

# **VRPanorama by OliVR**

(version 1.9)

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# 1.1. Introduction

VRPanorama is a fast and easy way to make fully functional stereoscopic panorama movies and standard movies for VR Headsets like Oculus or Gear VR and streaming services (Youtube, Facebook).

## FEATURES

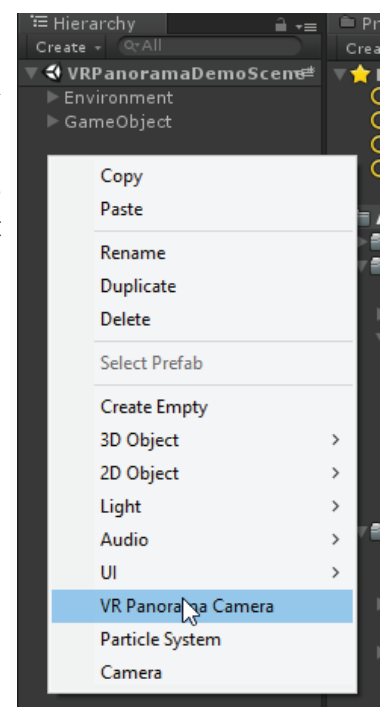
Render Stereoscopic (or monoscopic) 360 panorama image sequences and movies directly from Unity for VR HMD's or video streaming services (like Youtube or Facebook).

- PNG or JPG sequence output.-Animation Capture
- H.246 (MP4) VIDEO output.
- Support for deferred and forward rendering with screenspace image effects.
- Rendering with supersampled antialiasing also in Deffered Mode.
- High quality color conversion from HDR to standard colorspace.
- Render standard HD - 4K video captures.
- Capture audio support with Spatial Audio (Surround 4.0 , 5.1, 7.1 or Ambisonic 4.0 for Youtube).
- VR Panorama RT component for rendering 360 panoramas onscreen in realtime.
- Capture 360 screenshots for Facebook in runtime (only on Windows)

## Usage

-Right click in Hierarchy View and select VR Panorama Camera, or in menu Game Object/VR Panorama Camera. This action will add VR Panorama Camera into your scene. You can also enable VRPanorama by simply adding a VRCapture script to your existing camera.

-Set rendering settings for VRPanorama by modifying VR Capture Component (attached to VR Panorama Camera object). Palce your favourite image effects on camera (like ambient occlusion, ssr, tonemapping, bloom). Note that some Screen Space image effects (like adaptive Tonemapping) could introduce artifacts, but majority of them will work just fine.



## 2.0 Modules

You should start by selecting your desired Capture Mode:

### •Capture Mode:

VR Panorama features 3 different working modes/modules. Every capture mode has its own set of features and settings. Some of them are common, while others are specifically designed for each of the featured modes/modules:

**-Animation Capture** - Use it to capture 360 and standard video animations

**-Still image** - Use it to capture Realtime 360 screenshot images on a key press in editor or in your standalone game.

**-VR Panorama RT** - Render 360 panorama directly on screen in realtime

## 2.1 Animation Capture

### •Capture Type:

Can be Equidistant stereo, Equidistant stereo SBS (side by side) Equidistant Mono or Video Capture. Use stereo for VR HMDs, and Mono for 360 video streaming services like Youtube or Facebook. Video Capture is a standard camera HI-quality capture with configurable antialiasing.

### •Sequence Format:

Can be JPG or PNG. JPG is faster to render, but it introduces some compression artifacts. PNG is lossless but requires more space and is slower to render.

### •Save to Folder:

Folder under Your project folder, where your image sequence will be stored. If folder doesn't exist, script will create it for you.

### •Open Destination Folder:

When rendering finishes, script will open a destination folder for you.

