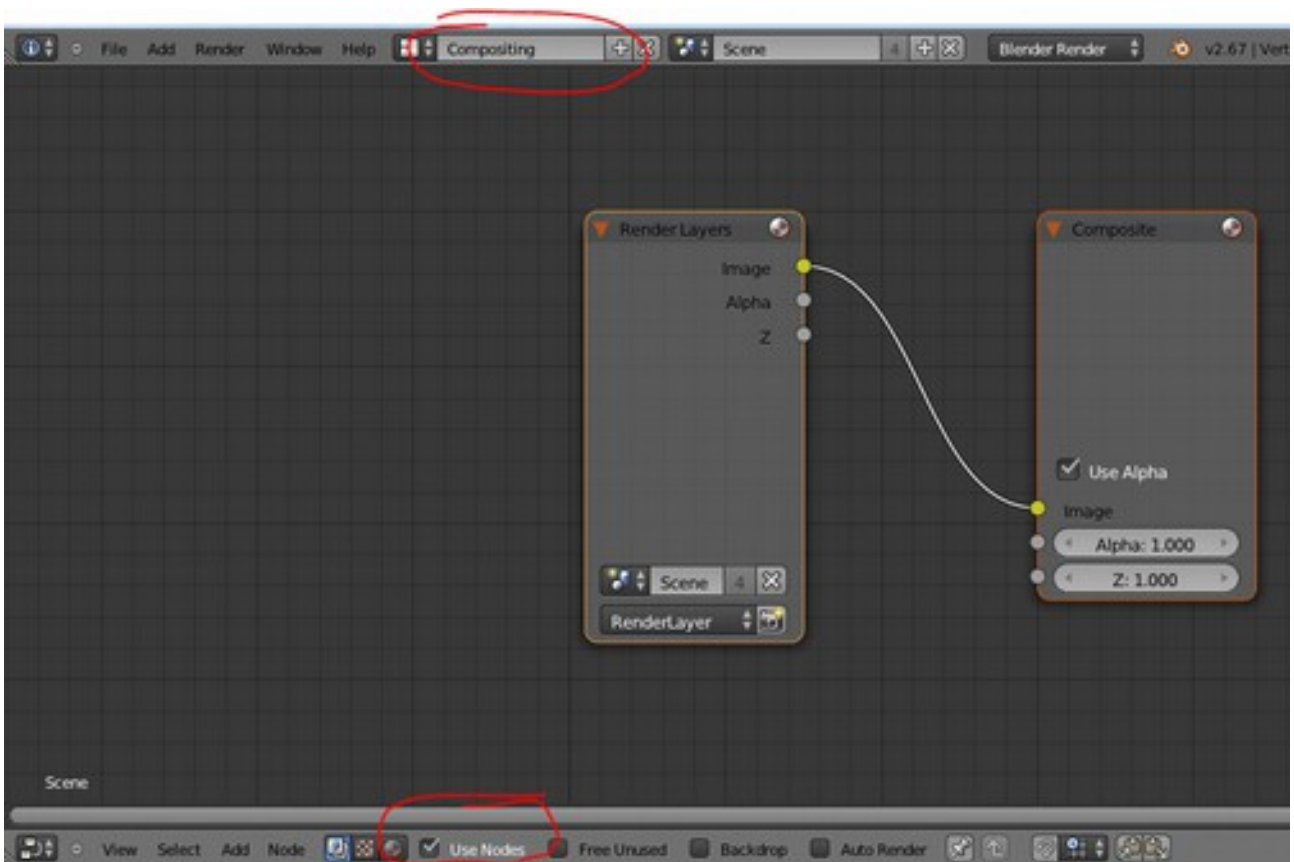
Rendering the 3D Stereoscopic Scene

It was already mentioned how to manually render the left and right images one by one. The problem is, that the output of both movies will not be merged, you will have in the end two separate video streams. By using the Stereoscopic Player, it is now problem to have a look at the output, and by using tools like VirtualDub, the two video streams can be merged manually. But we can also use the plugin, to solve this task.

First, after you have created your scene, press "Create L and R Scene" in the Stereo Camera Plugin.

Make sure that the "Scene" is linked/chosen before you proceed:

Select then the Screen layout "Compositing" (is default in version Blender 1.6.7) and choose "Use Nodes":

Delete the default nodes which have appeared now by selecting them (with RMB) and pressing DEL.

Now you will need the following window. If it did not appear by now, press "N".

Now, choose you preferred stereoscopic rendering mode. We will choose now: 1. "Red Cyan Anaglyph" and then press 2. "Add nodes".

