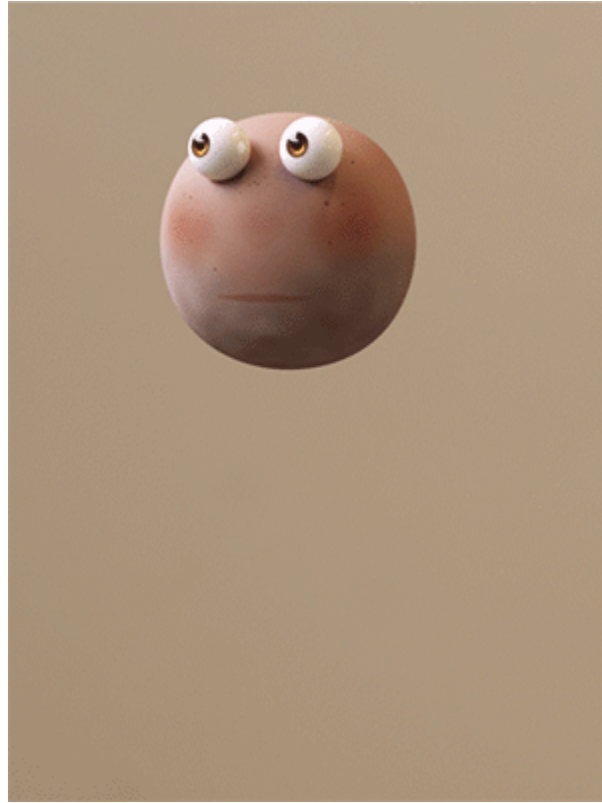


Vector Displacement from Mudbox to Arnold



In this tutorial, we will take you through the process of rendering a head model from nothing but a sphere and a vector displacement map. Vector displacement maps are a powerful and efficient way to add detail to your scene without the overhead of managing complex geometry. They provide a very efficient workflow when working with models from 3D sculpting applications and Arnold. Unlike traditional gray scale displacement maps which simply use a line long for the vertex normal, vector displacement maps have RGB values which represent the XYZ displacement direction and size. This means they don't follow a fixed surface normal and can move in any direction, including overlapping each other.

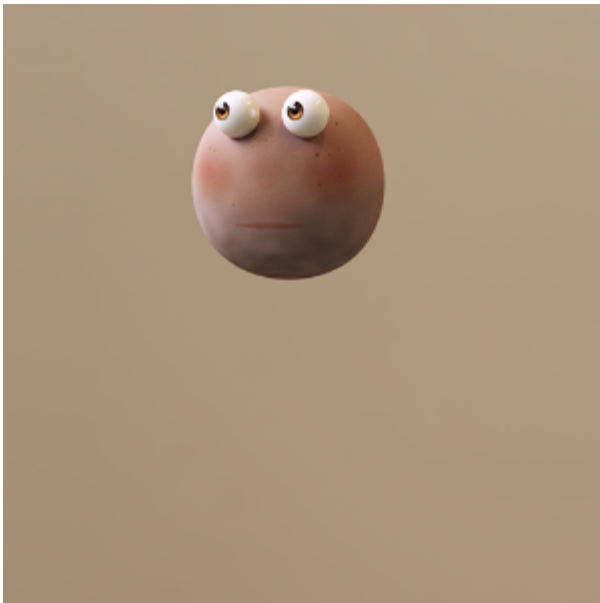
However, vector displacement maps have larger file sizes because they have to store more information than regular displacement maps. Also bear in mind that vector displacement maps, as with normal displacement maps, are not perfect for every situation. For example, UV seams can be problematic when using vector displacement maps.

Many thanks to the very talented [Zeno Pelgrims](#) for providing the assets and assistance for this tutorial.

