Using Renderman in Animation Production

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Course 4 NOTES

Using RenderMan® in Animation Production

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ABSTRACT

RenderMan has been used by many large and small animation production studios to create high-quality, often photorealistic, imagery for television and motion pictures. Its ability to render extremely complex scenes with motion blur, depth-of-field, and user-programmable shaders has made it the industry leader in feature film CGI, and in recognition of this, it received an Academy Award in 1993. This course will teach people how to use RenderMan. We will discuss generating data to pump into RenderMan renderers, programming the RenderMan Shading Language to generate special effects, and accessing the special features of the RenderMan-compatible renderers that are available today. We will examine in-depth the production of several famous computer animations made with RenderMan, to show what it really takes to make most effective use of the tools RenderMan provides. We intend to make this both entertaining and informative.

Course Objectives

By the end of this course, the student should understand why using RenderMan is both more difficult and more powerful than using other renderers available to him. He will know the basic techniques for taking advantage of that power to make great animations, see that it is not so difficult after all, and will be enthusiastic in his desire to get out there and do it.

Level/Desired Background

This course is rightfully an "Intermediate" level course. The course does require a basic background in both 3-D computer graphics and programming, but you don't have to be a rocket scientist. This course will not be nearly as technical as the 1992 course "Writing RenderMan Shaders". However, some familiarity with the RenderMan and its Shading Language is valuable (e.g., have read the "RenderMan Companion", or have written at least one shader).

What's most important is a facination with and love of computer graphics animation production. We encourage graphics programmers, advanced graphics users, CGI production personnel, or anyone who wants to see how other people cajole RenderMan into doing all that neat stuff to attend.

Suggested Reading Material

"The RenderMan Companion: A Programmer's Guide to Realistic Computer Graphics," Steve Upstill, Addison-Wesley, ISBN 0-201-50868-0

> This is the basic textbook for RenderMan, and is a must read. Answers to all of the typical, and many of the extremely advanced, questions about RenderMan are found within its pages. Its only failing is that it does not cover RIB, only the C interface.

"The RenderMan Interface Specification, Version 3.1," Pixar

> The bible. The first half of this book is the Technical Reference for RenderMan's geometric interface, both C and RIB versions. The second half of this handbook is the Technical Reference for the RenderMan Shading Language. Unfortunately, it is not as approachable as the Companion.

"The RenderMan Interface and Shading Language," Siggraph 1991 Course #21 Course Notes (or alternatively, Siggraph 1990 Course #18 Course Notes)

> These are the notes to the first Siggraph course on RenderMan. This course follows the presentation of the Companion. If you can find one of these, you may find them very useful.

"Writing RenderMan Shaders," Siggraph 1992 Course #21 Course Notes

> These are the notes to the advanced course on RenderMan. This is the heavy-duty, very technical course specifically focused on writing high-quality effects in the Shading Language, including topics such as noise synthesis, lighting and antialiasing. The best source available for this topic.

Lecturers

Tony Apodaca
> Tony Apodaca is the Director of RenderMan R&D at Pixar. Tony is co-developer and reigning Chief Architect of the RenderMan Interface Specification. He is also one of the Unknown Implementers of all of Pixar's image synthesis products, both famous and infamous. Tony received his Master's degree in Computer and Systems Engineering at Rensselaer Polytechnic Institute in 1986. His screen credits include *Tin Toy* and *knickknack*, but unfortunately not *Jurassic Park*.

Larry Gritz
> Larry Gritz is a Graphics Software Engineer at Pixar. Prior to joining Pixar he developed the Blue Moon Rendering Tools (BMRT), a shareware, RenderMan-compliant renderer which supports ray tracing and radiosity. He expects to complete his PhD at the George Washington University later this year.

Tom Porter
> Tom Porter is Director of Effects Animation at Pixar. Tom has been working in 3-D graphics since 1976. He wrote the software for the first commercial paint program (the Ampex AVA), developed fundamental algorithms for digital compositing (which led to the Pixar Image Computer) and for motion-blurred rendering. Tom has taken time out over the years to create still frame images (*1984*, *Textbook Strike*) to advance the state of the art in computer generated photorealism, his main research interest.

Oren Jacob
> Oren Jacob is a Senior Technical Director at Pixar. He has been with the company for five years and has worked on numerous award winning commercials like Listerine *Arrows*, *Mission* and *Jungle*, LifeSavers *Conga*, TetraPak *Island*, and short films for Sesame Street like *Luxo Jr. in In and Out*. He has also worked on several commercials that did not win any awards, but his mother still loves him. Oren holds a Master's Degree from the University of California, Berkeley in Mechanical Engineering yet still claims to understand computer graphics.

MJ Turner
> M.J. Turner is the Lead Technical Director for the CGI department at Walt Disney Feature Animation. She joined Disney eight years ago and has worked on films such as *Oliver & Company*, *Oilspot and Lipstick*, *The Little Mermaid*, *Rescuers Down Under*, *Prince & the Pauper*, *Beauty & the Beast*, *Aladdin*, *The Lion King* and *Pocahontas*. She is involved with the design and development of new ideas and techniques to be used for upcoming releases. M.J. graduated from the University of Southern California with a B.S. and M.S. in Computer Science.

Joe Letteri
> Joe Letteri is a Computer Graphics Supervisor in the Computer Graphics Department at In-

dustrial Light & Magic where he specializes in lighting design and rendering of computer graphic images and special effects for integration into feature films. The award-winning work he did for the photo realistic look of the dinosaurs in *Jurassic Park* has made him one of the pioneers in computer graphics. His screen credits include *Casper*, *Flintstones*, *Jurassic Park* and *The Abyss*. Prior to ILM, Joe worked at MetroLight Studios. He is a member of ACM Siggraph.

Ellen Poon

Ellen Poon is a Computer Graphics Supervisor at ILM. In addition to overseeing a computer graphics crew, she also creates character animations and performs lighting tasks for feature films as well as commercials. Ellen received her B.Sc. in Computer Science from the University of Essex in England. She contined her Ph.D. studies at the University of London where she carried out Computer Graphics research work. She then joined the Moving Picture Company in 1986 and subsequently Rushes in London to produce computer animation pieces commercially. Her screen credits include Perrier *Toy Soldiers*, *Hook*, *Jurassic Park*, *The Mask* and *Disclosure*. Ellen's continuing interests are to extend the realm of creative vocabularies and to explore alternative art form are well beneath underground.

Habib Zargarpou

Habib Zargarpou is a Senior Technical Director at ILM. He has been an illustrator since 1981. He received his B.A.S.C in Mechanical Engineering from the University of British Columbia in VancouverCanada and went on to graduate with distinction in Industrial Design from Art Center College of Design in Pasadena, CA. He stumbled into 3-D graphics in film in 1990 while designing for a film. His recent projects include *The Mask* and *Star Trek: Generations*. He considers computer graphics to be the perfect mix of the technical and artistic worlds. He still likes to paint with real brushes once in a while to maintain his sanity.

Schedule

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