Advanced rendering techniques

Introduction

This sample exhibits several techniques that have been used in games and are now very popular in Computer Aided Design (CAD) and Digital Content Creation (DCC) applications and in particular:

- **Order Independent transparency** is a rendering technique that allows rendering overlapping semi-transparent objects without having to sort them. Rendering semi-transparent objects has always been a problem due to the fact that the blending operation is order dependent: when a semi-transparent fragment is rendered, the underlying color (i.e. the background) is crucial for the final color to be correct. Previously known method such as face sorting, triangle sorting or depth-peeling (multi-pass) are not totally accurate and have a huge burden on the rendering pipeline. They require preparation on the CPU side as opposed as OIT that is entirely processed on the GPU and doesn’t tax the existing pipeline.

- **Screen-Space Ambient Occlusion (SSAO)** is a shading method that increases realism by taking into account attenuation of light due to local occlusion. SSAO attempts to approximate the way light radiates in real life, especially off what are normally considered non-reflective surfaces.

- **Self-Shadowing, blurring and glowing effects** highlight the advantage of off-screen rendering for multiple special effects.

- **Usage of a single unique shader (Ubershader)** containing all the effects allowing smooth transition between them.

Running the sample

LMB drag to rotate, MouseWheel to zoom

space: toggle object rotation/transparency color animation

o: toggle Order Independent Transparency (OIT)

a: toggle Screen Space Ambient Occlusion (SSAO)

s: toggle self-shadowing (shadowmap)

g: toggle glowing effect
v: toggle SSAO/Glow/shadowmap debug educational mode

d: toggle double sided lighting

b: toggle blurring

t: toggle diffuse texture

e: toggle environment mapping

n: toggle bumpmapping

keypad +/- : increase/decrease number of lights (0, 1, 2 or 3)

keypad 0/1 : increase/decrease diffuse texture blending with material diffuse color

keypad 2/3 : increase/decrease shadow darkness

keypad 4/5 : increase/decrease envmap contribution

keypad 6/7 : increase/decrease transparency

m: toggle OGL debug callback mode

ESC: quit