Controlling Lines

UE4 Character Cel Shading Pack

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Silhouettes and Creases

The lines we detect and draw consist of two parts, silhouette and crease lines. The silhouette lines mainly captures the boundary pixels of objects, while crease lines captures interior lines of objects. We combine those two lines to generate final line drawing (Figure 1).

Figure 1. (Left) Silhouette Only, (Middle) Crease Only, (Right) Silhouette + Crease

The line width, color, and detection threshold of each line can be controlled in the material instance of PP_CharCelShading_silhouette_and_crease material (Figure 2). If you don't want to draw crease, you can input 0 in the crease line width.

Figure 2. Line drawing parameters in the PP material instance

Thin (Subpixel) Lines

Our line drawing material detects lines by testing the difference of certain geometric values between neighboring pixels. But because we decide the line for each pixel, the detected lines cannot be thinner than one pixel width. To draw thinner lines, the only way is to provide subpixel information to our line drawing material. In UE4, users can do such a thing by putting higher values than 100 in "Screen Percentage" parameter in the PP volume (Figure 3). We used 200 for our Mixamo demo video scene. Notice the higher value means the higher computation cost for overall rendering. It would be important to minimize the computation cost to find the smallest value of this parameter when you get the satisfying line quality.

Figure 3. The Screen Percentage option in PP volume to enable thin lines.

Use Normal Map for Line Detection Option (v1.1.0)

If you are using normal map for your cel shading material instance, you will see an option "Use Normal Map For Line Detection" in the material instance. By turning on the switch, the crease line drawing material will use normal-map-applied-normal-vectors of the character. It makes the interior lines much more detailed. But, in some cases users may want to turn the option off because the normal-map-based lines can be too much detailed (Figure 4).

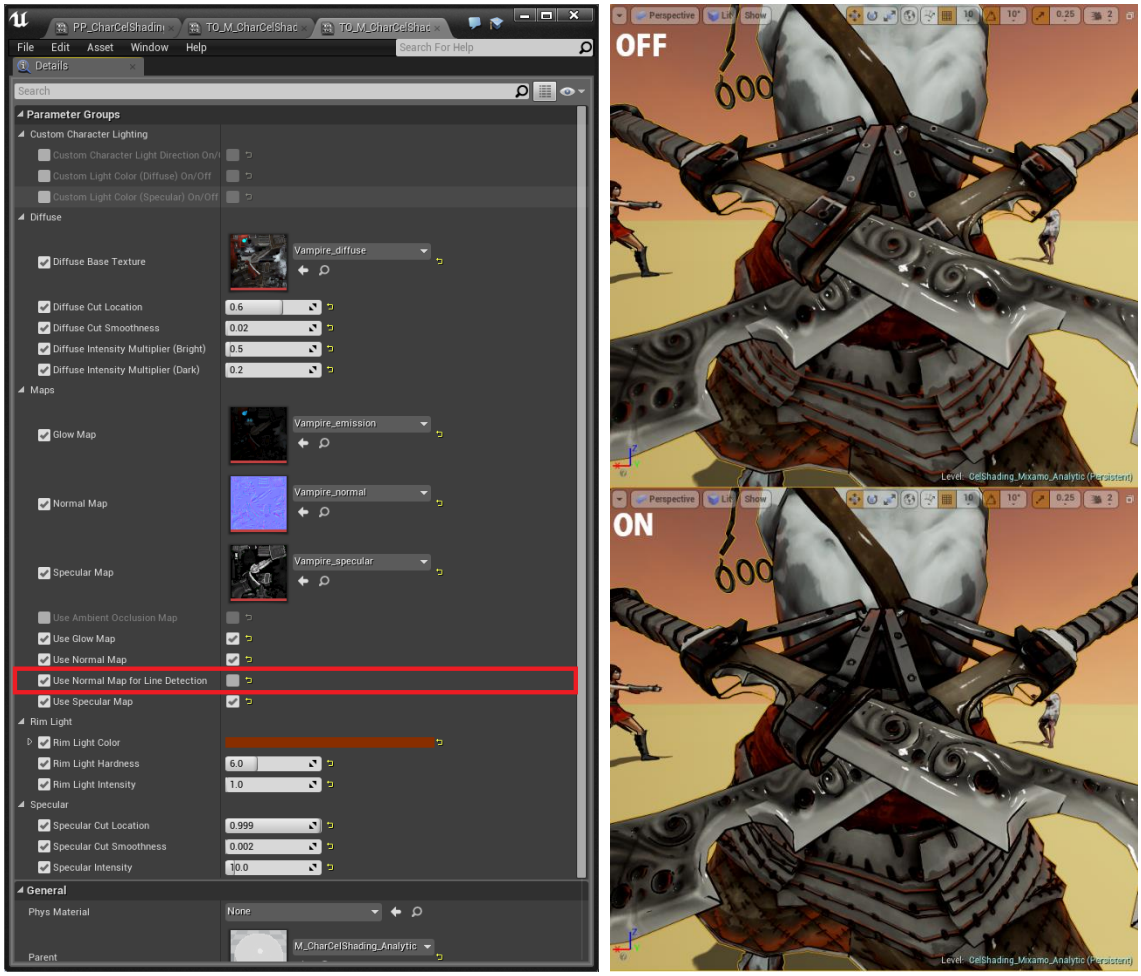

Figure 4. (Left) The Use Normal Map for Line Detection Switch, (Right) The On/Off Results

Use Depth Adaptation Option (v1.1.0)

The common limitation of PP line drawing methods is when the object is zoomed-out, the line pixels dominates the outlook of characters. Our PP line drawing material has depth adaptation logic in it to handle this issue (Figure 6). This depth adaptation by default is on. If users want to turn it off to have the fixed width lines regardless of the depth of objects, they can do it by turning off the "Use Depth Adaptation" switch in the PP line drawing material instance (Figure 5).

