Introduction

Advanced Graphics Programming

About AGP

- Learning goals
- What we will learn
- Methodology
- Evaluation
- Tools

Image from *Horizon Zero Dawn*

Learning goals

Extending our knowledge of GPU's capabilities at a lower level

(Already introduced in other subjects)

Develop our skills in GPU programming with OpenGL and GLSL

(Bye bye OpenGL < 3.3)

Learn to implement advanced computer graphics techniques

(Using OpenGL of course, some techniques actually used in AAA games)

What we will learn

Shader programming

(Math tools / raycasting)

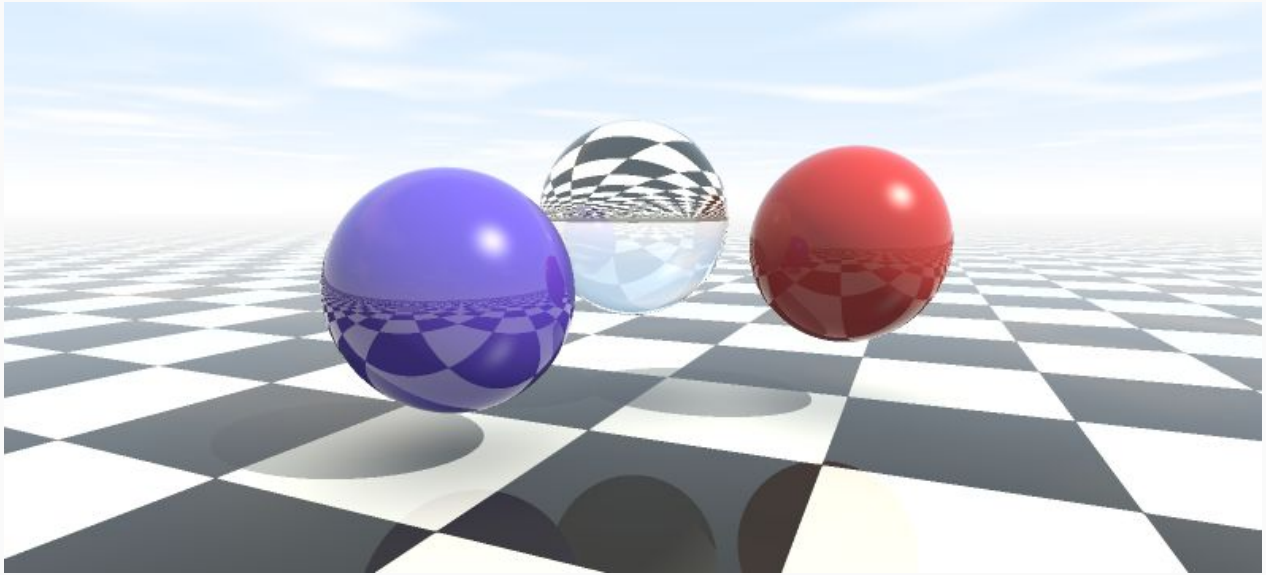
OpenGL foundations revisited

(Shaders / transforms / meshes / textures / framebuffers / tools…)