### •Resolution:

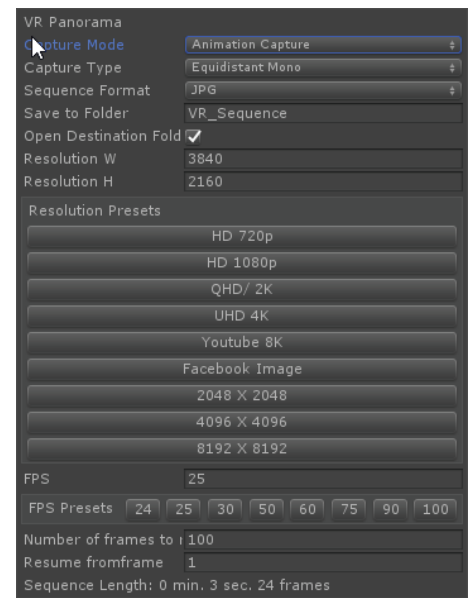
Here you can set a custom resolution, but it's better to choose from a preset below.

### •Resolution presets:

Choose one of them in base of your task. You can select up to resolutions as high as 8192 X 8192

### •FPS:

Image sequence framerate. Can be any, set it in base of your final device. Note that if you don't have fast moving objects, it can be as low as 25 fps. You can choose from presets instead of typing.



•**Number of frames to render:**

Your final sequence length. A scene will stop playing after this number of frames.

•**Start at frame:**

Time in frame domain, from where a rendering will start. Useful if you have to change only one portion of animation.

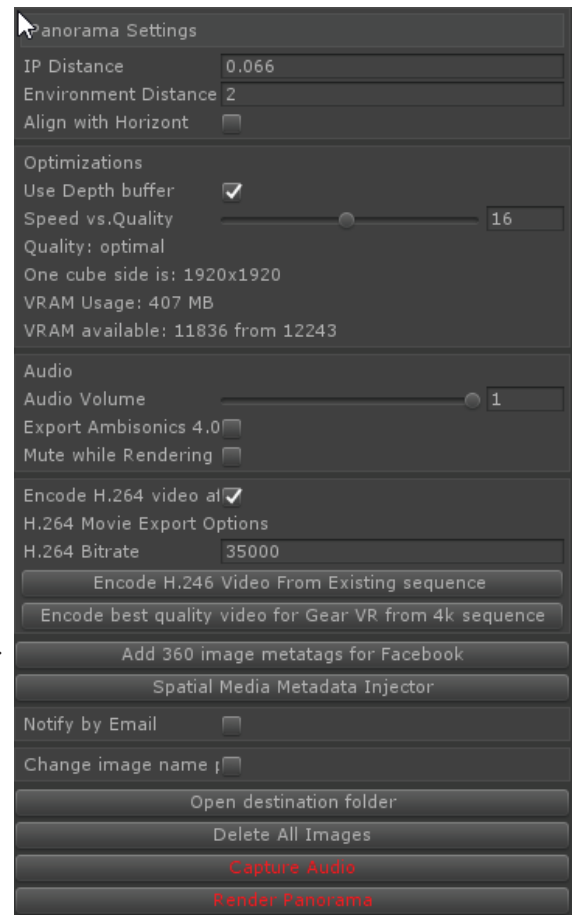
**VR CAPTURE SETTINGS:**

•**IP Distance** (only available in one of the Stereo modes):

Interpupillary distance. Default for average human is 0.064, but I suggest using 0.066 as for people with larger IP distance, 0.064 can be really uncomfortable.

•**Environment Distance** (only available in one of the Stereo modes):

Very important feature. Setting this value correctly makes a lot of difference. It compensates for stitching artifacts. This is a value of a nearest distance where your stitching has to be perfect. Don't set it too close, and don't set it too far. Best values are from 2 to 7. If your scene is large (like outdoors) go for larger values, if you are rendering a small corridor, make it smaller.



*TIP: Use VR Panorama RT Module to preview your stitching and set Environment Distance that fits best your scene. Then Switch back to Animation Capture mode.*

•**Align Horizont:**

Keeps animated camera leveled with horizont. You can use it you already made an animation that rotates cameras on other axes than Y.

