Triplanar Ultimate

User Guide and Documentation

(While a bit dry, I do recommend giving this a brief skim over even if you think you know what you're doing)

IF YOU ARE USING THIS IN YOUR PROJECT, PLEASE CREDIT ME AND TRIPLANAR ULTIMATE SOMEWHERE! – Luke "Mab" V

Contents:

HOW TO ADD TRIPLANAR ULTIMATE TO YOUR PROJECT

Triplanar Ultimate is a simple assortment of shaders and a single editor that handles them. Adding them to your project is as simple as unpacking the ZIP file and dragging and dropping the shaders into your project
However, there are some caveats that need to be mentioned:

TO ADD THE SHADERS

Drag and drop all or some of the shader files to somewhere in your asset's directory.

I would recommend adding them to a separate shader folder, but not entirely necessary for them to function (as far as I am aware).

TO ADD THE EDITOR

While the shaders can function without the custom editor, I would suggest including it in your project as it adds a lot of functionality and quality of life additions.

While the shaders themselves are fairly unfussy about where in the directory your copy them too, the editor MUST be added to a folder named "Editor" in your assets folder.

Not doing so wont cause the editor to stop functioning, but Unity WILL NOT COMPILE if the editor is not placed in an Editor Folder.

This might be because the editor folder is flagged by unity to not be included in the compilation, and the UnityEditor library isn't designed for compilation. Regardless of the reasoning, just follow the above steps and you should be good to go.

NOTE: UPON SELECTING A SHADER FOR YOUR MATERIAL, YOU WILL NEED TO UNSELECT AND RESELECT THE MATERIAL FOR THE EDITOR TO POP UP

USEFUL TOOLS

https://cpetry.github.io/NormalMap-Online/ - Website to turn Height maps into Normal Maps

http://kitfox.com/projects/perlinNoiseMaker/ - Website for making repeating Noise Textures

HOW TO USE THE EDITOR

THE DIFFERENT SHADERS AND THEIR USE CASES

Once a material is created, select the shader drop down menu. Triplanar Ultimate should be listed as an option, once clicked on you will have access to all the shaders

As you might have guessed, all the shaders are permutations of the same Dual Surface Shader, with their main characteristics between them all being the features that have been removed from the full fat Dual Surface Shader.

Any Shader with “LightWeight” in the title signifies that the Triplanar Blending feature has been removed. By doing so, the performance of the shader gets a sizeable bump, as it no longer has to sample three axis and blend between them all, it can just choose a single axis.

No other feature is sacrificed for this change, and it is the shader I would recommend using the most, especially for urban environments where Triplanar blending usually doesn’t occur.

Any Shader with “NormalLess” in the title signifies, predictably, that all normal mapping for the shader has been removed. Again, for performance reasons. On top of the overhead gained from the lights no longer needing to account for complex normal maps, less texture sampling can occur, and equations regarding normal map reorienting necessary for Triplanar Normal Mapping no longer needs to occur. As blending is still a feature unless the title also includes LightWeight, this is a shader that would be best suited for terrain or rock formations.