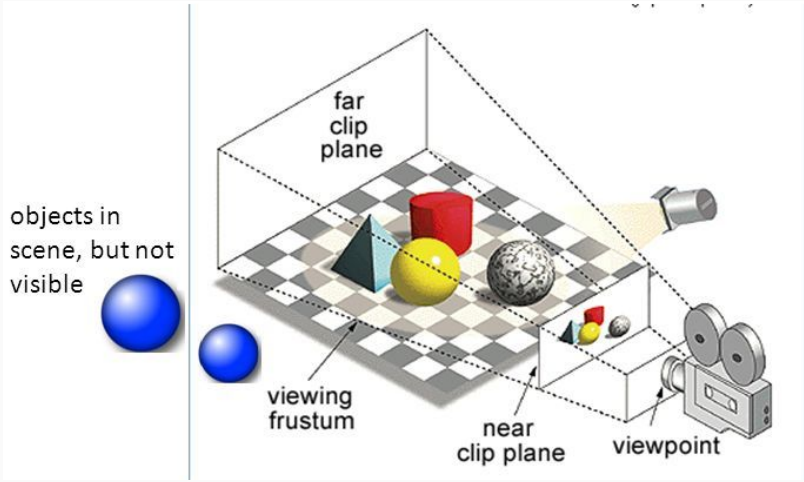
Advanced computer graphics techniques

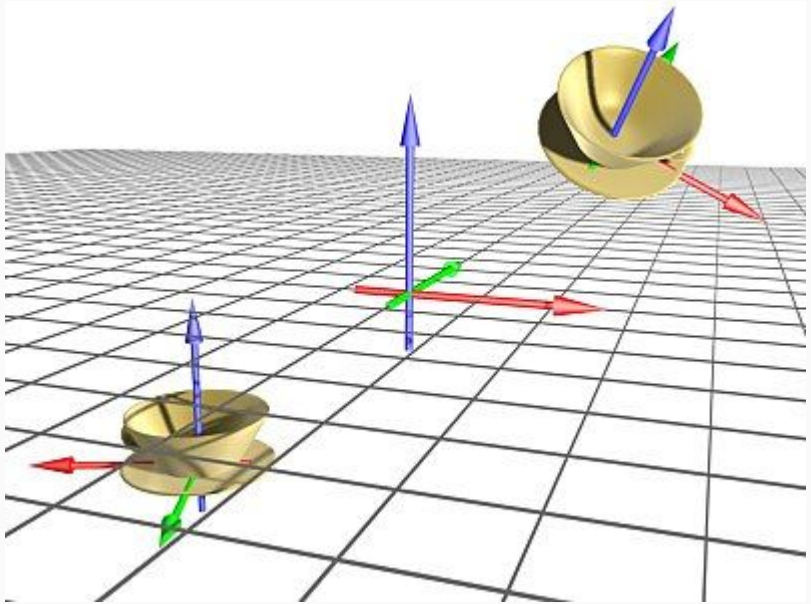
(lighting, deferred shading, bump mapping, env. mapping, bloom, SSAO, PBR, etc…)

What we will learn (GLSL programming & raycasting foundations)

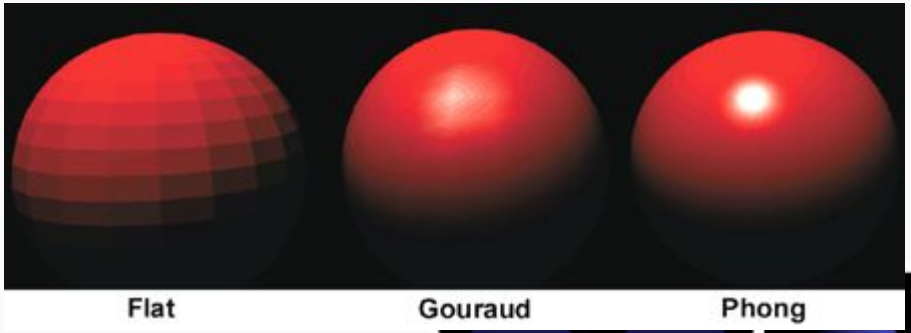


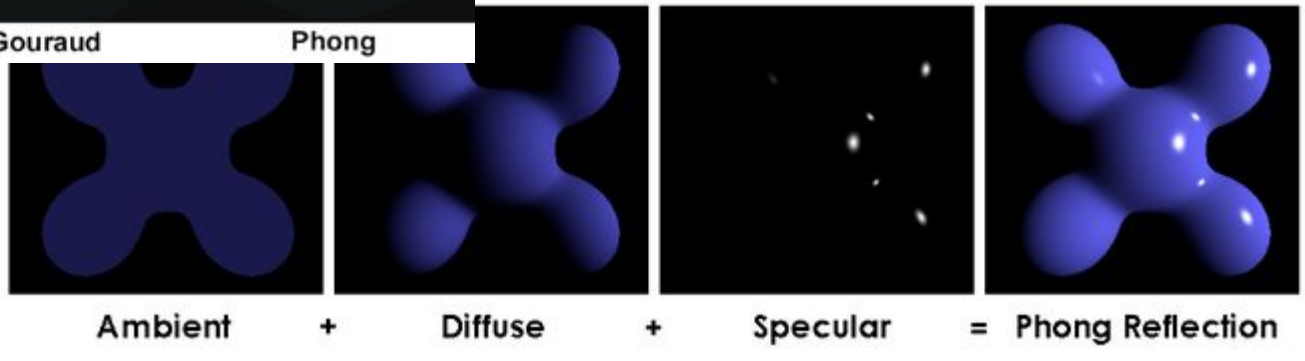
What we will learn (review of scene transforms, visibility, etc)