**OPTIMIZATIONS:**

**Render Depth buffer:**

Enables Depth buffer writing (default is disabled, as this saves much VRAM), should be used only if you have Z issues with some transparent shaders or Skyboxes

*TIP: Deactivate Render Depth Buffer whenever you can. When activated, your VRAM Usage will be almost twice as large. Also, your rendering speed will decrease.*

**Speed VS. Quality:**

Supersample Antialiasing and subsample quality. Value of 8 is one to one pixel rendering, but without antialiasing (but you could use Image Antialiasing screen space effect). Smaller values are good for speed preview, they will export into a desired format, but with pixelisation. Value as 16 will give you a 2X supersampled antialiasing that is great for transparent textures. You can go as high as 32, that would be a 4X supersampled

AA, but this function has to be used at own risk, especially for 4k or 8K renderings. (it requires lots of VRAM).

*TIP: Be sure to check VRAM Usage fields info. It will give you a warning if your VRAM usage is too high for your rendering system. This calculation is approximate, and depends also of your scene, so feel free to experiment.*

**Audio:**

Audio settings for a Video capture or VR Panorama RT (Realtime)

**Audio Volume:**

Here you can attenuate volume if there are some clippings in final audio.

**Export Ambisonics 4.0:**

Export Ambisonics audio for Youtube (or other services that have support for this type of spatial audio encoding). Please read a section 3.2 of this manual.

*TIP: To understand spatial audio capturing, please read a section 3.2 of this manual.*

**Mute while rendering:**

Mute audio while rendering video.

**Encode To MP4:**

Encode a video file after rendering finish.

**MP4 bitrate:**

Encoding bitrate for videos.

*TIP: When using Resolution presets, MP4 Bitrate will be set accordingly to the best recommended bitrate. If you want a smaller video filesize, you can set some smaller values.*

**Encode H.246 Video from Existing Sequence:**

Encodes to video an existing image sequence. Useful if you want to re-encode at a different bitrate.

**Encode best quality video for Gear VR from 4k sequence:**

Encodes to video an existing image sequence. It can be used for encoding a best quality H.246 for Gear VR devices. Note that sequence has to be rendered on max 30fps.

**Notify by mail:**

You have to render a long sequence, and don't want to stay in front of your computer. Check this box and fill your email settings, and you will receive an Email when rendering finishes. You have to use credentials of an existing Gmail account.

**Open Destination Folder (button):**

Opens a storage file folder.

**Change Image Name:**

Here you can change a prefix of a numbered image sequence.

**Capture Audio (button):**

First step to do when capturing videos with audio. It will play a scene and capture audio sequence. Be aware that some audio will not be captured as intended, as it will start later cutting a start of an audio (unity takes some time to initialize scene, but audio will start before). This happens if an audio track is meant to be played at awake. For syncing audio tracks like backing music, please, use a script "AudioSyncWithVR-Capture.cs".

Audio capture has to be done before Render Panorama capture. It will check if there is an existing audio file, and will add it to a video stream.

**Render Panorama (button):**

Render your panorama with a click. But, you can also render it by playing a scene.

## 2.2 Still Image Capture Module

VR Panorama features a mode where you can capture single panoramic screenshots simply with a press of a Key. This mode works in Editor and in Runtime.

Any captured 360 mono panoramas are compatible with Facebook 360 images and VR Panorama will automatically add necessary metatags\*. This means that you can freely upload 360 photos to facebook, and it will recognise that this image is 360 panorama.

\*automatic tagging is supported only on PC platform. Be aware that Facebook 360 images has to be mono and have 2:1 resolution aspect ratio. Max resolution is 6000x3000 (at the moment).

**•Capture Type:**

Can be Equidistant stereo, Equidistant stereo SBS (side by side) Equidistant Mono or Video Capture. Use stereo for VR HMDs, and Mono for 360 video streaming services like Youtube or Facebook. Video Capture is a standard camera HI-quality capture with configurable antialiasing.

