

COMP 308 - 2014T2 Final Project Proposal

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Project Title and Objective

Contact person: Joseph Zachariah Sim.

Title: Photorealistic interactive lens flares and sky rendering.

Objective: To convincingly render a day or night sky, taking into account atmospheric scattering and simple weather and lighting conditions, and to display lens flares resulting from light in the scene interacting with the camera aperture in a physically-based way (in real time). This can be used to increase the realism of a variety of computer-generated scenes when integrated within a graphics pipeline.

Task Allocation

Joseph Zachariah Sim: Lighting & Texturing

- Topic: sky rendering and lighting, large scene model interface
- Methods: atmospheric scattering and illumination, HDR rendering, extend OBJ parser to handle multiple textures
- References: SIGGRAPH99 and SIGGRAPH01 papers (see references)

Thomas Beneteau: Rendering & Interaction Control

- Topic: dynamic lens flare rendering and scene graph control
- Methods: physically based diffraction, convolution and fast Fourier transform, GUI programming to interact with scene
- References: SIGGRAPH11 paper (see references)

Plan and Milestones

We have set a few milestones to ensure each part of the project is led to completion within the time allocated:

- September 13th: Ability to display a static 3D scene with simple lighting and navigate in it with a camera, basic lens flares
- October 1st: Realistic sky (or night) rendering with good lighting, interactive scene controls and dynamic/better quality lens flares
- October 8th: Bug fixing, and program optimizations, make sure it runs on the ECS computers (this will also be done periodically)
- October 17th: Polish the scene controls, and add any extra features if time permits before submitting the source code

References

- [1] Matthias B. Hullin, Elmar Eisemann, Hans-Peter Seidel, and Sungkil Lee. Physically-based real-time lens flare rendering. *ACM Trans. Graph. (Proc. SIGGRAPH 2011)*, 30(4):108:1–108:9, 2011.
- [2] Henrik Wann Jensen, Frédo Durand, Julie Dorsey, Michael M. Stark, Peter Shirley, and Simon Premože. A physically-based night sky model. In *Proceedings of the 28th Annual Conference on Computer Graphics and Interactive Techniques*, SIGGRAPH '01, pages 399–408, New York, NY, USA, 2001. ACM.
- [3] A. J. Preetham, Peter Shirley, and Brian Smits. A practical analytic model for daylight. In *Proceedings of the 26th Annual Conference on Computer Graphics and Interactive Techniques*, SIGGRAPH '99, pages 91–100, New York, NY, USA, 1999. ACM Press/Addison-Wesley Publishing Co.