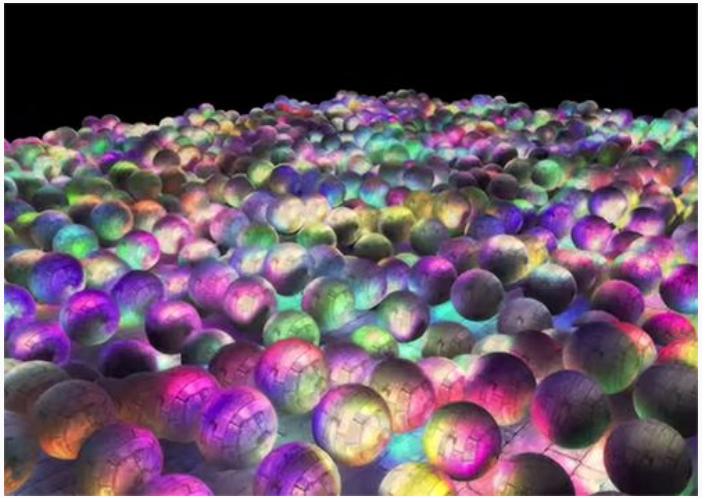


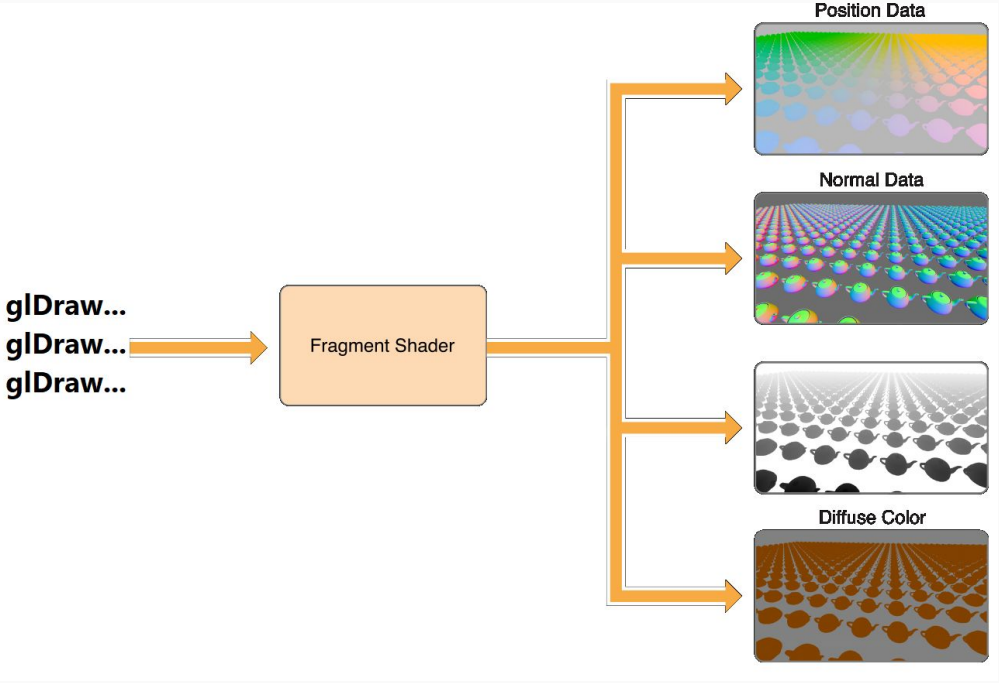
What we will learn (review of basic materials and shading)



