

CS7GV3

Fifth Assignment Research Implementation

2nd March 2021

Research Implementation

- Pick a **research paper** published in SIGGRAPH or sufficiently important conference and implement a **real-time interactive demo** based on it
 - Some papers will require more work than others so we provide some suggestions
 - You do not have to follow the paper exactly
 - If the implementation is easy OR available, you should make this clear in your **write-up and spend appropriate time in building a detailed demo around it**
- This project is worth 40% and is expected to take up around 40-50 hours of work

Additional Notes

- You do not have to implement papers directly, you are encouraged to **search for related tutorials**, alternate implementations, existing code, external assets but you should link back to the original paper (or equivalent paper, see below) in your presentation
- You may pick your paper from:
 - ACM SIGGRAPH Annual Conference
 - ACM Transaction on Graphics journal
 - IEEE Transaction on Visualisation and Computer graphics journal
 - Symposium on Interactive 3D Graphics and Games
 - Eurographics Annual Conference
 - Symposium on Computer Animation
 - Siggraph Asia - Annual Conference

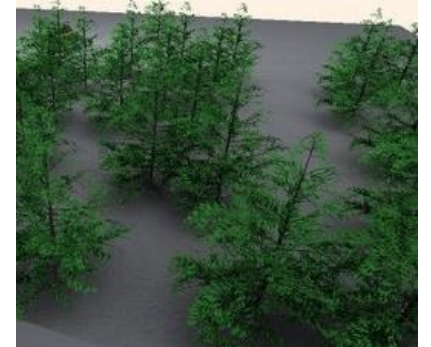
Example Papers

- Caustics
 - Musawir A. Shah, Jaakko Konttinen, Sumanta Pattanaik
“Caustics Mapping: An Image-space Technique for Real-time Caustics” IEEE Transactions on Visualization and Computer Graphics
- Refraction (at two surfaces)
 - Chris Wyman “An Approximate Image-Space Approach for Interactive Refraction” in SIGGRAPH 2005
<http://www.cs.uiowa.edu/~cwyman/pubs.html>
- Sub surface scattering
 - Rui Wang, John Tran, David Luebke "All-Frequency Interactive Relighting of Translucent Objects with Single and Multiple Scattering" Sigraph 2005
<http://www.cs.virginia.edu/~rw2p/s2005/>



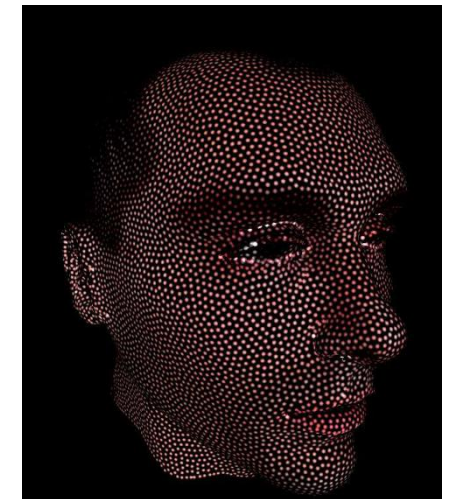
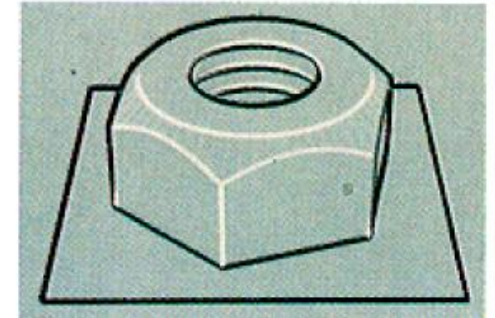
Example Papers

- Ambient occlusion
 - Perumaal Shanmugam and Okan Arikan “Hardware Accelerated Ambient Occlusion Techniques on GPUs” in I3D 2007
<http://sites.google.com/site/perumaal/>
- Translucent objects with depth-peeling
 - Louis Bavoil, Steven P. Callahan, Aaron Lefohn, Joao L. D. Comba, Claudio T. Silva "Multi-Fragment Effects on the GPU using the k-Buffer" in I3D 2007
<http://www.sci.utah.edu/~bavoil/research/kbuffer/>
- Relief mapping
 - Oliveira, Manuel M., Gary Bishop, David McAllister. Relief Texture Mapping. Proceedings of SIGGRAPH 2000 . (see: <http://www.inf.ufrgs.br/~oliveira/RTM.html>)



Example Papers

- NPR
 - T. Saito and T. Takahashi, “*Comprehensible rendering of 3-D shapes*”, SIGGRAPH 1990
- Impostors/Billboards
 - S. Dobbyn, J. Hamill, K. O'Connor, C. O'Sullivan “Geopostors: A Real-Time Geometry/Impostor Crowd Rendering System” - i3d 2005. _ <http://isg.cs.tcd.ie/dobbys/VirtualDublinProject.html>
- Point Based Rendering/ Splatting
 - J.P. Grossman, “Point sample rendering” In Rendering Techniques (Eurographics Symposium on Rendering) 1998



Present your paper/project next week Tuesday, 9th March 2021 and submit the presentation on Friday, 12th March 2021

- Short presentation
- 7 Minutes

Approximate Marking Scheme

You tube video (Friday, 23th April 2021) <ul style="list-style-type: none">- Should be meaningful (viewers should understand what's going on)- Should show main technical contributions- Should be relatively presentable	5%
Source Code (Friday, 23th April 2021) (mostly the technical component – not necessarily demo elements): legible, well written, re-usable, optimised	5%
Final Demo (Tuesday, 20th April 2021): <ul style="list-style-type: none">-Running demo. Robustness, quality, complexity, aesthetics.-Summary technical implementation slide-Results/evaluation slide	15%
Report (Friday, 23th April 2021): <p>Also comprises mark for project as a whole evaluated based on:</p> <ul style="list-style-type: none">- Quality of written presentation- Completeness (all requirements in prev slide)- Technical complexity	15%
- Results and Conclusions: useful insights provided	

Deliverables submitted by 23th April 2021

- Youtube video
- Source code & assets
- Implementation report
 - Length: 4-10 pages:
 - Formatting: 1-1.5 spacing, Times 12 point font or equivalent, single column, moderate margins
 - Abstract: overview of what you've done
 - Background: Summary of technical paper
 - Implementation details: tech & demo
 - Results/Evaluation: how fast, how much detail can you handle in realtime? How many resources does it hog-up
 - Improvements / limitations
 - Proper Citation of papers, source code, libraries, text, images and assets used