Now you only have to take care that the left and right camera are selected. Located the Rendered layers and change 1. the top one to "Left_Camera", and the bottom one to "Right_Camera".
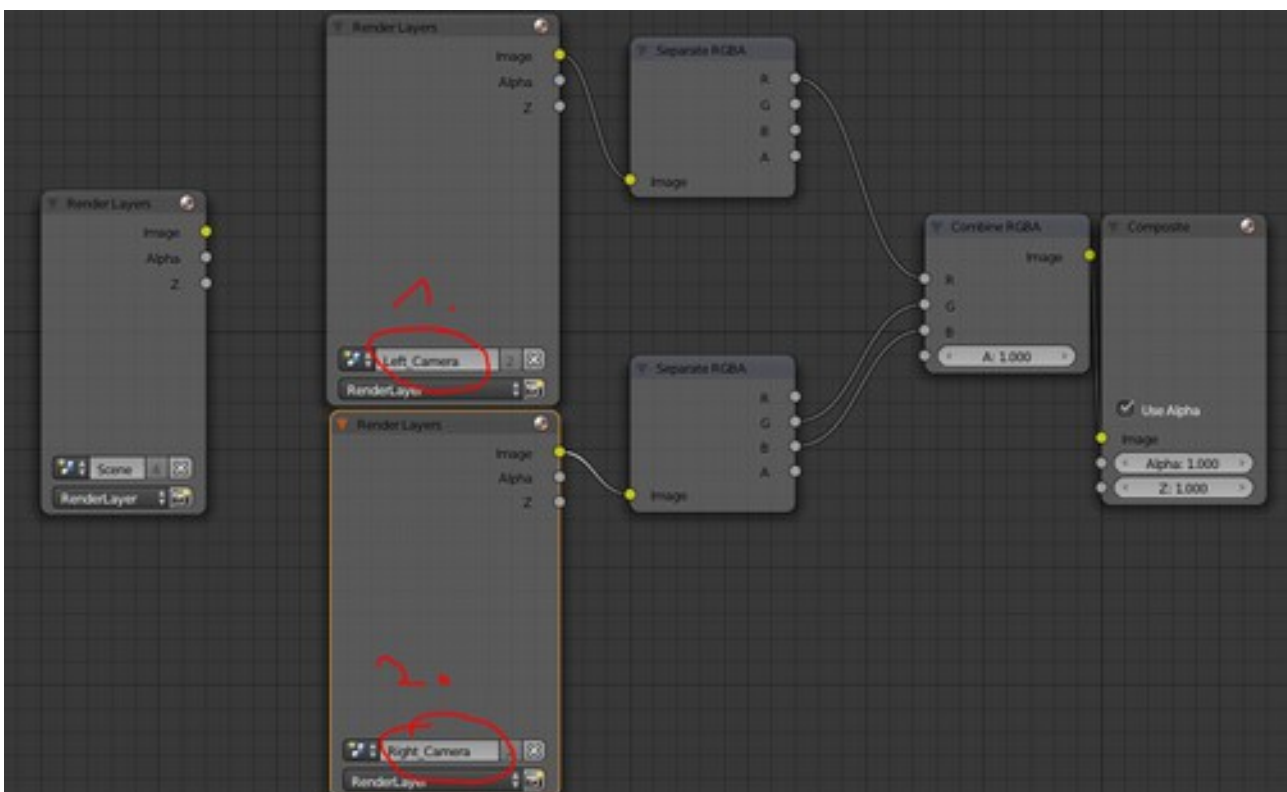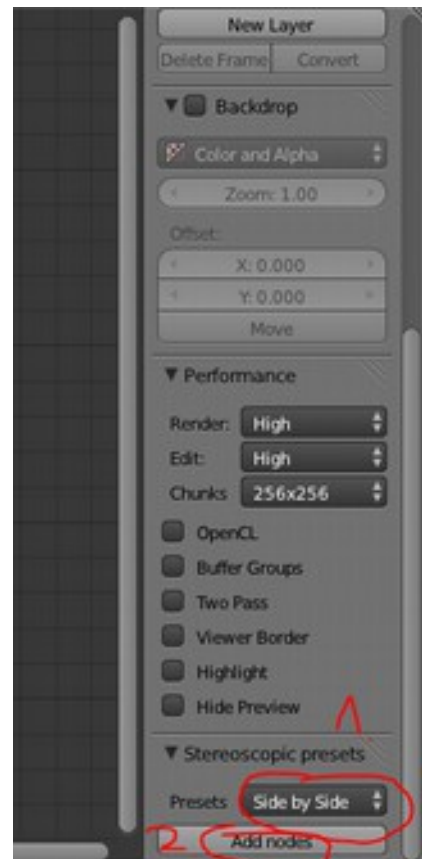
If you render now your image again, you should change the resolution to 100%, then you will see: you have now a Red-Cyan 3D image!