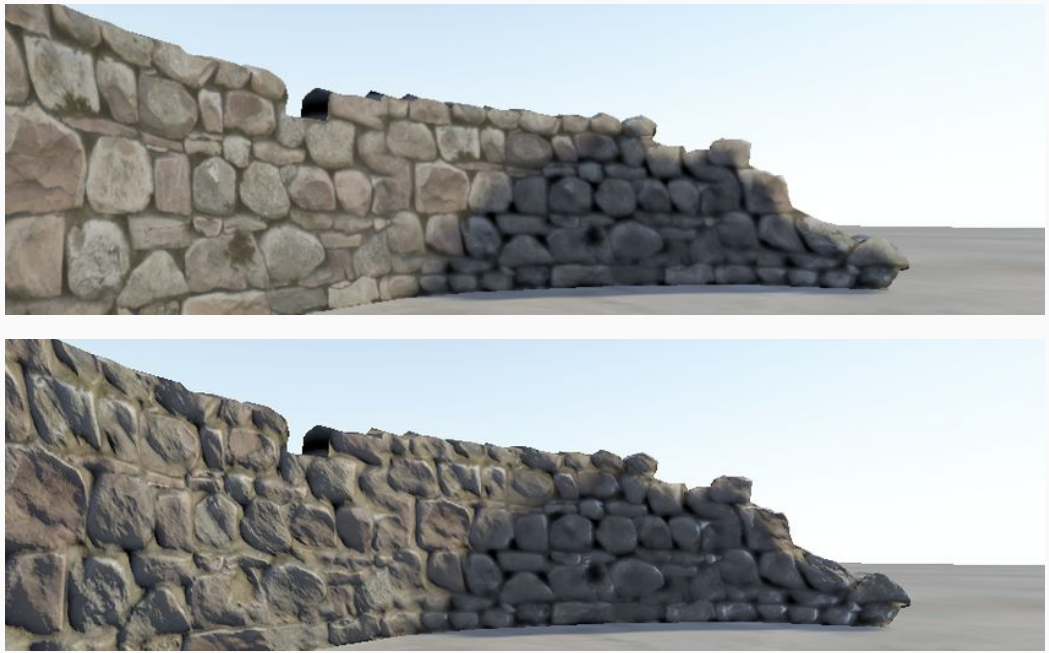


What we will learn (deferred shading)



