

Soft Mask

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Documentation for version 1.1

What is Soft Mask?

Soft Mask is a component for smooth masking of UI elements in Unity.

After adding to a Game Object, Soft Mask “masks” its child elements. Soft Mask gives a quite similar effect as standard Mask and Mask Rect 2D but has some advantages over them.

- Unlike [Rect Mask 2D](#), Soft Mask supports rotation of the mask and renders it with anti-aliasing.
- Unlike [Mask](#), Soft Mask supports transparency, which allows you to create smooth transitions from visible to invisible parts of the image, as well as use inclined or rounded edges of UI elements.



Soft Mask



*Standard Unity's Mask
(notice visual artefacts on the rounded corners caused by cutoff)*

Features

- *Easy to use:* Soft Mask works in the same way as the standard Mask. There's no need to assign special materials or modify the masked elements in any other way.
- *Support for Image, Raw Image, Sprite or Texture:* Soft Mask supports the usage of the Image and Raw Image components as a mask. Also, you can explicitly set the Sprite or Texture.
- *Raycast filtering:* you can set up rectangular or per-pixel test for event raycasting.

- *Flexible adjustment of mask's color channels:* you can use black and white images, images with transparency or set a weight value for each color channel.
- *Custom shader support:* Soft Mask can be easily supported in custom shaders by adding a few instructions to the shader code.
- *Separation from the masked hierarchy.* Masked elements doesn't have to be children of a Rect Transform that represents the mask.
- *Real-time updates:* moving, scaling, rotating and changing the image of the mask in real-time or animation mode.

Getting Started

Soft Mask requires no additional setup. Just import the package, and you are ready to go.

The package includes example scenes so that you can see Soft Mask in action. These scenes can be found in the `Samples` folder. This folder is unnecessary for the Soft Mask to work, you can remove it completely from your project.

If you are using UnityScript instead of C# in your project, you can move the imported `SoftMask` folder to the `Plugins` folder. It allows you to use Soft Mask in UnityScript code.

The Use of Soft Mask

Applying a Soft Mask

To apply the Soft Mask, follow the steps below.

1. Add a UI/Soft Mask component to the Game Object in the same way as you add a standard Mask.
2. Set up a Soft Mask:
 - a. If you want to display the mask image in the scene, ensure that the Game Object has an Image or Raw Image component. The Soft Mask will use the same image that is rendered by this component.
 - b. If you want to use the mask image as a mask only and do not display it in the scene, you have two ways to do this:
 - i. Select *Sprite* or *Texture* in the *Source* drop-down list and set a sprite or texture for the mask. In this case, the Game Object doesn't have to have a Graphic component at all.
 - ii. Alternatively, if you already have an Image or Raw Image on the Game Object, you can just disable it. Soft Mask will continue masking. Note that this option has some limitations, see section [Interaction with the Graphic component](#).

Replacing a standard mask by a Soft Mask

Soft Mask can replace a standard Mask that uses an Image or Raw Image component only. For details, see section [Interaction with the Graphic component](#).

To replace a standard Mask by a Soft Mask, follow the steps below.

1. Add the UI/Soft Mask component to the Game Object, which already has a standard Mask.
2. Disable the standard Mask and check that Soft Mask works properly.
3. If the *Show Mask Graphic* option has been disabled for the standard Mask, you have two options to make up for it.
 - a. Assign the same sprite or texture that was used by Image or Raw Image to the Soft Mask and set the according settings (border mode or UV rect). After that delete the Graphic component.
 - b. Alternatively, you can just disable the Graphic component. Soft Mask will continue masking. Note that this option has some limitations, see section [Interaction with the Graphic component](#).
4. Delete the standard Mask from the Game Object.

Disabling a Soft Mask

If you want to turn off masking, disable the Soft Mask component on the Game Object. Unlike the standard Mask, when a Graphic component of the Game Object is disabled, Soft Mask still keeps masking.

Adding support of Soft Mask to custom shaders

Soft Mask is able to mask all Graphic components which use the standard Unity UI shader. If you want to use custom shaders for rendering UI elements (for example, your own solutions or another asset from Asset Store), you can add the support of Soft Mask to them.

To add the support of Soft Mask to the custom shader, you have to insert some declarations and instructions into the shader code. For more details, see the *04-CustomShaders* example. The custom shader used by this example can be found at `/Assets/SoftMask/Samples/Materials/WaveWithSoftMask.shader`. All instructions required for Soft Mask support have the comment “Soft Mask Support”.

Using Soft Mask in code

Everything related to Soft Mask is contained in the namespace `SoftMasking`. Any properties that are described in the section [Properties](#) are available from code too. Public interface of `SoftMask` has XML comments in code.

If you are interested in how Soft Mask is implemented, you can find an overall description in the beginning of the `SoftMask` class.