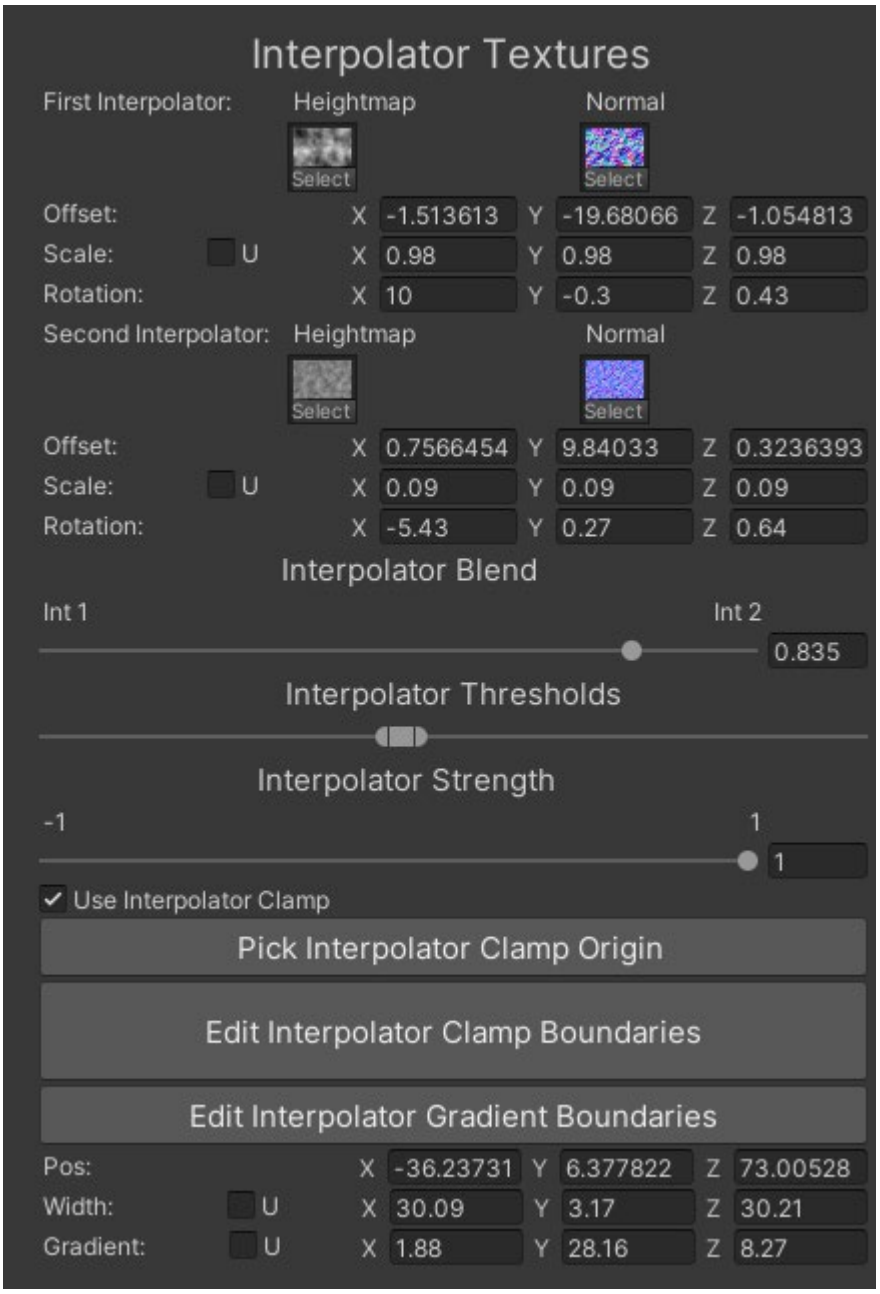
Any Shader that begins with “Single Image” in the title signifies that only all dual image options in the shader have been stripped back to a single image. The interpolator can still be used to add depth and patina to the material.

The Main Textures Component

This component covers the colour and normal map of the textures used, depending on the thresholds set by the interpolator. When at the first interpolator threshold, the top texture will be used and vice versa.

While offset and scale are self-explanatory, I have elected to use the letter U to signify “Uniform” scaling. I.e., any change made to the x y or z axis will be replicated on all other axis

The Interpolator Component



The interpolator component works initially very similarly to the main texture component, but there are a few differences that should be mentioned

As the heading suggests, the interpolator is treated as a heightmap. A colour texture can be used, but afaik, the shader will only consider the red channel.

Also added is the option to rotate the interpolator to allow for hiding the tiling of the interpolator for chaotic textures like noise. Just note, while it does support high rotation, it is not recommended, as it will cause the normal map to become incorrect and face the wrong direction.

Interpolator blend is used to lerp between the interpolators, mixing between the two to again reduce the appearance of tiling or add additional texture. Sliding the slider to the extremes means only one of the interpolators will end up being used, however both will still be sampled

The interpolator thresholds determine the start and end point of the interpolator used, from 0 to 1. All values below the first threshold will be 0 and all above will be 1. As mentioned in the main texture component, when the value of the interpolator is 0, the top texture is used and vice versa.

The interpolator strength variable controls how much the interpolator's normal map overrides the main normal maps. At a strength of 1 or -1, the interpolators normal maps completely override them, with any other value having the interpolator normal fade into the main normal maps until hitting 0

The negative strength value allows for the normal map to be completely flipped. In most cases, this allows for the bottom texture to appear on top of the top texture

And now the clamp.

