POST-PROCESSING EFFECTS 1

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WE WILL GO THROUGH:

• WHAT ARE POST PROCESSING EFFECTS?
• BLOOM
• DEPTH OF FIELD
• MOTION BLUR
• CELL SHADING
• LENS FLARE
• VIGNETTE
• AMBIENT OCCLUSION
• BUMP MAPPING
I have no idea what I'm doing.
WHAT IS POST-PROCESSING?

• COMMONLY USED TECHNIQUE IN 3D RENDERING, ESPECIALLY IN VIDEO GAMES
• PROCESS OF ADDING ADDITIONAL EFFECTS INTO THE SCENE AFTER RENDERING TO IMPROVE THE QUALITY AND THE OVERALL FEEL OF THE SCENE

WHY?
• FOCUS THE PLAYER ON SOME IMPORTANT OBJECT IN THE SCENE
• GUIDE THE PLAYER TO SOME PARTICULAR DIRECTION
• CREATE A MORE REALISTIC FEELING OF THE SCENE
BLOOM

• MAKING BRIGHT PARTS BRIGHTER AND DARKER PARTS DARKER
• SPLIT SCENE INTO TWO FRAMES – ONE CREATES A BLUR EFFECT AND THE SECOND ONE IS ORIGINAL WITH AMPLIFIED LIGHT TO THE BRIGHT AREAS → HIGH CONTRAST
• RESULT IS „GLOWING“ CHARACTER OR OBJECT THAT HAS A LOT OF LIGHT BEHIND HIM
• LIGHT BLEEDING – LIGHT FROM A SOURCE REACHES TO OTHER OBJECTS IN THE SCENE
USE OF BLOOM (EXAMPLE ON FAR CRY3)
BLOOM STEP BY STEP
GAUSSIAN BLUR:

Left top: No bloom used means that brightness of both objects is not shown very well.

Right top: A single Gaussian Works well for the left object but not so well for the right one.

Left bottom: Using two Gaussians works well on both objects.

Right bottom: Using three Gaussians also adds a subtle nice large scale glow.
DEPTH OF FIELD

- Outside of the view of the camera's focus is blurred
- Used to direct the viewer's attention within the scene, and to give a better sense of depth within a scene
GAUSSIAN DEPTH OF FIELD

• GAUSSIAN DOF BLURS THE SCENE USING A STANDARD GAUSSIAN BLUR.

• THE GAUSSIAN METHOD IS FAST AND GENERALLY WELL-SUITED FOR USE IN-GAME, WHERE PERFORMANCE IS CRITICAL.
BOKEH DEPTH OF FIELD

• „METHOD, WHERE A TEXTURED QUAD IS RENDERED FOR EACH PIXEL USING A TEXTURE TO DEFINE THE SHAPE TO REPRODUCE THE EFFECT PRODUCED BY CAMERA LENSES, WHICH GIVES A FILMIC LOOK TO THE SCENE“

• THIS METHOD NEED FAR MORE PERFORMANCE THAN PREVIOUS METHOD, THEREFORE IT IS NOT SUITED FOR REAL TIME RENDERING, BUT RATHER FOR MOVIES OR ANIMATIONS
LET’S TRY IT 😊

• HTTP://DOFSIMULATOR.NET/EN/
MOTION BLUR

• ONE OF THE BEST WAYS TO SIMULATE SPEED IN A VIDEO GAME

• HELPS GAME’S GRAPHICS BY SMOOTHING OUT ITS APPEARANCE – FOR EXAMPLE BLURING THE BACKGROUND – MAINLY IN GAMES THAT RENDER UNDER 30 FPS

• ADDS EXTRA SENSE OF REALISM
HOW TO PROGRAM IT?

