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SIMPLE API FOR 3D APPLICATIONS

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Contents

Abstract

The application programming interface which is presented in this thesis, alongside implementation related concepts, is actually a small library packed with a couple of graphical effects based on particle systems. The thesis is composed out of four chapters and the content of each chapter is shortly described bellow.

In the *Introduction* chapter, a brief history of computer graphics and particle systems is given. This chapter also specifies the role that particle systems play in computer graphics and why are they necessary.

The *Particle Systems* chapter obviously describes some technical details about particle systems. By the end of this chapter a programmer should already have an idea about how to implement such a system in a graphical application.

The *Application* chapter presents all the particle based graphical effects in the API and gives implementation details about them. It also gives details about the structure of the API and that of the application which uses the API. Besides this it demonstrates the API's use with a couple of screen-shots.

Very few software pieces are perfect at their first implementation. The *Conclusion* chapter emphasizes some changes which can be made in order to improve the performance of the API and gives a short description of my learning experience.

Abstract

Abstract in Romanian.

Chapter 1

Introduction

1.1   A Brief History of Computer Graphics

First of all, what is *computer graphics*? The term first appeared in 1960 and it was made-up by William Fetter who was, at the time, a computer graphics researcher for Boeing. The term refers to a subfield of computer science which deals with image data representation and manipulation using computers.

The first computer able to do graphics is the Whirlwind computer. Its development was started in 1945 at MIT by a team of computer scientists led by Jay Forrester. The purpose of this computer was to make aircraft tracking possible on a large oscilloscope screen via a graphical application. Although the aircraft tracking application was the first application in the field of computer graphics it was not interactive. It could only display the real time positions of the tracked aircrafts. The first interactive graphical application was Tennis For Two and it was created by William Higinbotham because he wanted to kill the boredom of the visitors of the Brookhaven National Laboratory.

In 1959 the TX-2 computer emerged. This computer was used by Ivan Sutherland to program the Sketchpad, a tool for creating very precise engineering drawings. The software offered its users the possibility to draw lines and circle arcs. The lines could then be made perfectly parallel or perpendicular in order to fit the users drawing needs. Sketchpad is known to be the first graphical user interface or GUI in short form.

In 1966 Ivan Sutherland made yet another contribution to the field of

computer graphics by inventing the Sword of Damocles the first computer controlled head mounted display. This device displayed two stereoscopic images of the same wire-frame mesh. Two decades later NASA would use his methods in virtual reality research.

Very soon after, in 1970 actually, the field of computer graphics was upgraded by Henri Gouraud, Jim Blinn and Bui Tuong Phong. The first added the Gouraud shading model and the other two added the Blinn-Phong shading model. In 1978 Jim Blinn also added bump mapping to the computer graphics field.

1.2   A Short History of Particle Systems

The term *particle system* was coined in 1982 by William T. Reeves who was a computer graphics researcher for Lucasfilm Ltd., a film production company known for films like the Star Trek and Star Wars franchises.

"A particle system is a collection of many minute particles that together represent a fuzzy object. Over a period of time, particles are generated into a system, move and change from within the system, and die from the system."

–William T. Reeves–acm Transactions On Graphics–April 1983–Vol. 2, No. 2

Chapter 2

Particle Systems

2.1   What are particle systems?

This section presents all the specific details of particle systems.

Chapter 3

Application

This is the application chapter.

Chapter 4

Conclusion

This is the conclusion chapter.