

Assignment 4 – rendering in games (research task)

ITU Graphics Programming 2021

Description

In groups of two, study and present a rendering technique that you find interesting. Please send a private message to Henrique on teams if you do not have a group, if you would like to do it alone, or if you would like to do it in a group of three.

The presentations will be scheduled on lecture 13, the group will share the screen and present during class. Optionally, the group can prerecord the presentation. The presentation will be followed by questions if time permits. In total, each group will have a timeslot of 15 minutes for presentation and questions.

This assignment has no hand-in, the presentation is the only requirement to complete the assignment. You should write Henrique to inform who are the group members and what is your topic (once you have selected one).

Warning: Please mind that modern games build upon decades of developments in computer graphics and rendering. If modern content sounds overly complicated, try to limit your search to rendering techniques from games launched between the years 2005 to 2012.

Intended learning outcomes:

- You will get to know common graphics programming research resources.
- You will learn about the rendering techniques that your colleagues have selected.
- You will be exposed to potential topics for your course project.

Two ways you can approach this assignment:

1. Select a visual effect from a game you like (e.g. water reflection on game X, grass rendering on Y or cloth rendering on game Z), search for resources on that effect. Notice that it is easier to find information on some games than others. For instance
 - a. if you like the Uncharted game series, Naughty Dog often hold presentations at GDC and Siggraph, where they detail how rendering works on their games;
 - b. if you like a Zelda or Mario game, you may have hard to find official information on it (but some enthusiasts may have gone through the trouble, it is worth searching!)
2. Skim through the resources, select a topic you find interesting.

Recommended resources:

- GDC vault, there are many technical presentations there, for example:
 - “Water Technology of Uncharted”, talk from 2012 covering many possible topics, such as water waves, flow shaders, geometry patches for level of detail, geometry culling ...
<https://www.gdcvault.com/play/1015517/Water-Technology-of>
- Siggraph is the prime conference on computer graphics. It includes the latest academic and industrial research on topics such as rendering, computer animation and geometry processing, with heavy participation of game development companies.
 - The yearly course “advances in real-time rendering” includes presentations, mostly from game development companies, on real-time rendering for specific games. Presentation slides are available on <https://advances.realtimerendering.com/> , most of the sessions are recorded, some are available on youtube, and some are available on Siggraph’s website

(<https://www.siggraph.org/learn/conference-content/> select the year of the conference, click on **courses**, and search for **advances in real-time rendering** to see if the video recording is available)

- Book series (some of the books are free):
 - GPU gems (example: <https://developer.nvidia.com/gpugems/gpugems3/foreword> , look at the list of the topics on the right. Chapter names often sound overly complicated, but have a look on the content to find out if that is really the case),
 - ShaderX,
 - GPU pro,
 - GPU zen
- Many programmers write blogs about rendering and visual effects in games:
 - <https://seblagarde.wordpress.com/>
 - Example: the series on rain, with a description on how certain effects were achieved in the game “remember me”
<https://seblagarde.wordpress.com/2012/12/27/water-drop-2a-dynamic-rain-and-its-effects/>
 - <https://fabiensanglard.net/>
 - mostly things of historical value, like how the fire effect was implemented in the opening screen of DOOM for the ps1.