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COURSE NOTES

26

3D Computer Animation Workshop

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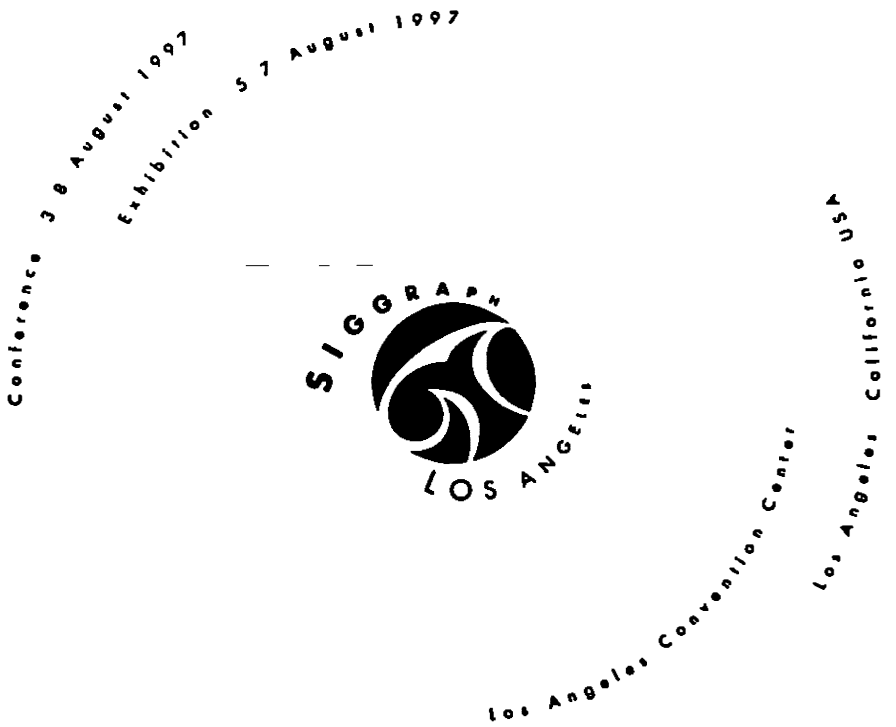

3D Computer Animation Workshop

Siggraph'97 Course #26 Notes

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Special Note to all Course participants

Please bring your copy of these Course Notes with you to the Workshop, you will need to follow the Exercise portions of these Notes as you work at the machines

Acknowledgements

I wish to thank the Siggraph organization and in particular Barb Helfer Courses Chair and Steve Alexander Creative Applications Lab Chair, for their help in organizing this Workshop I also want to express my gratitude to all the people at Softimage for generously contributing their support to the Workshop Finally I want to thank all of my colleagues at Pratt Institute for their support especially Rick Barry Chair of the CGIM department Khalida Lockheed for her help in the preparation of these Course Notes and other Workshop materials and all of my students and former students who helped as Animation Assistants to this Workshop

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Author Biography

Michael O'Rourke is an artist and animator and Associate Professor in the Department of Computer Graphics and Interactive Media at Pratt Institute in Brooklyn, NY His professional training in the arts includes an M F A degree from the University of Pennsylvania Following his studies, he was a Senior Research Staff Artist at the New York Institute of Technology Computer Graphics Laboratory, where he worked on personal animations and artwork as well as commercial animations contributing to a Clio award winning animation and a first prize winner at the Los Angeles Animation Celebration

At Pratt, he is the senior faculty member and lead instructor in the animation program of Pratt s Department of Computer Graphics and Interactive Media He is also the author of *Principles of Three-Dimensional Computer Animation* (W W Norton, 1995) While teaching, he continues to work on his own artwork, both animation and still imagery, concentrating most recently on several series of prints He has exhibited his work internationally, and is one of the featured artists in the Siggraph '97 *Ongoings* exhibition He has also done several series of computer aided sculpture and graphic works for the artist Frank Stella

In addition to his experience as an artist he has broad experience as an educator His studies in this area were at Harvard University, where he earned an Ed M degree In addition to his teaching at Pratt he has taught Kindergarten, English as a foreign language in West Africa, and conversational French

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Introduction

This course is a beginning level hands on workshop whose objective is to introduce participants to the principles and practice of high end 3D computer animation This goal is accomplished in the course through a combination of lecture presentations and hands on experience with one of today s major high end 3D software packages Beginning with simple modeling rendering and keyframing participants progress through more complex techniques including texture mapping path animation hierarchical animation inverse kinematics and envelope surfaces Participants learn both the underlying principles that are shared by all 3D computer animation software packages as well as how these principles are implemented on one of today s important software packages

The course is divided into four parts with each part consisting of a brief lecture presentation on the principles of 3D animation a brief demonstration of how these principles are implemented on the software package used by the Workshop and an extended exercise in which participants work with this software to develop a short animation utilizing those principles

The writtenNotes for this course printed here follow the structure of the course itself – that is four parts with each part consisting of a brief lecture and an extended exercise The exercises are in the form of command by command tutorials for *Softimage v3 7* which is the software package used in the Workshop

In the lecture portion of these Notes the text was adapted from the author's book *Principles of Three Dimensional Computer Animation* (WW Norton 1995 239 pages 296 illustrations ISBN 0 393 70202 2 $48 00 USA) The illustrations for these Notes were taken directly from the same book Please note that the illustrations retain the original numbering as they appear in that book and are therefore not sequential as they appear here in these Notes Readers interested in a much more detailed explanation of the principles presented here as well as many other principles of three dimensional computer animation may find it useful to refer to the book *Principles of Three Dimensional Computer Animation* mentioned above from which all this material is derived

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PART 1

Lecture 1

Coordinate Systems

Geometric Primitives

Transformations

Keyframing

Wireframe Preview

Parameter Curve Editing

PART 2

Lecture 2

The Camera

Lighting

Surface Characteristics/Shaders

Basic Texture Mapping

Rendering & Shading Algorithms

Final Frame Considerations

Flipbooks

PART 3

Lecture 3

Polygonal Modeling

Patch Modeling

Common Modeling Techniques

Surface Editing

Object Path Animation

Camera Path Animation

Bump and Transparency Mapping

PART 4

Lecture 4

Hierarchies

Rotational and Positional Constraints

Inverse Kinematics

Rigid Surfaces

Flexible Surfaces

Recording