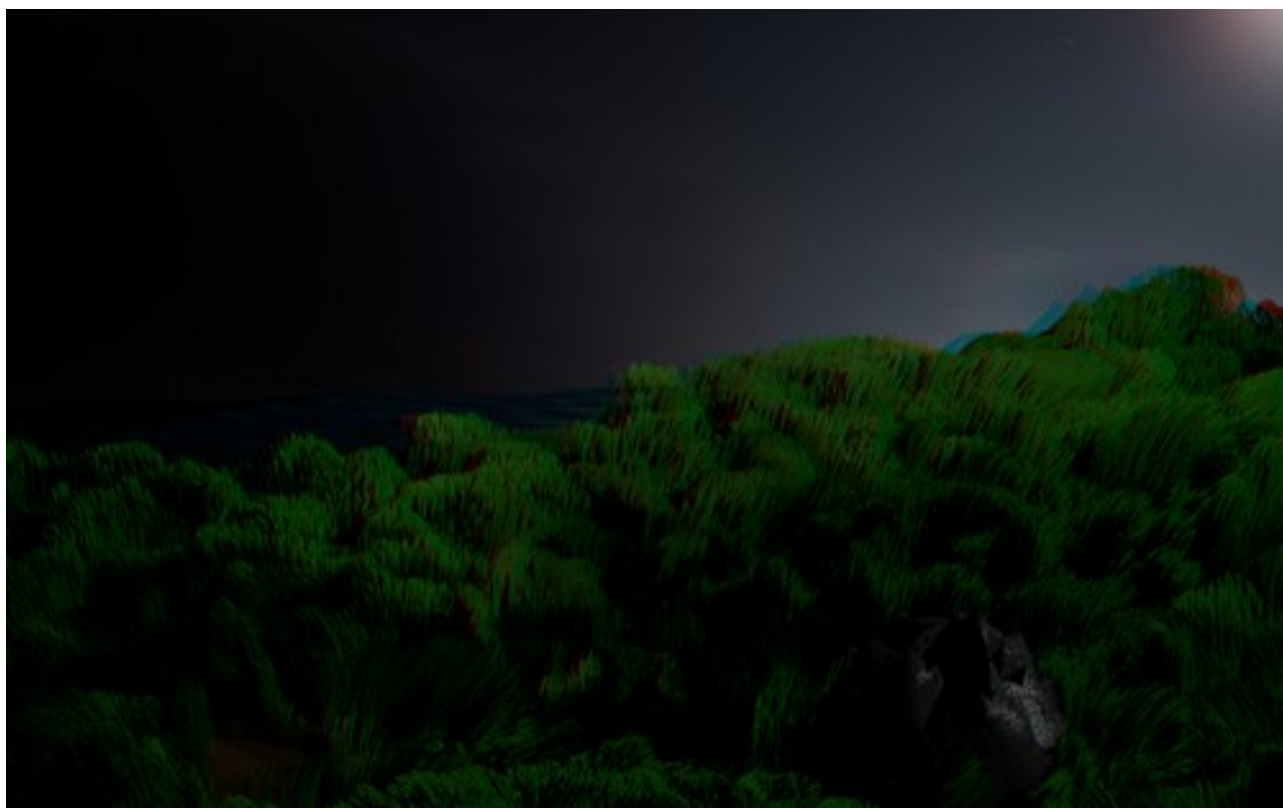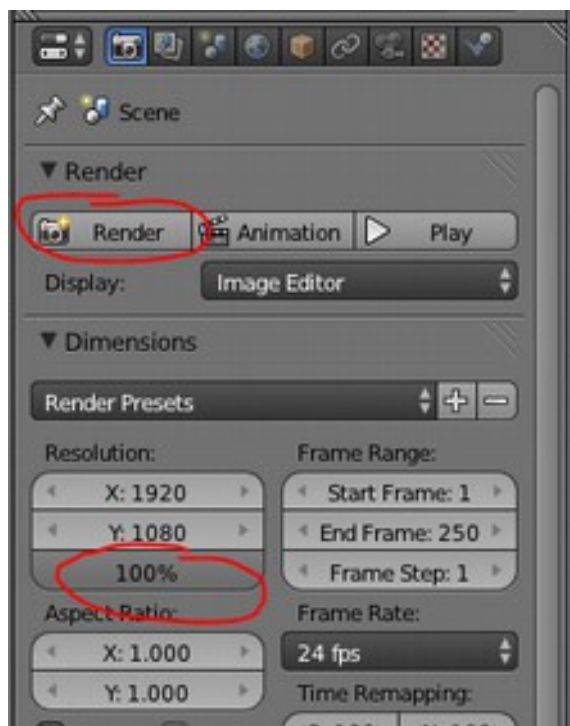
Note that all stereoscopic render modes, except "Side by Side", will only render to the screen. The "Side by Side" option will only show the full result in the Blender-tmp folder. On Windows, this is usually "C:\tmp\".