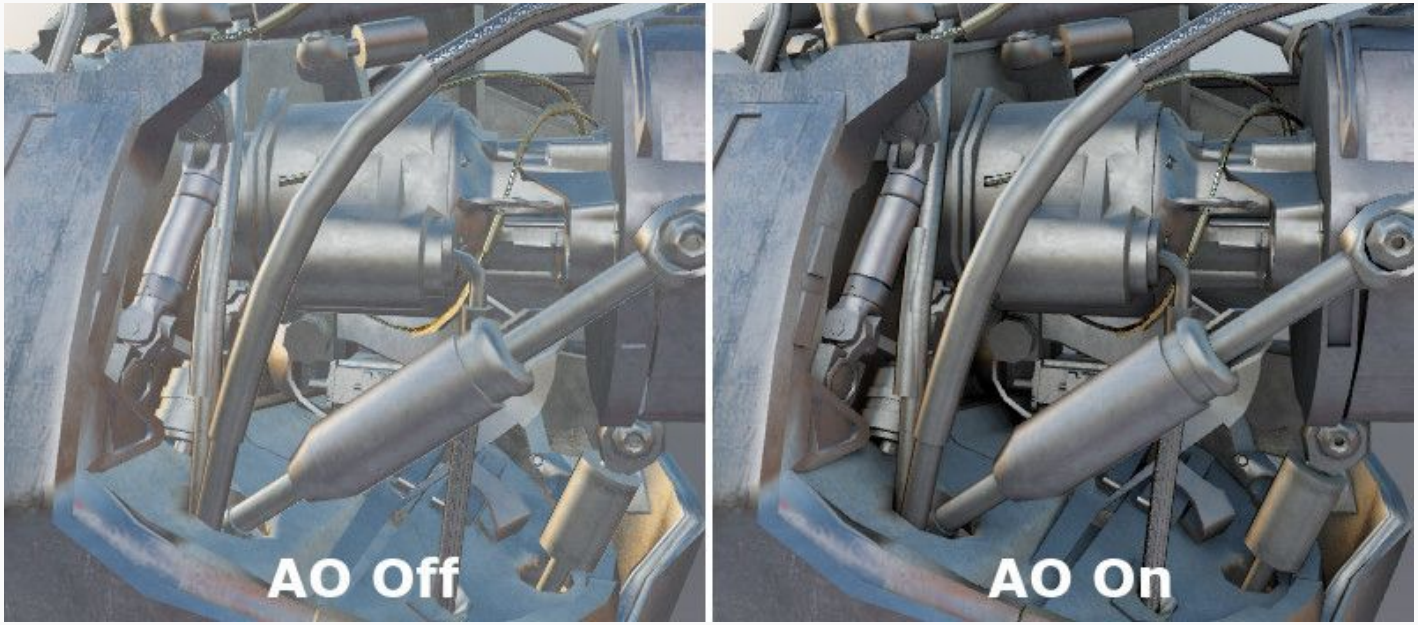


What we will learn (bump mapping techniques)

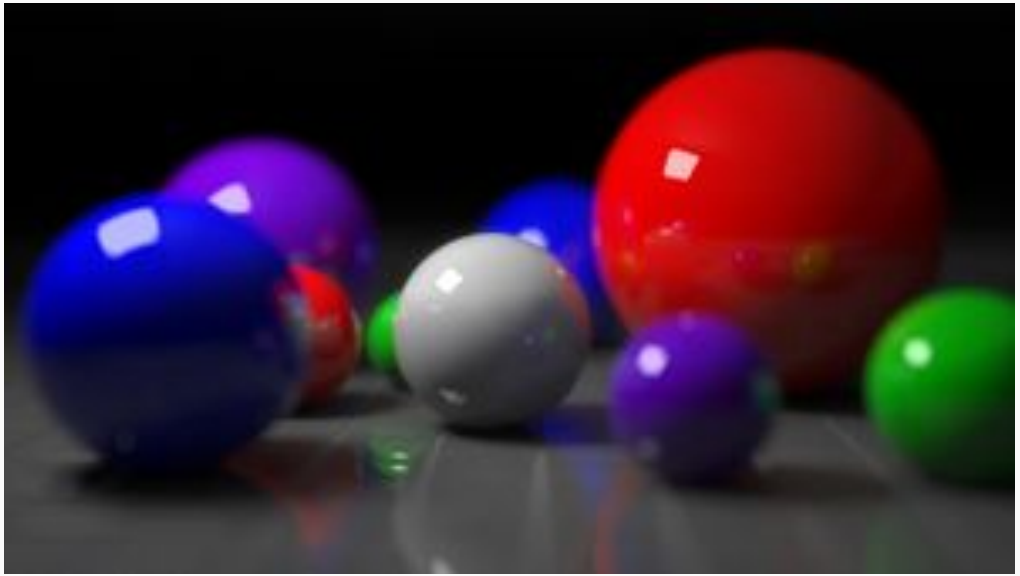


What we will learn (bloom/glow effects)

