CS7GV3

Research Implementation

21 February 2023

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 also pick your own 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)
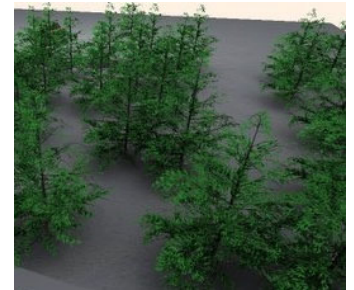
Example Papers

- NPR
  - T. Saito and T. Takahashi, "*Comprehensible rendering of 3-D shapes*", SIGGRAPH 1990

- Impostors/Billboards
  - S. Dobbyn, J. Hamill, K. O'Conor, C. O'Sullivan "Geopostors: A Real-Time Geometry/Impostor Crowd Rendering System" - i3d 2005. http://isg.cs.tcd.ie/dobbyns/VirtualDublinProject.html

- Point Based Rendering/ Splatting
  - J.P. Grossman, "Point sample rendering" In Rendering Techniques (Eurographics Symposium on Rendering) 1998
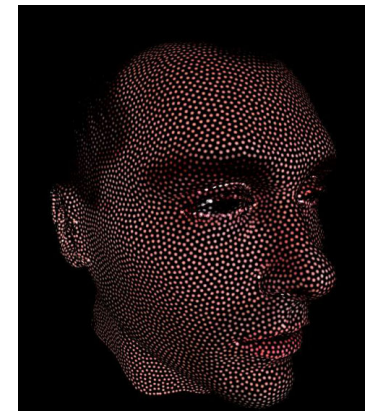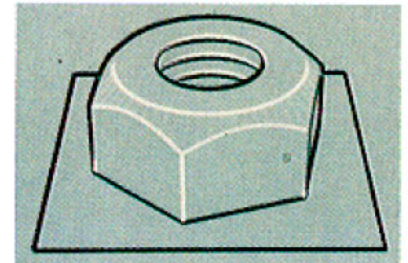
Present your paper/project next week Tuesday, 28th February 2023

- Short presentation
- 3 Minutes
- All in one presentation

Approximate Marking Scheme

You tube video - Should be meaningful (viewers should understand what's going on) - Should show main technical contributions - Should be relatively presentable	**5%**
Source Code (mostly the technical component – not necessarily demo elements): legible, well written, re-usable, optimised	5%
Final Demo: -Running demo. Robustness, quality, complexity, aesthetics. -Summary technical implementation slide -Results/evaluation slide	15%
Report. Also comprises mark for project as a whole evaluated based on: - Quality of written presentation - Completeness (all requirements in prev slide) - Technical complexity - Results and Conclusions: useful insights provided as to applicability of	15%

Deliverables submitted by 14th April 2023

- Youtube video

- Source code & assets

- Implementation report

  - Length: 4-10 pages (less is better):

  - 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