Spherical panoramic images (360° x 180°)

They are images that create environments of 360 degrees in which to insert an object. If you want to see how a piece of furniture (sofa, chair, etc.) is integrated in an environment, you can use the 3D model of the cabinet and an image to 360x180 degrees.

Below a frame d’example:

The application referred to by the image is at the following link:
http://www.nobrandsolution.com/ecommerce-design/Nami_3D.html

These images allow the user to view an environment in every direction
There are applications that allow you to navigate within these images glancing in the direction you want to watch. These applications allow to rotate a video camera placed at the center of a virtual sphere, on which is applied the image to 360x180 degrees. If we place an object within a setting, we will crush the ball so as to create a support surface for the object. Then we'll get a form like this:

![Diagram of a virtual sphere with a grid]

**Methods of creation of images Panoramic Spherical**

To produce these images you can use different methodologies:
The easiest and inexpensive (if you own a smartphone or a tablet) is to use specific applications, which capture multiple images in each direction, and the process to provide a single spherical image.

The method is simple, but may present defects typical of these applications:
When you turn the device on himself to capture images in all directions, it is likely to move over the camera from its axis of rotation. The images do not coincide with each other and the software automatically applies shading to "eliminate" the error.

https://www.youtube.com/results?search_query=occipital+panorama

In addition, the image quality is related to the quality of the camera of the device you are using.

There is only one rule to follow when using these apps: Choose the place in the room where will be located the 3D model of furniture. Position the device at that location (can also be close to a wall) and capture images in all directions. You can get better results with the use of a camera with a fisheye lens. It is possible to realize both shots, that without a tripod. The following tutorial explains how to do:
If you use a tripod you must also use a swivel mount, like the one in the picture.

After these images have to join them. PTGui is software that performs this task. Even here there are plenty of tutorials on the web.

Finally there are tools dedicated to the production of images (and movies) spherical panoramas. It is probably the most expensive method, but it returns results quickly and with quality. One such tool is the bublcam.

Apply images to the spheres.

This type of images is also used to create experiences Virtual Reality. Oculus Microsoft uses this type of images, but is imposing its own standard. This is a "classic" spherical panoramic image, produced with a ipad2 and the app 360 Panorama Occipital (the same results can be achieved even with the App Photosynth Microsoft).

It is named LatLong Projection, and has the following structure:
This is the same transformed image to the standard of Oculus (cubemap):

It is an Nvidia Cube Map, and has the following structure:

The image consists of 6 square images 1536x1536 pixels.
These images are applied on a sphere. The classic 3D sphere has this structure:
As the ball used by **Oculus** has this structure:

Create panoramic images in the Nvidia Cube Map format, allows to get images that can be leveraged for Virtual Reality applications, or for shader/Environment of Unity3D (Skybox) that supports this standard.

This panoramic images can be projected on several geometries:

- Sphere (For 360 videos)
- Plane (For regular movies projected on a virtual screen)
- Cube (Often used in video games)
- Cylinder (Mainly for panoramic pictures)
- Dome (For action cameras like the go pro)
- Full dome (For imax style experiences)
- Custom geometry imported from Maya or 3D Studio (For experimenting with other typologies)
Conversion from LatLong Projection Cube Map to Nvidia Cube Map, at this moment, seems only possible through 3D software. It is possible to do the conversion by the Unity plugin (Free) “Panorama to Cubemap”. And possible to convert inside Unity through the plugin (Free) “Panorama to cubemap”.

In the image you can see the main window of the Plugin, which shows the conversion occurred. The only drawback seems to be the maximum image resolution (1024x1024) below the demands of Oculus (1536x1536).
It is possible to convert images through render 3D software. Octane Render has Panoramic CubMap Camera, that returns the image of six panes.
To obtain the conversion of the image just make a spherical render by a Panoramic CubMap Camera placed in the middle of the sphere.
In this case there isn't limitations of maximum resolution

**Application in Unity**

It is possible create a scene, with an object in the middle, by Unity. The enviroment is a Panoramic Spherical Image. The observer can rotate around the object, within the enviroment.
In order to make it, it is necessary:
- the 3D model in the middle of the scene;
- A sphere deformed to provide a plan to place the object. It is possible use also other 3D objects such as a Cube;
- A Camera that rotates around the object.

Applying the cubemap to the deformed sphere, you will get a 360 degrees background for the object, that you'd like to place in the enviroment. It is possible apply at the same sphere, different cubemap panoramic images. It means that the application can have several locations to choose from.

**Notes:**

- The Panoramic sphere images or the Cubemap, aren't HDRI images. They could be also HDRI images.
In order to have an HDRI image you need of 32 bit images. They are obtained by overlapping the same photograph taken with a different exposures (at least three different exposure values). The HDRI images can be not panoramic images.

- It is possible create images for virtual reality supported by Oculus using 3D Render techniques or by a Stereographic Camera. It will be created spherical enviroment by 3D Stereo Render. Some examples: [http://vrplayer.tv/](http://vrplayer.tv/)