By default, this will be turned off, allowing for the interpolator to work uniformly across the entire texture. However, there are a great many cases when you only want the interpolator to be applied to a certain range, and that is the role the clamp performs.

Turning it on reveals the rest of the controls

In short, it is a box aligned to the axis, with the effect of the interpolator confined to that box. Furthermore, a gradient can be applied, allowing for smooth transition from no interpolator to full interpolator

Clicking any of the buttons will allow you to edit the clamp by manipulating the position and the boundaries of the clamp and the gradient directly from the scene.

For boundary edit, clicking any of the wireframe circles will select that as the active handle, allowing you to move it with the arrow.

Holding shift will disable the handle to let you more easily select non active handles

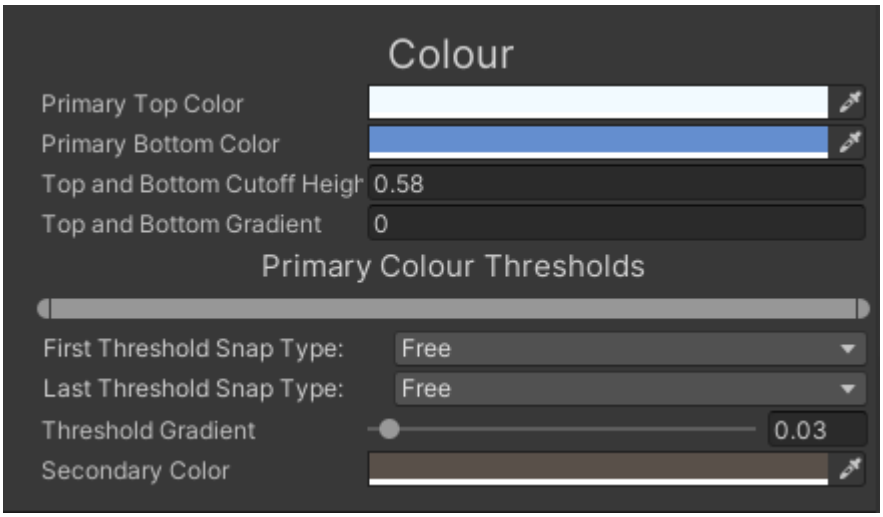
Note that the gradient boundary is double sided and has no limit on how far negative it can go, this is to allow for some interesting where the interpolator is applied everywhere but inside the box and along the axis.

Explicit values for all of these can be manipulated via the vector 3 inputs underneath. If you're finding that you are unable to change the values, or click on anything in the scene, turn off all clamp scene tools (if a button says click to exit, do so)

NOTE:
The set position interaction uses a ray cast to find where you want to place the centre point, which means that any object you want to click on must have a collider

If the scene gizmos are not showing up, try going to window>layouts>default. fixes the problem 99% of the time from personal experience

The Colour Component



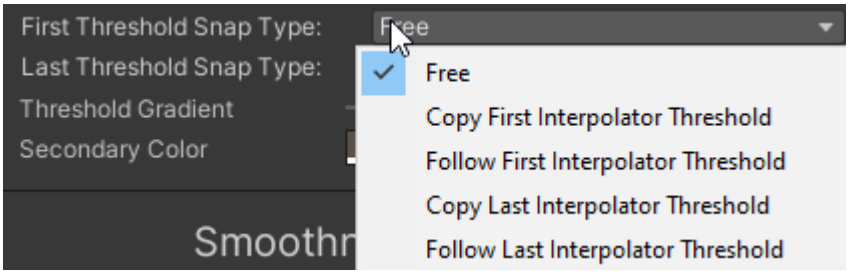
This component determines how colour is applied to the shader. Like everything else, there is a top and bottom layer that can be revealed and hidden using the interpolator values, using a separate threshold system.

The primary colours are split into top and bottom colours. This allows for things like 2 tone tiling, the height of which is determined by the cut-off height, ironically the title of which is cut off. The secondary colour is a single colour.

The primary and secondary colour values interact with the thresholds slightly differently to how the texture component does. The primary colour values are applied inside the thresholds, with the secondary colour applied everywhere else

By using the gradient tool, you can change how the smooth the transition between the colours is, allowing for effects like dirt and grime coming up from the floor, or if the gradient is negative, from the ceiling.

