COMP220: Research Journal

COMP220

1507866

November 22, 2016

1 Introduction

2 Lighting

Phong originally proposed a lighting model. Previous computer graphics only used diffuse lighting, Phong expanded this into three components and introduced highlights [1]. Phong's model split computer graphic lighting into three components which are specular, ambient and diffuse. Lighting models previous to this could take a long time to calculate or did not give realistic results [2]. Blinn refers to Phong's model as a more realistic model and says it improves the appearance of curved objects [3]. However Blinn and Newell suggested the Phong model was not suitable for reflections [4]...

3 Particle Effects

Reeves first proposed the idea of a particle system in 1983 [5]. A particle system was to be used to represent dynamic or irregular objects such as clouds, smoke and fire [5, 6]. A particle system would create new particles and make older particles "die".

Huang *et al* outline what the main properties of a particle and particle effect system are [7]. A particle system should initialise, emit, render and finally eliminate particles. This corresponds with Reeves as he says particle should be "born" and "die", both papers say that particles should have limited lifespans The properties a particle should have are spatial location, velocity, survival time, shape, size and a gravity factor [7].

3.1 Particle Effect for Fireworks

Lei and Wang looked using a particle system to simulate fireworks [6]. Like Reeves they mention particles need to have a lifetime and can be used to create dynamic objects. Their method also takes other forces into account such as simulated temperature, wind speed and physics and what effect this would have on the particle[6].

There are many other papers that look at using particle effects for fireworks [8, 9].

3.2 Particle Effect for Fire

4 Conclusion

References

[1] J. T. Kajiya, "Anisotropic reflection models," *SIGGRAPH Comput. Graph.*, vol. 19, pp. 15–21, July 1985.

[2] B. T. Phong, "Illumination for computer generated pictures," *Commun. ACM*, vol. 18, pp. 311–317, June 1975.

[3] J. F. Blinn, "Models of light reflection for computer synthesized pictures," *SIGGRAPH Comput. Graph.*, vol. 11, pp. 192–198, July 1977.

[4] J. F. Blinn and M. E. Newell, "Texture and reflection in computer generated images," *Commun. ACM*, vol. 19, pp. 542–547, Oct. 1976.

[5] W. T. Reeves, "Particle systems—a technique for modeling a class of fuzzy objects," *ACM Trans. Graph.*, vol. 2, pp. 91–108, Apr. 1983.

[6] S. Lei and W. Wang, "Study on algorithm for fireworks simulation based on particle system," in *Computer Science and Network Technology (ICCSNT), 2013 3rd International Conference on*, pp. 231–234, Oct 2013.

[7] X. Huang, D. Zhao, N. Li, and R. Xu, "Design and application of general data structure for particle system," in *Computer Science and Electronics Engineering (ICCSEE), 2012 International Conference on*, vol. 1, pp. 489–492, March 2012.

[8] W. Dong, X. Zhang, and C. Zhang, "Firework simulation based on particle system in virtual scene," in *Proceedings of the 2010 International Conference on Multimedia Communications*, MEDIACOM '10, (Washington, DC, USA), pp. 39–41, IEEE Computer Society, 2010.

[9] S. Zhang, "Fireworks simulation based on particle system," in *Proceedings of the 2009 Second International Conference on Information and Computing Science - Volume 01*, ICIC '09, (Washington, DC, USA), pp. 187–190, IEEE Computer Society, 2009.