Using the "Side by Side" option, you may have a look to the output node to understand how its functionality (just perform a RM onto the File Output node):
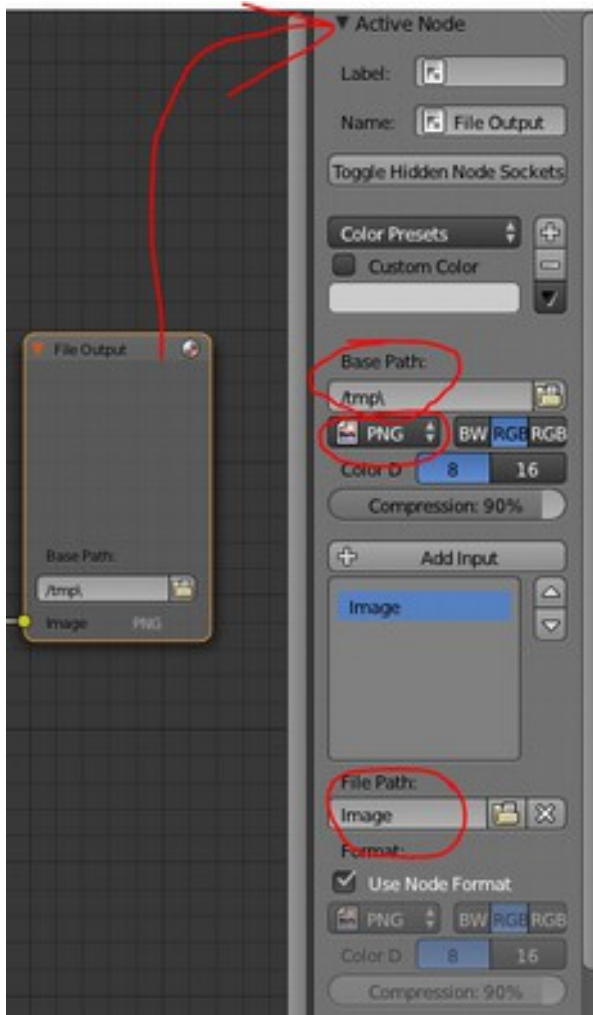