The snap types are a quality-of-life addition exclusive to the custom editor (it is not a feature of the shader alone. Those who wish to change the interpolator thresholds with code must also change the colour thresholds themselves). They handle the colour thresholds' relationship with the interpolator's thresholds. There are three types of relationships each threshold can have:

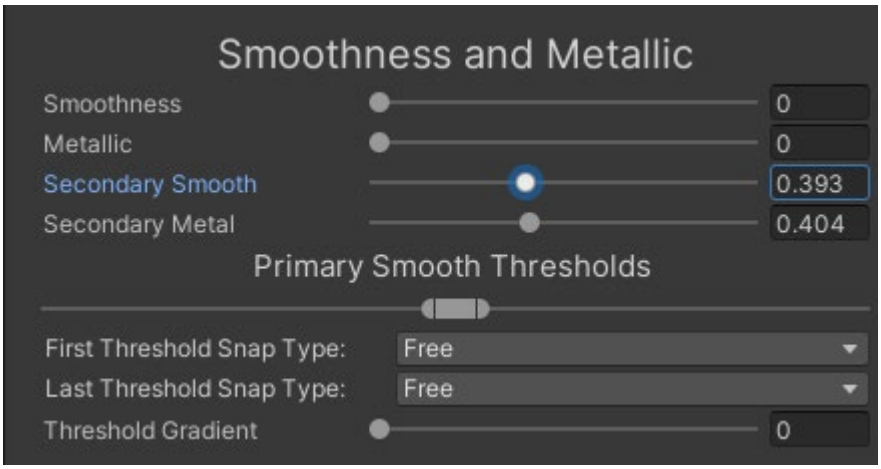


Free means that it has no relation to the interpolator thresholds
Copy means that it will copy the chosen threshold exactly
Follow keeps what relative distance there was to the chosen threshold and maintains that distance. Useful if you want a bit of colour bleed into the interpolator

Keep in mind however, that these settings are unfortunately lost upon hitting play or clicking on another object. Unfortunately, actions are only recorded if they have an object to record, and as such any variables stored in the editor cannot be saved and are dumped.

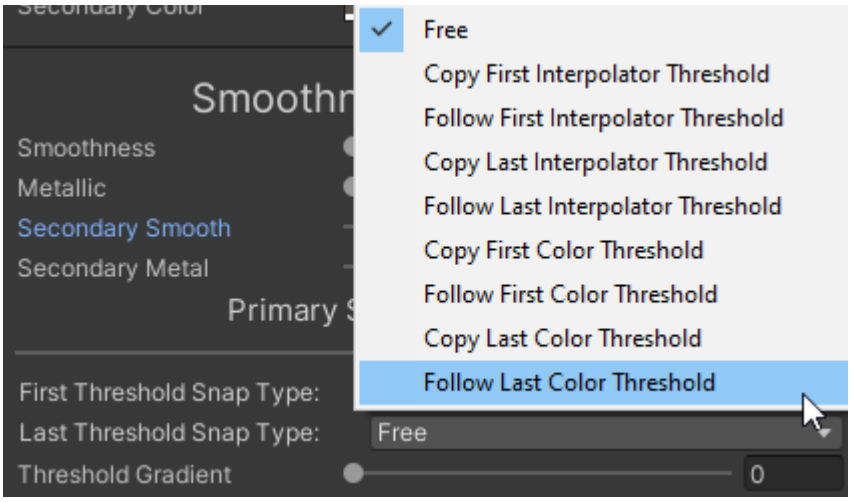
The threshold gradient works like the clamp's, allowing for a smooth transition between primary and secondary colours

The Smoothness and Metallic Component



The final component, one that controls how glossiness and metallic the material is, again influenced by the interpolator.

The primary values, secondary values and threshold gradient are handled the same way the colour component is handled.



The snap types are slightly different, however. The same logic applies, but now there are separate snap types to follow the colour threshold as well as the interpolator's, allowing for hopefully more quality of life with how you choose to use the shader.

NOTE: ALL SMOOTHNESS AND METALLIC VALUES ARE MULTIPLIED WITH THE COLOUR TEXTURE'S ALPHA TO ALLOW FOR MORE DETAIL

And that's all the components!
God this guide is long

Code Documentation

List of variable names and a brief description of their purpose.

