Documentation

Quick Setup

1. *(Optional, but very strongly recommended)* Enable HDR on your camera
2. *(Optional, but strongly recommended)* Set your Color Space to “Linear” under “Edit/Project Settings/Player”
3. Add the script called “ScionPostProcessing.cs” to your camera

Introduction

Scion is a combined post process pack. It combines a set of post process effects in an effort to minimize bandwidth costs and maximize performance. This documentation contains a description per effect with all the relevant information.

FAQ

- ***I am getting shader errors on import, how do I fix this?***

Go to the folder ScionPostProcess/Resources and reimport the ‘Shaders’ folder. You do this by right clicking the ‘Shaders’ and pressing ‘Reimport’

Reasoning

The idea behind Scion is twofold.

The first is to combine simple post process effects into a single ubershader to minimize bandwidth cost and maximize performance.

The second is to mimic the behavior of a real camera. The goal of realtime graphics is (often) to mimic the appearance of Hollywood films. A film is shot using cameras. A camera is not controlled by settings such as "blur amount" and "length of focus". A real camera is controlled by a few variables. These variables, in Scion's case, are

- F-Number
- Focal Length
- ISO
- Shutter Speed
- Focal Plane

Which variables you actually get to control depends on the camera mode. By default it is set to Auto Priority, which removes the F-Number, the ISO and the Shutter Speed settings.

Focal length is by default derived from the Field of View of the camera, but you can decouple the two by checking the box "Custom Focal Length".

Focal plane affects the depth of field, and is described in the Depth of Field section of this document.

Grain

Description

A procedural film grain effect controlled by a single intensity slider. The performance cost is next to nothing.

Vignette

Description

A vignette effect controlled by three variables. Intensity, scale and color. Intensity dictates how strong the effect is while scale controls how much of the screen is affected. The color of the vignette effect is by default set to black but the user has the choice to change it. For most purposes, the default black color should be the best choice.

Chromatic Aberration

Description

A chromatic aberration effect controlled by two variables. Intensity and scale. Intensity dictates how strong the effect is while scale controls how much of the screen is affected.

The scale is calculated the same way as the Vignette effect, meaning that if you want them to overlap perfectly you need to set the scales to the same value.

The effect differs slightly from the commonly encountered approach of splitting red, green and blue into three separate samples and offsetting. The implementation in Scion instead looks more like a rainbow, a gradual change, rather than just color channel splitting.

Tonemapping

Description

Tonemapping is the process of taking HDR values [0,infinity] and moving them inside the [0,1] range for display on your screen. Tonemapping and exposure are two different features, one does not replace the other rather they complement each other.

Scion will let you choose between 4 different tonemapping algorithms as well as setting the white point. The white point is the value, after exposure is applied, that will become white in the tonemapping process. The four tonemapping algorithms available are

- **Reinhard**
- **Luma Reinhard**
- **Filmic**
- **Photographic**

If you want to turn tonemapping off, you will have to exchange your “ScionPostProcess.cs” script for the “ScionPostProcessNoTonemap.cs” script.

Bloom

Description

A (almost) physically based bloom effect. It lacks a thresholding pass and therefore does not get rid of energy like old school bloom effects would. However, the input image is filtered to remove small bright spots that otherwise cause flickering and blowouts. These pixels are typically known as fireflies, flashing in and out of a moving render due to aliasing.

The filtering does reduce the energy of the input image, and there is therefore a brightness slider that allows the user to slightly skew and control the overall energy.

The bloom is controlled by three variables. Intensity, brightness and downsamples.

Intensity dictates how much of the final, composed image is taken from the bloom calculations. So an intensity of 1 would effectively completely remove the original texture, only taking the bloom into account.

Brightness is a multiplier to the bloom calculations.

Range controls how far light leaks. This setting has no effect on performance, it is purely aesthetical.

Downsamples is how long the chain of downsampling is. The larger this value the further away the bloom reaches. The cost also increases with each downsample, although the further you go the lesser the resolution becomes therefore the cost per downsample decreases as well.

Lens Flares

Description

A not physically based dynamic post process lens flare algorithm. Due to the very approximate nature of this technique, caution is advised. You are likely to get better results if the intensities are toned down.

In short, the algorithm works by downsampling the source image and then using two different techniques to produce ghosts and a halo. The texture is then optionally run through a hexagonal blur and then combined with the final image in the combination pass.

There are there textures that can greatly affect the look and feel of the lens flares. The lens color texture, the diffraction texture and the lens dirt texture. The demo scene includes examples of all these.

In order to generate your own lens color texture, go to **“Window/Scion”**.