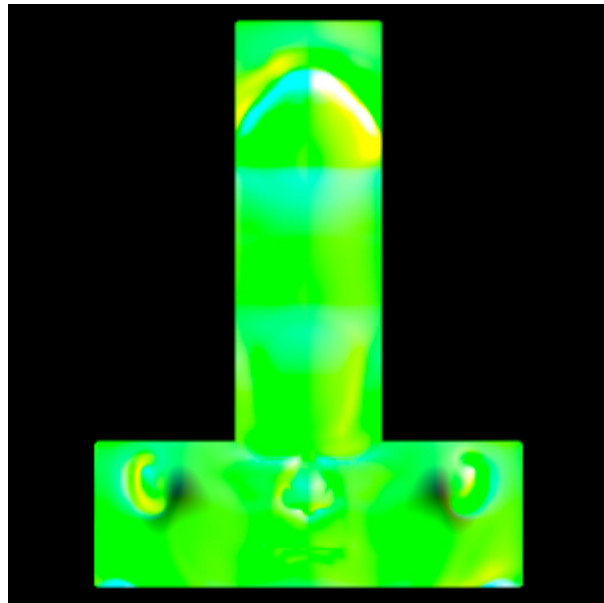
The [sphere.obj](#), [vector displacement map](#) and [diffuse color map](#) can be downloaded [here](#).



Ensure that you enable *Texture Coords* when importing the *sphere.obj* file (off by default) otherwise, the UVs will be missing and you will get incorrect displacement.



Sphere without vector displacement



Vector displacement map

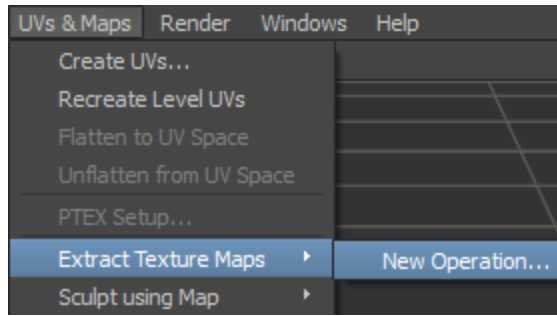
Mudbox

The original head sculpt has been extracted from Mudbox using the following settings.

●	- Scene	Geometries: 2	Cameras: 4
●	+ Perspective	FOV: 0.49	Near: 1.0000
●	+ Top	FOV: 0.49	Near: 1.0000
●	+ Side	FOV: 0.49	Near: 1.0000
●	+ Front	FOV: 0.49	Near: 1.0000
●	● Light 01 - Directional	Intensity: 0.80	
●	● Default Material		
●	- projected_sculpt	Levels: 1	Layers: 0
●	level_0	Faces: 1572864	Hidden: 0
●	- subdivided_sphere	Levels: 1	Layers: 0
●	level_0	Faces: 1572864	Hidden: 0

Mudbox sculpt details

- The vector displacement was extracted from the original head model in Mudbox under the menu **UVs & Maps > Extract Texture Maps > New Operation**



- Mudbox provides the following settings for extracting textures from models. In this case, we chose **Vector Displacement Map** and changed the **Vector Displacement** to **Absolute Tangent**. Ensure that the map is saved using **32-bit FP** depth and has a high enough resolution. This will give us an accurately displaced render in Arnold.

Name: My Extraction Operation 1

Maps to Generate:

- Transfer Paint Layers
- Ambient Occlusion Map
- Vector Displacement Map
- Displacement Map
- Normal Map

Vector Displacement Map Extraction

Compare detailed and simple surfaces and extract the detail



Target Model

Source Model

Vector Disp. Map

Extraction Options

Target Models (low resolution mesh)

1 subdivided_sphere level 0

Add All

Add Selected

Remove

Smooth Target Models

Smooth Target UVs

Use Creases & Hard Edges

Source Models (high resolution mesh)

1 projected_sculpt level 0

Add All

Add Selected

Remove

Smooth Source Models

Image properties

Generate one map for all targets

Image Size: 4096x4096

Antialiasing: Off

Vector Displacement Map Options

Vector Space: Absolute Tangent

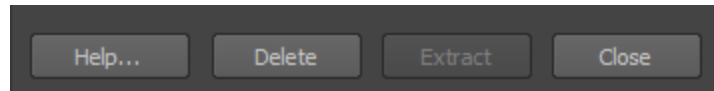
Output options

Map Type: Texture

Base File Name:

Bits per Channel: 32-Bit FP

Preview as Vector Displacement Map:



i Make sure that you use a 32bit or 16bit floating-point format to store your image, and not an integer format. An integer format will not work correctly. This is because integer formats do not support negative pixel values, which are used by floating-point displacement maps.

✓ The Utility shader can be useful for diagnosing issues when rendering displacement maps.



Utility shader. Shade mode set to *ndoteye* and Overlay Mode set to *polywire*.