Further explanation can be found in the comments of the shader.

Variables with "(N)" after them are not included in NormalLess shaders

Variables with "(L)" after them are not included in LightWeight shaders

Variables with "(S)" after them are not included in Single Image Shaders

(Note the markings are not part of the actual name)

For documentation on how to get and set variables,
https://docs.unity3d.com/ScriptReference/Material.html

Main Texture Variables

_MainTex	Texture2d	The Main Colour Texture
_BumpMap	Texture2d(Normal)	The Main Normal Texture
_MainScaleFactor	Vector3	The Main Scale Factor
_MainOffsetFactor	Vector3	The Main Offset Factor
_UnderTex	Texture2d	The Secondary Colour Texture
_BumpMapUnder	Texture2d(Normal)	The Secondary Normal Map
_SecScaleFactor	Vector3	The Secondary Scale Factor
_SecOffsetFactor	Vector3	The Secondary Offset Factor
_Blending	Float Range 0-1	The Triplanar Blending factor

Colour Variables

_MainColor	Color	The Primary Top Colour
_SecColor	Color	The Primary Bottom Colour
_CChangeHeight	Float	The Primary Colour Transition Height
_CChangeGrad	Float	The Primary Colour Transition Gradient
_CChangePenPos	Float Range 0-1	The Midpoint of the Colour Thresholds
_CChangePenWidth	Float Range 0-1	The Distance of Each Threshold to the Midpoint
_CChangePenGrad	Float Range 0-1	The Gradient of the transition from primary to secondary colour
_CChangeAmbCol	Color	The Secondary Colour

Interpolator Variables.

_InterpBump	Texture2d	The First Interpolator Texture Heightmap
_InterpNormal	Texture2d(Normal)	The First Interpolator Texture Normal Map
_IntScaleFactor	Vector3	The First Interpolator Scale Factor
_IntOffsetFactor	Vector3	The First Interpolator Offset Factor
_Sin	Vector3	The Sin Value of the First Interpolator Rotate Factor Precalculated for performance
_Cos	Vector3	The Cos Value of the First Interpolator Rotate Factor
_SecInterpBump	Texture2d	The Second Interpolator Texture Heightmap
_SecInterpNormal	Texture2d(Normal)	The Second Interpolator Texture Normal Map
_SecIntScaleFactor	Vector3	The Second Interpolator Scale Factor
_SecIntOffsetFactor	Vector3	The Second Interpolator Offset Factor
_SecSin	Vector3	The Second Value of the First Interpolator Rotate Factor, Precalculated for performance
_SecCos	Vector3	The Second Value of the First Interpolator Rotate Factor
_IntBlend	Float Range 0-1	The Lerp Factor Between Both Interpolators
_MinNoise	Float Range 0-0.99	The First Interpolator Threshold
_MaxNoise	Float Range 0.01-1	The Second Interpolator Threshold

NOTE: WHILE THE 2 THRESHOLDS ARE NAMED NOISE, OTHER HEIGHTMAPS OTHER THAN NOISE CAN BE USED AS INTERPRETORS

NOTE: WHILE COLOUR AND SMOOTHNESS THRESHOLDS ARE EXPRESSED AS MIDPOINTS AND WIDTHS, THE INTERPOLATOR THRESHOLDS ARE EXPRESSED AS EXPLICIT START AND END VALUES

_IntPosInf	Float(Toggle)	Determines If the clamp is used
_IntClampPos	Vector3	Clamp Position
_IntClampWidth	Vector3	Clamp Width Values
_IntPosGrad	Vector3	Clamp Gradient Values
_NoiseBumpStrength	Float Range -1 1	Intensity of Interpolator Bump Map

Smoothness and Metallic Variables

_Glossiness	Float Range 0-1	The Primary Smoothness Factor
_Metallic	Float Range 0-1	The Primary Metallic Factor
_SecGlossiness	Float Range 0-1	The Secondary Smoothness Factor
_SecMetallic	Float Range 0-1	The Secondary Metallic Factor
_SmoothStart	Float Range 0-1	The Midpoint of the Primary Thresholds
_SmoothEnd	Float Range 0-1	The Distance of Each Threshold to the Midpoint
_SmoothSmooth	Float Range 0-1	The Gradient of the transition from primary to secondary Factor