• **OPENGL** FUNCTION CALLED **GLACCUM**

• STORE A CERTAIN NUMBER OF FRAMES INTO AN ACCUMULATION BUFFER

• WHEN YOU HAVE ENOUGH FRAMES, BLEND THEM TOGETHER

• RESET THE FRAME COUNTER, DRAW

• SLOW, BUT EXTREMELY SIMPLE 😊
NEGATIVE EFFECTS OF MOTION BLUR

• SOMETIMES, USING MOTION BLUR IN GAMES CAN LEAD TO CAUSING HEADACHES

• ADVICE – TURN OFF THE MOTION BLUR, USE HIGH REFRESH RATE SCREEN, AND TRY TO MAKE YOUR FRAMERATE HIGHER
CEL SHADING

• ALSO KNOWN AS TOON SHADING.
• USING A METHOD OF EDGE DETECTION OF AN OBJECT, THE BLACK LINE IS DRAWN AROUND THE GIVEN OBJECT – AFTER RENDERING
• As it might not seem like it, the light source does not change, (or the texture/model)

• The difference from left to right is achieved by manipulating the rules for shadow and light reception
Many video games mix cel shading and modern post-processing effects, ending up with an incoherent mish-mash that is neither truly cel shaded nor photorealistic.
• ONLY CREATING AN OUTLINE AROUND OBJECT IS NOT CEL SHADING!

• “THE LEGEND OF ZELDA: WIND WAKER, FOR EXAMPLE, DOESN’T FEATURE ANY OUTLINE AROUND MODELS, AND IS THE TYPICAL EXAMPLE OF CEL SHADING.”
LENS FLARE

• A PHOTOGRAPHIC ARTEFACT, CAUSED BY VARIOUS INTERACTIONS BETWEEN A LENS AND THE LIGHT PASSING THROUGH IT.
WHY THE GAME DEVELOPERS USE LENS FLARE?

• „IT INCREASES THE PERCEIVED BRIGHTNESS AND THE APPARENT DYNAMIC RANGE OF AN IMAGE“

• LENS FLARE IS ALWAYS PRESENT IN THE REAL WORLD (EVEN IF WE DO NOT WANT IT TO) THEREFORE IT SHOULD BE ALSO IN A GAME

• ADD REALISM TO THE SCENE, OR TO SHOCK PLAYER

• BLINDING THE PLAYER (YOU WAKE UP, OR GET BLINDED FROM FLASHBANG..)

• IT LOOKS REEEEEALLY COOL
ALGORITHM

THE APPROACH CONSISTS OF 4 STAGES:
• DOWNSAMPLE/THRESHOLD.
• GENERATE LENS FLARE FEATURES,
• BLUR.
• UPSCALE/BLEND WITH ORIGINAL IMAGE.
AMBIENT OCCLUSION

• This effect is used to create shadows in cracks of objects.

• “The soft shadows that are created from ambient occlusion can help to define the separation between objects in the scene and add another level of realism to rendered scene.”
The Stanford dragon above is rendered in an evenly lit environment. There are a few darker and lighter areas on the model, but the lighting is mostly uniform. Despite having fairly intricate geometry, the dragon appears flat and without clear depth perception.

The most distinct change with AO is that smooth shadows have been added to the image. Unlike standard shadows which appear as solid regions enclosed by blurred edges, AO based shadows have wide and smooth gradations.
VIGNETTE

• "IT IS A REDUCTION OF AN IMAGE'S BRIGHTNESS OR SATURATION AT THE PERIPHERY COMPARED TO THE IMAGE CENTER"

• USED TO DRAW ATTENTION OF THE PLAYER
MOST OFTEN USED TO ENHANCE „AIM“ EFFECT IN GAMES
Call of duty ultra super realistic almost dying animation

Captain MacTavish: Tangos moving in low from the southeast!
BUMP MAPPING

• “BUMP MAPPING IS A TECHNIQUE IN COMPUTER GRAPHICS FOR SIMULATING BUMPS AND WRINKLES ON THE SURFACE OF AN OBJECT.”

• THE SURFACE OF AN OBJECT IS NOT CHANGED, IT ONLY APPEARS SO
• THE MAIN ISSUE WITH THIS TECHNIQUE IS THAT THE SURFACE ITSELF DOES NOT CHANGE
• THEREFORE SHADOWS REMAIN UNAFFECTED (MAINLY NOTICABLE WITH BIG CHANGES TO THE SURFACE)
• TO SOLVE THIS, YOU HAVE TO USE OTHER TECHNIQUES – E.G. DISPLACEMENT MAPPING, WHERE YOU ADJUST THE SURFACE ITSELF, OR TO USE ISOSURFACE
QUESTIONS?
THANK YOU FOR YOUR ATTENTION 😊

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