The "Base Path" shows, where the raw images will be saved. Then, the format is defined. I suggest to use PNG, because its compression is lossless.

The "File Path" represents the name of the files. So, you will find Image0001.png in the tmp folder after you have finished the rendering.

To define an output file for "Side by Side Squashed" (two images are compressed to 1XFull HD), do the following after you added the nodes like previously described:

Choose your preferred file type for the generated images in the "Render" dialog (previous page).

Then, connect the generated node (place it somewhere via LMB) to the "Image" output of the "Screen" as marked below:
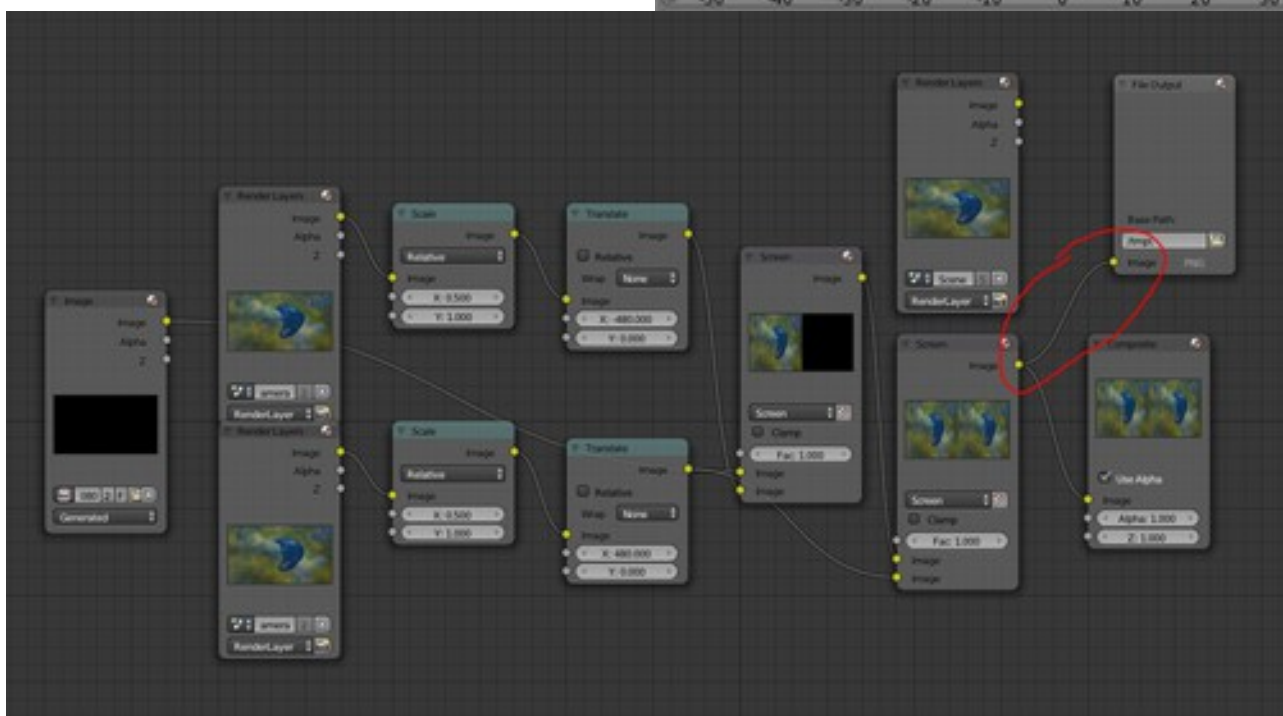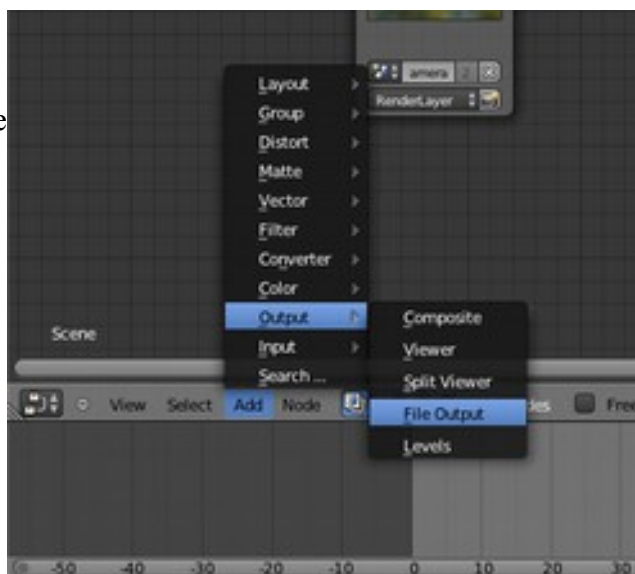
If you now render a screen again, if will be saved to an image file. However, if you render an animation, the files will be saved as a movie file in the tmp directory.
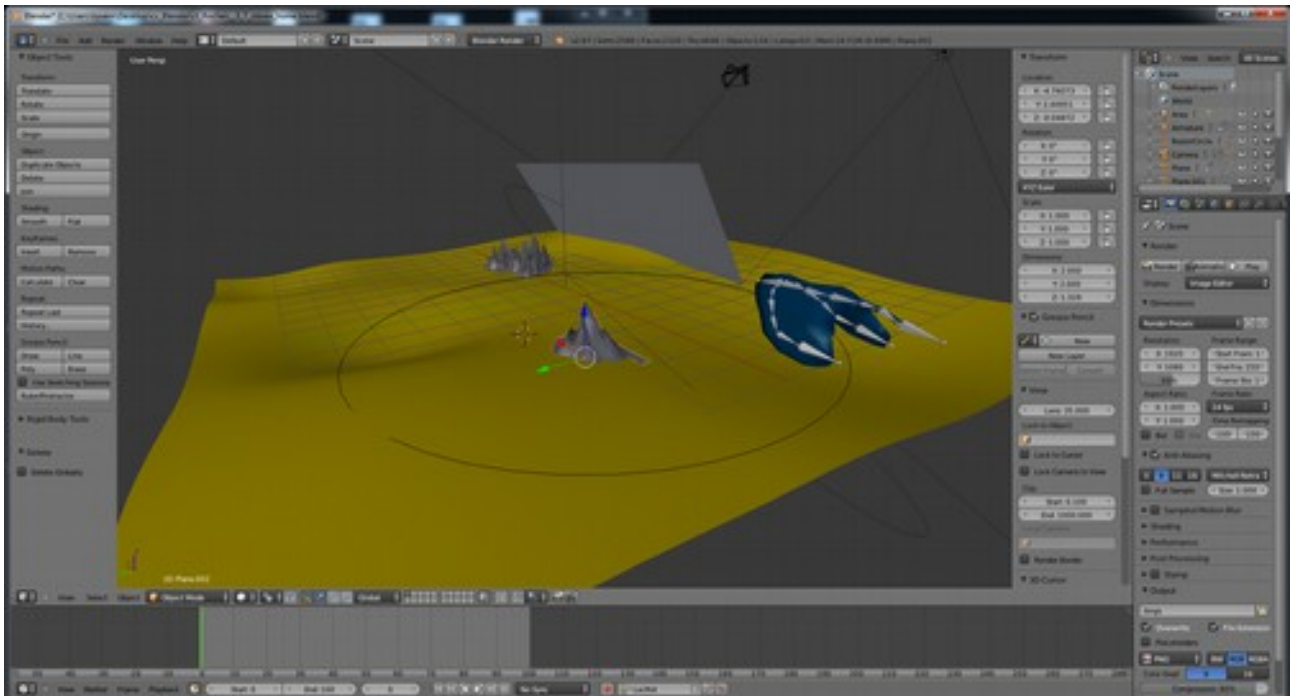
Creating a Camera Path