Instantiating Soft Mask from code

Soft Mask replaces the standard Unity UI shader during the rendering of child objects. When you add a Soft Mask component in the editor, it gets a reference to the replacement shader and works “out of the box”. But if you add a Soft Mask from code by `AddComponent()`, then you have to specify the shader manually. To do so, set the `defaultShader` property:

```

public class InstantiateSoftMaskSample : MonoBehaviour {
    public Shader defaultMaskShader;

    void Start() {
        var mask = gameObject.AddComponent<SoftMask>();
        mask.defaultShader = defaultMaskShader;
    }
}

```

If none of masked objects use the default UI shader, you don't have to set the `defaultShader` property.

If you're going to publish the project on the mobile platforms and use ETC1 compressed textures in UI, you should also set the `defaultETC1Shader` property.

Reference

Interaction with the Graphic component

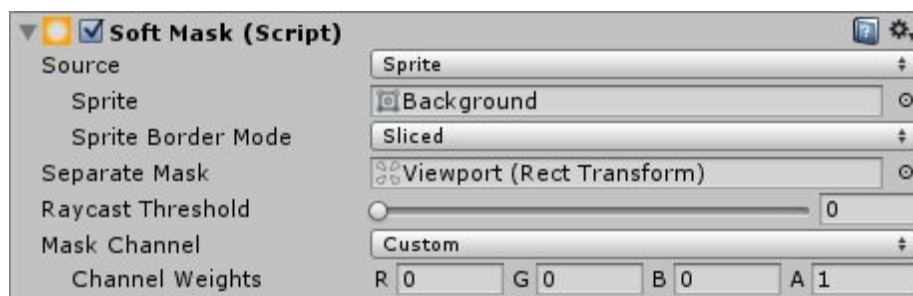
Unlike Unity's standard Mask, Soft Mask doesn't rely on rendering of the Graphic component. When you set *Source* to *Graphic*, Soft Mask just picks up some properties (texture and border mode or UV rect) from the Graphic component, but doesn't really use it itself.

This approach has some limitations comparing to standard Mask:

- You can use only Image or Raw Image of all Graphic components as a mask source. Text and any other Graphics aren't supported as a mask.
- Soft Mask doesn't support Filled type and Fill Center option of Image.
- The color set in the properties of Image or Raw Image isn't accounted by the Soft Mask. Only texture will be used.

When the Graphic component is disabled, Soft Mask continues to work, but isn't updated accordingly when properties of the Graphic change. Despite the limitation, this work mode may be useful when you transit from a standard Mask with the *Show Mask Graphic* option enabled to a Soft Mask. If you don't change Graphic properties at real-time, everything should just work.

Properties



Soft Mask Inspector

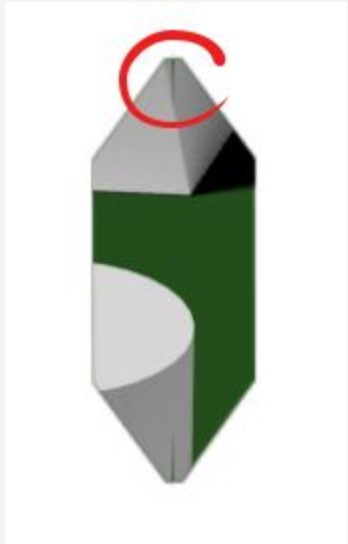
Property:	Function:
Source	<p>Defines the way to configure a mask image. Possible values:</p> <p>Graphic The mask image is taken from the Graphic component of the Game Object. Soft Mask supports Image and Raw Image components only. If there is no appropriate Graphic on the GameObject, a solid rectangle of the RectTransform dimensions will be used.</p> <p>Sprite Mask image is taken from an explicitly specified Sprite. When this mode is used, <i>Sprite Border Mode</i> can be also set to determine how to process Sprite's borders. If the sprite isn't set, a solid rectangle of the RectTransform dimensions will be used. This mode is similar to using an Image with according <i>Sprite</i> and <i>Type</i> set.</p> <p>Texture The mask image is taken from the explicitly specified Texture2D. When this mode is used, <i>Texture UV Rect</i> can be also set to determine what part of the texture should be used. If the texture isn't set, a solid rectangle of the RectTransform dimensions will be used. This mode is similar to using a RawImage with according <i>Texture</i> and <i>UV Rect</i> set.</p>
Separate Mask	<p>Allows to specify a separate Rect Transform that should be used as a mask.</p> <p>If you set this property, the Soft Mask will still mask only its own children but the masking window will match the specified Rect Transform. If <i>Source</i> mode is set to <i>Graphic</i>, the Graphic component of the specified object will be used.</p> <p>This property simplifies the way to make masks that are moving relative to the masked content. An example of this you may see in the sample <i>04-CustomShaders</i>.</p> <p>When the value is set to None, the Rect Transform of the Soft Mask will be used (this is the way standard Unity's Mask works).</p> <p>The default value is None.</p>
Raycast Threshold	<p>Specifies the minimum mask value that the point should have for an input event to pass. Accepts values in range [0..1].</p> <p>If the value sampled from the mask is greater or equal this value, the input event is considered to be 'hit'. The default value is 0, which means</p>