Lens Dirt

Description

The Lens Dirt effect modulates the appearances of the bloom and the lens flares, so it only becomes usable if either of them are active. It allows you to use a texture to alter the appearance of said effects, simulating the effect of a dirty lens.

There are two effect sliders, one for bloom and one for lens flare, which determine how influenced each effect is by the lens dirt texture.

There are also two brightness sliders each, which increase the brightness of the lens dirt effected parts of bloom and lens flares.

Camera Mode

Description

There are 4 different camera modes in Scion.

- Auto Priority
- Aperture Priority
- Manual
- Off

Auto priority is the default mode and handles all settings for you.

Aperture priority allows you to manually set the Camera's F-Number.

Manual gives you full direct control over all the variables.

Off removes exposure all together from the render. However, the F-Number will still be visible due to its impact on the Depth of Field.

You may also choose to toggle "Custom Focal Length". Typically the cameras focal length is derived from the Field of View setting, enabling this however does allow some artistic freedom. Focal length impacts how large the "blur" is for the Depth of Field.

Exposure

Description

The Exposure Settings are only visible if applicable to the current selected camera mode. The applicable modes are “Aperture Priority” and “Auto Priority”.

Exposure compensation is a flat additive to the calculated exposure. You can use this to force the exposure to become brighter or darker, while still adapting to the surroundings.

Min Max Exposure allows you to force the exposure to stay within a certain range. It is useful if an area is supposed to be visibly darker to the player and you want to stop the automatic exposure from making it bright.

Adaption speed dictates how fast the camera adapts to a change in lighting.

Depth of Field

Description

The Depth of Field effect in Scion differs from the effects you are likely to have encountered before. Unlike traditional Depth of Field effects, it is not controlled by arbitrary values such as "blur amount" or "focus length". It instead mimics a real camera, so to increase the out of focus effect you would reduce the F Number or increase the Focal Length.

The **exclusion mask** allows the user to exclude layers from the depth of field calculation. ***Important note:*** *The exclusion does not take Z testing into account. This means you should only ever exclude "overlayed" objects close to the camera, such as a FPS weapon. Artifacts will appear if an excluded object is behind a non excluded object.*

The **maximum radius** dictates how far away the algorithm is allowed to sample. There will be fewer under sampling artifacts the less the maximum radius is.

Setting the **quality level** to high allows the algorithm to take more samples in the worst case scenario (heavy blur).

Using **temporal supersampling** means the previous frames result is fed into the new frames result, increasing quality at the potential sacrifice of loss of sharpness. Under some conditions temporal supersampling will create more or less visible artifacts. The general recommendation is that this is a lot of quality for a very cheap cost.

When using **temporal supersampling**, you get to decide the **temporal blend** value and the number of **temporal steps**. The blend value dictates how much the history of a pixel affects the new result. Lower values are noisier but higher values can have more artifacts and be less sharp. The steps dictate how many offsets are used per pixel before returning back to the first offset (this is done per frame). More steps essentially means a higher sample count, but can cause noise.

Continued on the next page

Depth of Field

Description

The in focus distance is called the focal plane. In Scion there are three ways to control the focal plane of the camera.

- **Manual Distance** – Manually specify the distance to the focal plane
- **Manual Range** – Functions exactly like manual distance when range is set to 0. When the range is increased this "pulls in" depth values towards the focal plane. E.g. if the depth range is 5 everything will behave as if it is 5 meters closer to the focal plane.
- **Point Average** – Average a part of the screen to calculate the focal plane

When using point average you get to choose the exact UV coordinates (in the [0,1] range) and the range of the circle. Check the "Visualize" box for a clearer understanding of what pixels contribute to the average depth. You also get to choose an adaption speed. This is how quickly the average depth is allowed to change. A very fast adaption speed causes unnatural instant shifts.

- **I am getting artifacts under some circumstances. How do I fix this?**

Experiment with turning temporal supersampling on. If this does not fix it, turn down the "Max Radius" until the amount of artifacts reaches an acceptable level. The amount of artifacts can vary a lot depending on camera perspective and type of geometry present.

Color Grading

Description

Scion supports color grading (or color correction) lookup textures from several different sources. If your LUT (lookup texture) functions in any of these programs it can be converted to Scion

- Amplify Color
- Chromatica
- Standard Assets Color Correction

In order to convert a LUT, go to “Window/Scion”. Then select the LUT and the desired compatibility mode and hit the convert button. This will save a new texture next to the old one, with the letters “_Scion” appended at the end.

Color grading in Scion supports either a single LUT or runtime blending between two different LUTs.