



NEXT-GEN SOFT-SHADOWS

For Unity built-in lights.

For **Install & Tweaks** instructions please refer to **pages 2 and 3**.

The technique is the one used by **CryEngine/UnrealEngine** real-time shadows, with extra adaptive penumbra size that changes based on receiver distance to light source. This technique removes aliasing and banding on extremely tiny shadowmaps textures. It requires less sampling to smooth/AA out shadows while being faster than any other similar solutions on the Asset Store. Plus, it works on any platforms where Unity support shadows.

Two variations at your disposal: A full PCSS filtering and a cheaper variant that simulates PCSS (requires less samples). Both techniques automatically changes penumbra size based on distance between receiver/caster and light positions. They are both visually similar but the PCSS is more physically correct. Bonus, NGSS features screen space Contact Shadows.

Compatibility: Unity 5.4 - 2017. Deferred/Forward render paths, **VR** (Single and Multi-Pass stereo), **DX9 (SM3.0)**, **DX11**, **DX12**, **PS4**, **XB1**, **GLS3.0**, **Metal**, **Vulkan**. Should work with others similar APIs but not yet tested. For older versions than 5.6 please email support.

Note: Since NGSS **v1.4.0** Directional, Spot/Point and Contact Shadows files are independent. You can set them up in any order or install only the shadows type you want.

Spot/Point shadows Install/Uninstall:

It's quite simple, you just need to replace the file **UnityShadowLibrary.cginc** located inside the **CGIncludes** folder (where Unity is installed) with the one provided in this package. Here's how:

1. Close the Unity Editor. Go to the directory where you installed Unity and open the **CGIncludes** folder. On Windows: "**C:\Program Files\Unity\Editor\Data\CGIncludes**". On Mac: "**/Applications/Unity/Unity.app/Contents/CGIncludes**"
2. Backup the file **UnityShadowLibrary.cginc** inside that folder, rename it to **UnityShadowLibraryBAK.cginc** or something else (In case you want to uninstall it)
3. Replace the file **UnityShadowLibrary.cginc** with the one provided in this package (you may need administration rights to replace the file)
4. Delete the **ShaderCache** folder on any project you want to use this shadow system. This will force Unity re-import **NGSS** library. To do it, simply navigate to your project folder, open the **Library** folder and delete the **ShaderCache** folder. On large projects this can take a bit the first time you delete it but should be OK afterwards

Spot/Point Shadows Properties Tweaks:

Set the **Shadow type** to **Hard-Shadows** to enable **PCF** filter (fast to compute) and **Soft-Shadows** to enable **PCSS** filter (visually better). To change other **shadows features and quality** please refer to **UnityShadowLibrary.cginc** (lines 26 to 47). To tweak shadow softness, change the **Shadow Strength** on the Light.

Note: The install process for Spot/Point shadows must be done every time you install Unity as Unity overwrites **UnityShadowLibrary.cginc** file upon every install. Your project's folder **ShaderCache** must be deleted every time you install **NGSS** or if you are tweaking internal shadows properties within **UnityShadowLibrary.cginc** file. Unity does not provide a clean way to replace Spot/Point shadows library other than this brute way.

Important: If you have a custom shader (such as pre-integrated skin shading) or any other shader framework that internally access to **_LightShadowData.r**, override that value to 1.0 in that shader. Otherwise your Spot/Point shadows will become transparent when you lower the **Shadow Strength** value. NGSS internally uses **_LightShadowData.r** to tweak the penumbra size of shadows which correspond to the **Shadow Strength** value of Unity built-in lights.

Note: Since v1.4.0 Directional shadows works better with **StableFit Projection** if multiple cascades are present. There's a bug with Unity 2017.1f1 that prevent proper cascade blending with **StableFit Projection** leading to transparent shadows cascade blending. To avoid such artifacts, cascade blending is turned off if **StableFit Projection** is on in Unity 2017 until the bug is fixed (Cascade Blending works fine with both projections in Unity 5.6).

Directional/Contact shadows Install/Uninstall:

- 1 – **Directional Shadows** Open your Scene, select your main **Directional light** and add the **NGSS_Directional.cs** script to it. Directional Shadows properties are tweaked within this component.
- 2- **Contact Shadows** Add **NGSS_ContactShadows.cs** to your **Main Camera** to enable raymatched screen space shadows. Contact Shadows properties are tweaked within this component.
- 3- To uninstall Directional or Contact Shadows just remove the component on the objects they where attached to.

Important: There's a bug that prevents Unity from allowing custom Directional shadows replacement if platform is set to mobile and renderpath is forward. The bug have been reproduced by Unity staff and it's being fixed. Works fine in mobile deferred.

Bonus: If your target platform is Desktop or Consoles, try to enable 32 bit depth buffer in Graphics Menu, this provide better shadows precision (less panning) with larges distances. Available only in Unity 2017.

Email Support: support@psychozinteractive.com

Unity Forum: <https://forum.unity3d.com/threads/next-gen-soft-shadows-custom-shadows-filters-for-unity-lights-with-adaptive-penumbra-size.440088/>