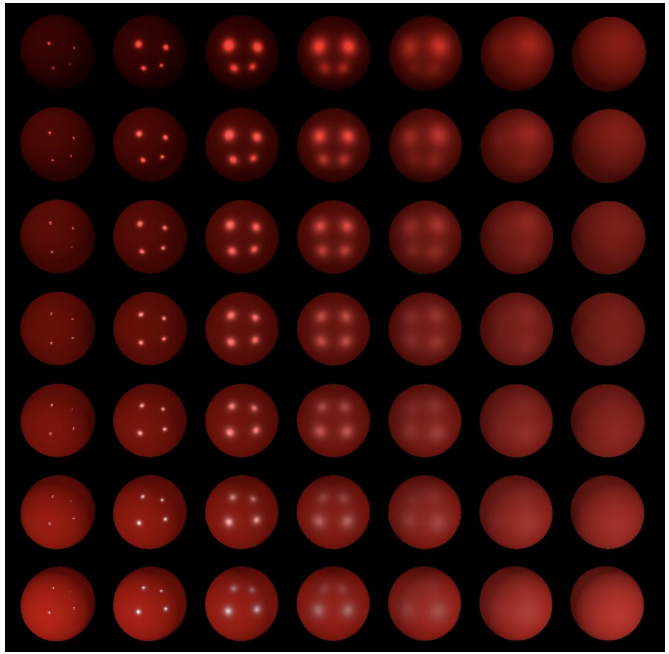
What we will learn (simulation of ambient occlusion)



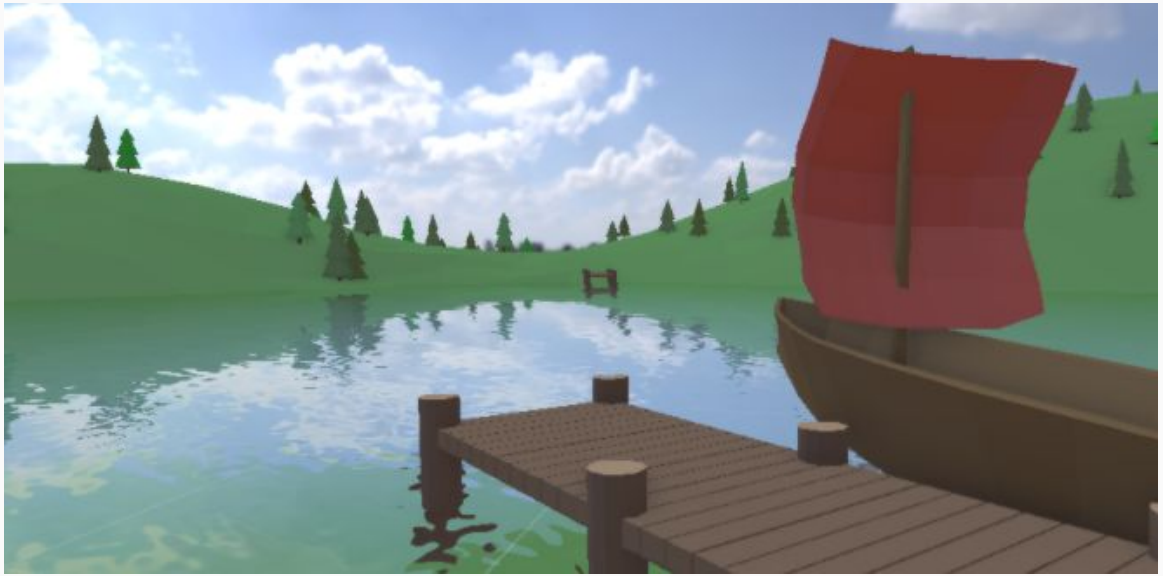
What we will learn (depth of field effect)



What we will learn (physically based materials)



What we will learn (simulation of a water plane)



Methodology

2h sessions

- 30-60 min (approx.) explanations
- Quick break
- Hands-on learning the rest of the time

Material

- Annotations on the board (virtually)
- Slides / documents / links in the ATENEA campus

Evaluation

No exams in this subject… **Hooray!**

- But… get ready to code
- Deliverable 1 counts **30 %**
- Deliverable 2 counts **30 %**
- Final project counts **30 %**
- Participation / attendance counts **10 %**

Tools

C++ (of course)

GLFW (Platform abstraction)

OpenGL / GLSL (GPU programming)

STB (To read/write image files)

GLM (OpenGL-like math lib)

Assimp (Asset Import library)

RenderDoc (Your life-saver, you'll see)

Questions?