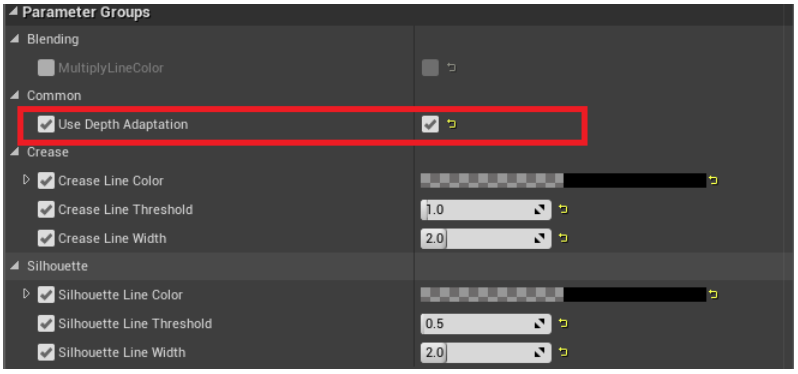

Figure 5. The Use Depth Adaptation switch.

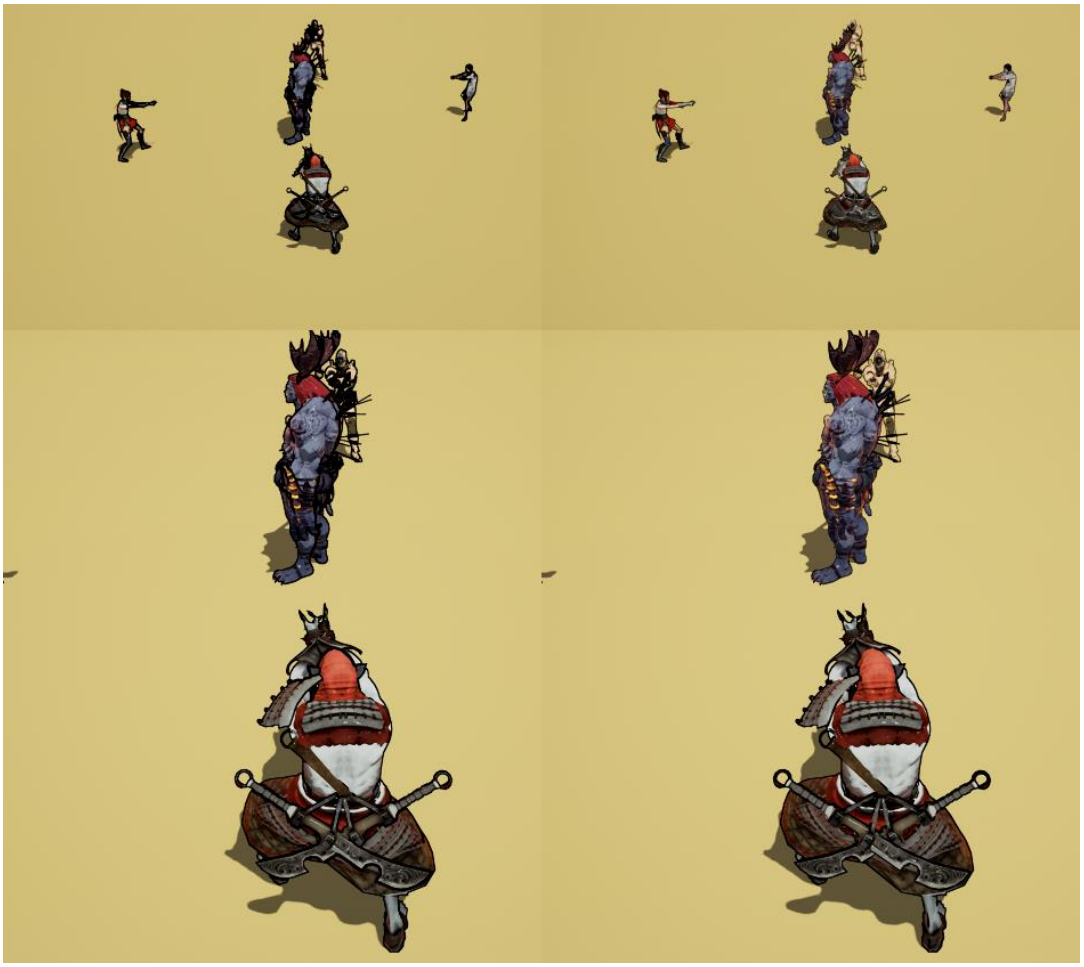

Figure 6. (Left) Depth Adaptation Off, (Right) Depth Adaptation On