Now, we will create a circular camera path which can be used to observe an object from all sides. We want to create a 360° view of an object.

First, create a circle:

Add → Curve → Circle

Place the center of the circle to an object which want to observe in 360°.
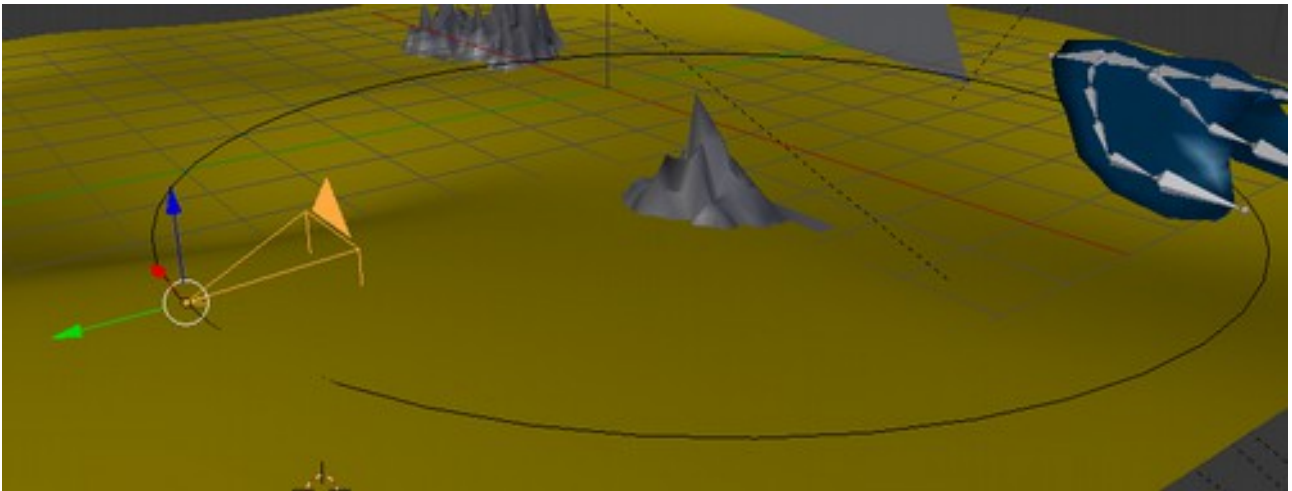

Now, add a new camera to the scene:

Add → Camera

To define the camera as the active one (which means, it is shown if you are pressing the NUM key 0) just select the camera and press CTRL+0 (the NUM key)

Now move the camera across the circle, pointing towards the object in the center.