**•Sequence Format:**

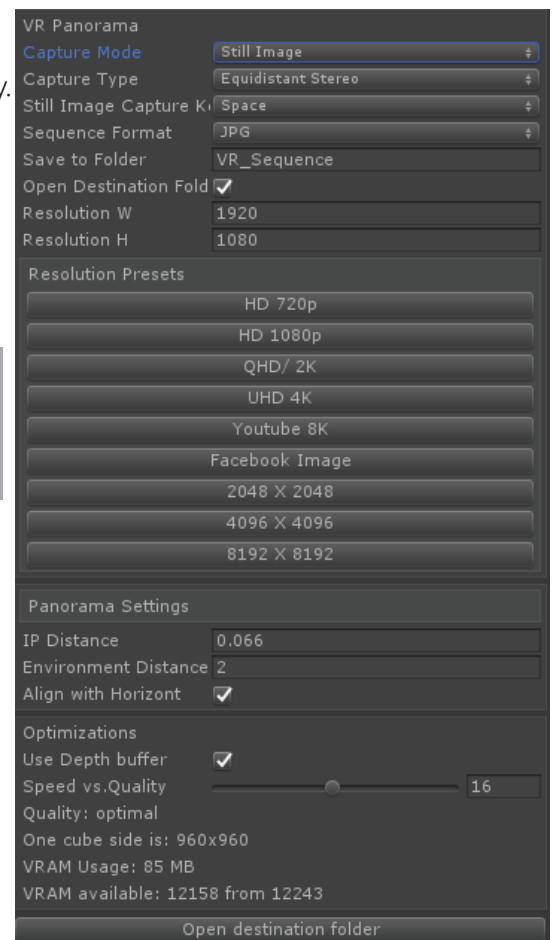
Can be JPG or PNG. JPG is faster to render, but it introduces some compression artifacts. PNG is lossless but requires more space and is slower to render.

**•Save to Folder:**

Folder under Your project folder, where your image sequence will be stored. If folder doesn't exist, script will create it for you.

**•Resolution:**

Here you can set a custom resolution, but it's better to choose from a presets below.



### •Resolution presets:

Choose one of them in base of your task. You can select up to resolutions as high as 8192 X 8192

## PANORAMA SETTINGS:

### •IP Distance (only available in one of the Stereo modes):

Interpupillary distance. Default for average human is 0.064, but I suggest using 0.066 as for people with larger IP distance, 0.064 can be really uncomfortable.

### •Environment Distance (only available in one of the Stereo modes):

Very important feature. Setting this value correctly makes a lot of difference. It compensates for stitching artifacts. This is a value of a nearest distance where your stitching has to be perfect. Don't set it too close, and don't set it too far. Best values are from 2 to 7. If your scene is large (like outdoors) go for larger values, if you are rendering a small corridor, make it smaller.

*TIP: Use VR Panorama RT Module to preview your stitching and set Environment Distance that fits best your scene. Then Switch back to Animation Capture mode.*

### •Align Horizont:

Keeps animated camera leveled with horizont. You can use it you already made an animation that rotates cameras on other axes than Y.

## OPTIMIZATIONS:

### Render Depth buffer:

Enables Depth buffer writing (default is disabled, as this saves much VRAM), should be used only if you have Z issues with some transparent shaders or Skyboxes

*TIP: Deactivate Render Depth Buffer whenever you can. When activated, your VRAM Usage will be almost twice as large. Also, your rendering speed will decrease.*

### Speed VS. Quality:

Supersample Antialiasing and subsample quality. Value of 8 is one to one pixel rendering, but without antialiasing (but you could use Image Antialiasing screen space effect). Smaller values are good for speed preview, they will export into a desired format, but with pixelisation. Value as 16 will give you a 2X supersampled antialiasing that is great for transparent textures. You can go as high as 32, that would be a 4X supersampled AA, but this function has to be used at own risk, especially for 4k or 8K renderings. (it requires lots of VRAM).