	<p>that any input event inside the RectTransform is passed further. If you specify the value greater than 0, the mask's texture should be readable.</p> <p>An example usage of this property you can found in the sample <i>02-Minimap</i>.</p>
Mask Channel	<p>Defines what color channels of the image are used as a mask. Possible values:</p> <p>Alpha The alpha channel (transparency). Coincides with (by default) <i>Channel Weights</i> = (0, 0, 0, 1).</p> <p>Red The red channel. Coincides with <i>Channel Weights</i> = (1, 0, 0, 0).</p> <p>Green The green channel. Coincides with <i>Channel Weights</i> = (0, 1, 0, 0).</p> <p>Blue The blue channel. Coincides with <i>Channel Weights</i> = (0, 0, 1, 0).</p> <p>Gray The average value of the red, green and blue channels. Coincides with <i>Channel Weights</i> = (0.33, 0.33, 0.33, 0).</p> <p>Custom Allows to set a specific weight for each color channel of the image.</p>
Channel Weights	<p>Displayed if <i>Mask Channel</i> is Custom.</p> <p>You can set the weight from 0 to 1 for each color channel. Given the value sampled from the mask texture is <i>mask</i> and the specified property value is <i>weights</i>, the resulted mask value is calculated as:</p> $\sum_{i \in \{r,g,b,a\}} mask_i \cdot weights_i$

Additional properties for Texture-based masks:

Texture	Defines a texture to use as a mask.
Texture UV Rect	Defines coordinates and size of the texture fragment to display the image, given in normalized coordinates (range 0.0 to 1.0). This property works in the same way as UV Rect property of RawImage.

Additional properties for Sprite-based masks:

Sprite	Defines a sprite to use as a mask.
Sprite Border Mode	<p>Specifies how to render the sprite borders. Possible values: Simple, Sliced, Tiled. They all work in the same way as according values of Type property of Image.</p> <div><p>If you notice visual artefacts in <i>Sliced</i> or <i>Tiled</i> mode when the central part of a mask is too shrank, you may try to reduce the anisotropy level of the mask texture or even disable it at all. Also, disabling of mipmapping may help. The cause of these artefacts is that when a child element is rendered there are no separate vertices between different parts of a sliced sprite, all mapping is performed in the shader. In case when the central part is collapsed, the texture coordinate changes are too steep which causes the hardware to perform texture filtering in a way that produces artefacts. In many cases both anisotropy and mipmaps aren't needed for UI textures.</p></div>

Limitations

- Only textures and sprites can be used as a mask. Currently Soft Mask doesn't support masking by Text or any other Graphic components except of Image and Raw Image.
- Soft Mask doesn't support nested masks. To work around this limitation, use a standard Mask or Rect Mask 2D in combination with a Soft Mask.
- Sprites that are packed in *Tight Packing Mode* aren't supported as a mask. Disable packing for the mask sprite or use *Rectangle Packing Mode*.
- Sprites with an alpha split texture aren't supported as a mask. Disable compression for the mask texture or use another compression type.
- Soft Mask is intended to work with Unity UI and doesn't support any other 2D or 3D graphics "out of the box".

Performance

- Soft Mask uses 3 Shader Keywords, while Unity 5 provides 128. Before using Soft Mask, make sure that you have enough free slots in the project. For details about Shader Keywords, see [Multiple Program Variants](#) section in the Unity Documentation.
- Support of Soft Mask adds to a shader from 7 to 10 constants and 1 sampler, depending on Soft Mask settings.
- All child elements of a Soft Mask are rendered using the special shader. This shader is more complex and a bit slower than the standard shader. Execution speed of the shader depends mostly on the *Border Mode* value. The fastest mode is Simple. It's recommended to use Soft Mask only when you lack features of standard Mask.

Compatibility

Soft Mask 1.1 is compatible with Unity versions 5.3 - 5.6.

Tested platforms:

- standalone (Windows/Mac OS),
- WebGL,
- Android,
- Windows Phone.

Change history

1.1

Improvements

- Added the *Separate Mask* parameter that allows to separate mask from the masked elements. The sample *04-CustomShaders* has been reworked to show this feature in use.
- Optimized real-time performance, especially on huge hierarchies. Soft Mask now has almost the same performance cost on CPU as standard Unity Mask (which is very close to zero).
- Improved mapping of Sliced and Tiled masks in case when the central part is collapsed.
- Reworked samples: they now demonstrate more features of Soft Mask and also look better.

Bug fixes

- Fixed a bug causing Soft Mask to work incorrectly on nested canvases. Partial consequence of this was the inability to use Soft Mask in a standard Dropdown control which uses nested canvas for the drop down list. Now it is possible.
- Fixed a bug preventing Soft Mask from updating after moving it from one canvas to another.

- Fixed a bug preventing rendering of the child elements when a mask used a sprite with one of its borders set to zero in Sliced or Tiled mode.

Support and feedback

If you need support for this product or wish to provide feedback or suggestions, feel free to email me at knyazev751@gmail.com or post on [the forum thread](#).