Please be aware that in this example the local Y axis of the camera is pointing outwards the circle, this will important for the following settings
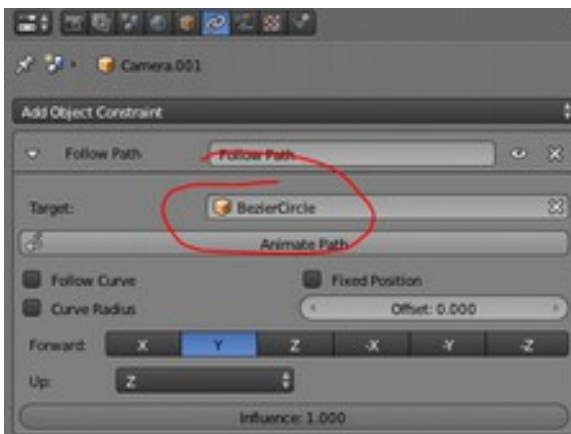
Now, the camera has to be attached to the circle. This is done by using the "Follow Path" contraint:

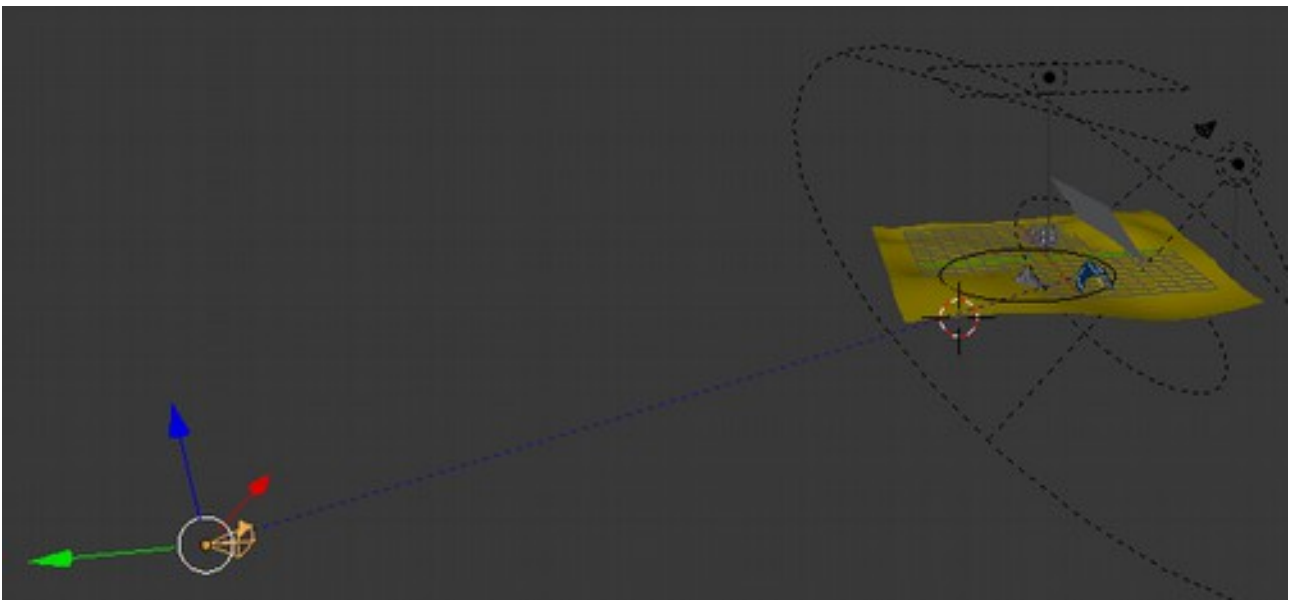First, select the camera, go to the constraints section and select