*TIP: Be sure to check VRAM Usage fields info. It will give you a warning if your VRAM usage is too high for your rendering system. This calculation is approximate, and depends also of your scene, so feel free to experiment.*

## 2.3 VR Panorama RT Module

NEW Feature of VR Panorama adds a VR Panorama RT MODULE. This module lets you render onscreen VR Panoramas in Realtime in HD resolution. This is usefull if you have a HD capture/streaming card, and you want to Live Stream your gameplay via internet. It doesn't feature any streaming method, but gives you only a possibility to render Fullscreen VR Panoramas that can be later captured with a hardware device (or something like Spout). Note that you would want to use advanced hardware and latest generation GFX cards (something like GTX980ti or Titan). Also, you would use this component fullscreen directly from a compiled player. Be avare that it uses monitor aspect ratio standards, so set your player resolution and aspect ratio accordingly to your resolution (1920x1080, 16:9 aspect ratio).

### •Capture Type:

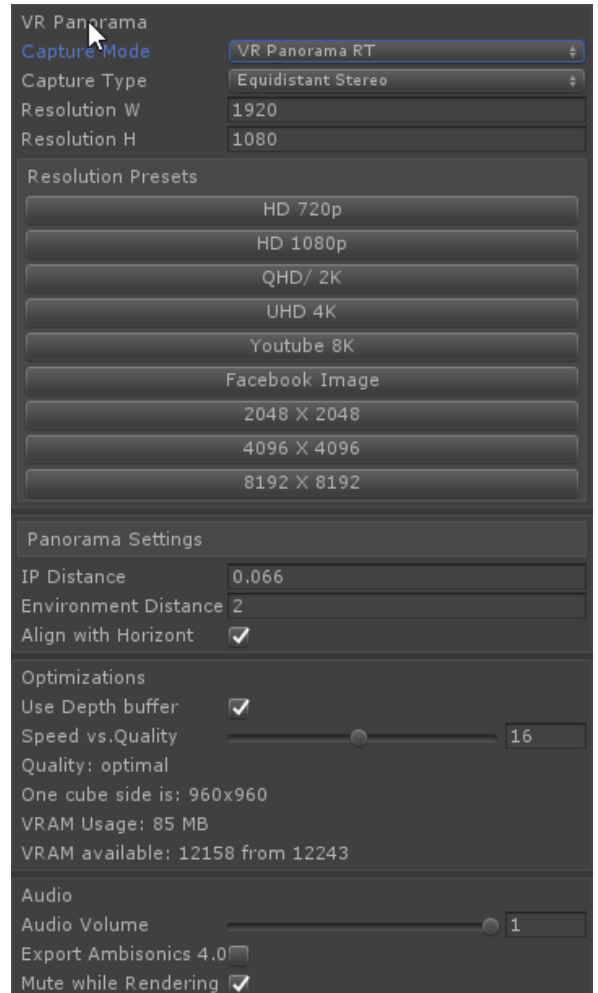
Can be Equidistant stereo, Equidistant stereo SBS (side by side) Equidistant Mono or Video Capture. Use stereo for VR HMDs, and Mono for 360 video streaming services like Youtube of Facebook. Video Capture is a standard camera HI-quality capture with configurable antialiasing.

### •Resolution:

Here you can set a custom resolution, but it's better to shoosse from a presets below.

### •Resolution presets:

Choose one of them in base of your task. You should set your resolution as high your capture device (or monitor) can support.



### VR CAPTURE SETTINGS:

#### •IP Distance (only available in one of the Stereo modes):

Interpupillary distance. Default for average human is 0.064, but I suggest using 0.066 as for people with larger IP distance, 0.064 can be really uncomfortable.

#### •Environment Distance (only available in one of the Stereo modes):

Very important feature. Setting this value correctly makes a lot of difference. It compensates for stitching artifacts. This is a value of a nearest distance where your stitching has to be perfect. Don't set it too close, and don't set it too far. Best values are from 2 to 7. If your scene is large (like outdoors) go for larger values, if you are rendering a small corridor, make it smaller.



*TIP: Use VR Panorama RT Module to preview your stitching and set Environment Distance that fits best your scene. Then Switch back to Animation Capture mode.*

**•Align Horizont:**

Keeps animated camera leveled with horizont. You can use it you already made an animation that rotates cameras on other axes than Y.