→ Add Constraint → Follow Path
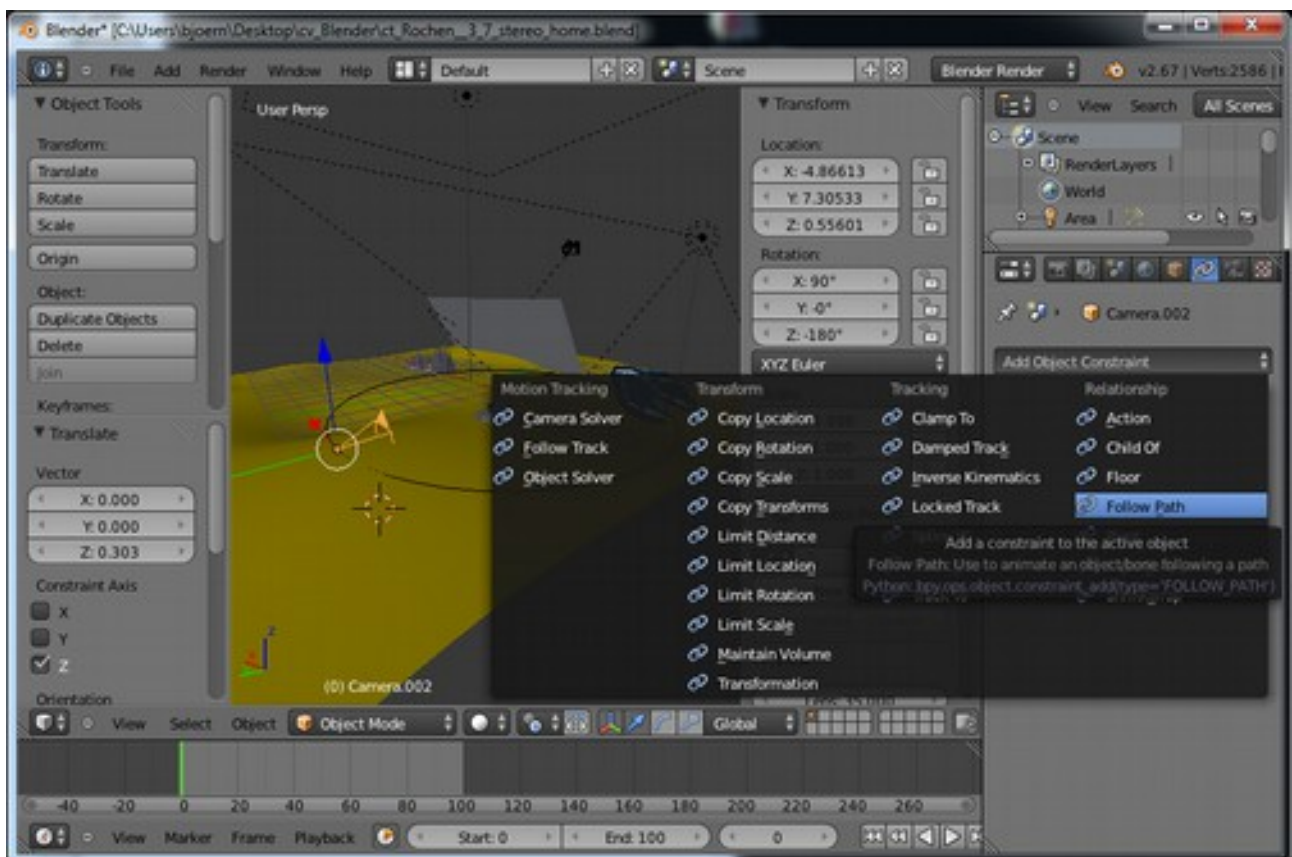
Go now to the constraint dialog and select as the target the BezierCircle:

You will see now that the camera somehow disappeared from the previous position:

Here, the linkage between the camera and the circle is shown by a blue line. This line points to a specific position. Change the position of the camera so that it matches the position of the blue line on the circle. In other words, if you do not see the blue line anymore, you are finished with the placement. Now, you only have to correct the rotation so that the camera is pointing towards the center of the circle.
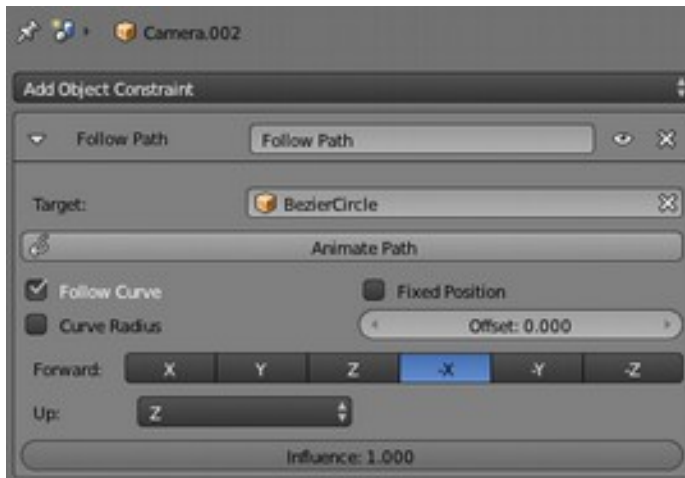
Click "Animate Path". If you move now the animation by using the time line:

you will see that the camera moves and follows the path, but the rotation does not change, it always

points straight ahead, along the local Y axis.

To change this, go to the Follow Path contraint and activate "Follow Curve" and change the Forward selection to "-X".

Now, the forward axis of the camera has changed from +Y to -X, causing a 90° rotation towards the center. (The settings here always depend on the local axis of the camera!)

Target Camera

There is also another option to handle the camera; just transform it to a target camera.

For this purpose, just create a camera and add the constraint "Damped Track".

Create no e.g. a dummy object, Add → Empty → Cube

Select the camera and add the "Damped Track" constraint:

→ Add Constraint → Damped Track

The camera will now always point towards the "Target" which you will have to define as the empty object