**OPTIMIZATIONS:**

**Render Depth buffer:**

Enables Depth buffer writing (default is disabled, as this saves much VRAM), should be used only if you have Z issues with some transparent shaders or Skyboxes

*TIP: Deactivate Render Depth Buffer whenever you can. When activated, your VRAM Usage will be almost twice as large. Also, your rendering speed will decrease.*

**Speed VS. Quality:**

Supersample Antialiasing and subsample quality. Value of 8 is one to one pixel rendering, but without antialiasing (but you could use Image Antialiasing screen space effect). Smaller values are good for speed preview, they will export into a desired format, but with pixelisation. Value as 16 will give you a 2X supersampled antialiasing that is great for transparent textures. You can go as high as 32, that would be a 4X supersampled AA, but this function has to be used at own risk, especially for 4k or 8K renderings. (it requires lots of VRAM).

*TIP: VR Panorama RT has to render a lots of pixels. Don't use too high settings for Quality vs. performance. A good value to start is 8 - that means it will render without antialiasing. Use AA as image effect.*

*TIP: Be sure to check VRAM Usage fields info. It will give you a warning if your VRAM usage is too high for your rendering system. This calculation is approximate, and depends also of your scene, so feel free to experiment.*

**Audio:**

Audio settings for a Video capture or VR Panorama RT (Realtime)

**Audio Volume:**

Here you can attenuate volume if there are some clippings in final audio.

**Export Ambisonics 4.0:**

Export Ambisonics audio output (or other services that have support for this type of spatial audio encoding). Please read a section 3.2 of this manual. This will output your audio in ambisonics format.

*TIP: To understand spatial audio capturing, please read a section 3.2 of this manual.*

**Mute while rendering:**

Mute audio while rendering video.

# GENERAL INFORMATION ON STEREOSCOPIC 360 PANORAMA MOVIES

Be aware that VR 360 panorama can suffer some stitching artifacts. Unfortunately, these artifacts can't be avoided for stereoscopic VR panoramas (in general, it applies to all techniques). It will happen when objects are near camera (they are bigger as object gets closer to camera, but they will get smaller or eventually disappear for objects that are far away). Due to a parallax difference between eyes, you can't correct them in any way without breaking stereoscopic illusion. There are different techniques for minimizing (one of them is usage of vertical scanline rendering technique, but it works only with static stereoscopic panoramas, as for animation, it would introduce heavy wobbling and spatial distortion (closer objects will be vertically stretched resulting in a wrong dimensional perception)).

Here are some tips on how to minimise stitching artifacts:

- use correctly a Environment Distance value.
- place camera in a way that those stitching edges look at objects that are far from camera.
- Project your animations in a way that they capture viewers attention at zones that are artifact free.
- Avoid using thin vertical objects.
- On near planes like floor use textures that don't have large checker or stripe patterns. High frequency textures or uniform colors work better.

VRPanorama asset is made to use psico-optical perception illusion: these artifacts are more visible in unwrapped image than in VR.

## Troubleshooting

-DO NOT change a default installation directory (Assets/VRPanorama) as this will break correct functioning of a script!

-BE SURE THAT YOU AREN'T USING A WEB PLATFORM (under build settings). WEB PLATFORM doesn't support writing to disk, and using it will break the script.

-Unity has a shadowing system that is limited on available VRAM. If you notice that in your scene a realtime shadows disappear, lower your "Speed VS. Quality" settings or a final resolution. This could happen if there are many ScreenSpace effects that use RT's, rendering to 4K stereo panorama output, especially on GFX cards that have 2 gb or less VRAM. A future version of VR Panorama will be more optimised on VRAM usage.

-When rendering VR Panorama, please turn off your HMD device if Unity 5 Virtual Reality Supported is active. VR Device tracking could mess with Virtual cameras that VR Panorama uses.

Support mail: [olix@iol.it](mailto:olix@iol.it)