SIGGRAPH 97
24TH INTERNATIONAL CONFERENCE
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AND INTERACTIVE TECHNIQUES

COURSE NOTES

Designing Real-Time Graphics for Entertainment

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Designing Real-Time Graphics for Entertainment

SIGGRAPH '97 Course

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Designing Real-Time Graphics for Entertainment

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SIGGRAPH '97 Course

Abstract

This course offers a guide to the design and construction of real-time computer graphics for entertainment applications Creating something truly fun with a computer is a difficult task, and using computer graphics in the pursuit of this goal does not make it any easier We will cover the issues of creating real-time 3D games on hardware platforms that span a range from home game consoles up to high-performance image generators used in theme parks Topics include the hardware architectures of various game platforms, visual simulation tricks, 3D modeling, real-time character animation, game prototyping and programming The speakers and included papers draw examples from the development of actual games, tools and game development environments

The course has three related sections, each targeted at a different point on the price-performance curve The examples chosen include destination-attraction location based entertainment using high-end graphics hardware, the populist middle ground of computation, the personal computer designed for use in the home, and game console machines, designed to be affordable by all

Each of these design points will be discussed in terms of the computer graphics features and performance as well as the software approaches used to take full advantage of this hardware In addition, since each new generation of graphics systems borrows something from it's predecessors, we will review the trends in this technology migration and postulate on where they may lead

The papers printed in these course notes cover three areas

- The graphics and programming techniques available to make the best use of graphics tech nology for high quality real time renderings The topics include hardware and software architectures graphics optimization database tuning and other tricks of the trade The visual simulation roots of many of these hardware and software techniques is also covered
- Developers discussions of the use of those techniques as one component in creating interac tive 3D experiences whether for home game consoles or for location based entertainment or theme park installations The topics covered include tools and methods for content gen eration software frameworks and animation systems
- Reference materials that provide context for the above or offer detailed advice on the topics covered more broadly by the speaker s presentations

Lecturers Contributing Course Notes

Sharon Clay
Silicon Graphics

Sharon Rose Clay is the manager of the IRIS Performer engineering team in the Advanced Graphics Software department at Silicon Graphics She specializes in performance issues for system implementation and real time graphics applications She was a member of the original Performer design team and before that, was a member of the Graphics Software group where she worked on the development team for the VGX graphics platform Her interests besides a real need for speed include user interfaces plants and fish (simulated and real) She studied using natural language in graphical user interfaces at the University of California at Santa Cruz where she received her Masters degree in Computer Science Her Bachelors degree is in Math ematics and Linguistics from the University of California at Berkeley

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Michael Jones
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Michael Jones is the engineering director responsible for Silicon Graphics Advanced Graph ics Software department, which designs and produces several well known graphics APIs OpenGL Cosmo OpenGL OpenGL++ ImageVision Library OpenInventor Molecular Inven tor IRIS Performer and OpenGL Optimizer He has developed high performance visual simu lation systems for several years and prior to joining Silicon Graphics worked in diverse areas including visual simulation color conversion of monochrome films and serials optimization of cellular telephone antenna placement and the nationwide routing of delivery trucks He has been a professional computer programmer since the seventh grade His personal interests include sheep wrestling used book sales afternoon drives and the poetry of Hopkins

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John Rohlf works at Navio a silicon valley area startup company He previously worked in Silicon Graphics Advanced Graphics Division as the main architect of IRIS Performer, having designed and written the multiprocessing and rendering core of the toolkit Before coming to SGI he worked on architectural walkthrough techniques at the University of North Carolina, where he received his Masters in Computer Science He is also a torquehead with an affection for small block V8 s

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Andy Bigos has been on the engineering staff at 3Dlabs (formally DuPont Pixel) for 5 years As part of the GLINT & PERMEDIA core architecture teams he helped bring workstation class 3D graphics to the PC platform As well as working on core architectures he s being closely involved with porting and optimizing OpenGL and Direct3D for 3Dlabs hardware Andy is currently working with game developers to enable console class games on PC He holds a Masters degree in Computer Graphics and a Bachelors degree in Engineering his inter ests include real time physically based modelling as well as play testing the latest and greatest games

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Eric Johnston
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Eric Johnston is currently the technical lead for LucasArts Entertainment s 3D console devel opment group Previously at Spectrum HoloByte, as head of their VR group, he developed Onyx-based games for location based entertainment applications As a Macintosh games pro-grammer his credits include the Mac versions of Rebel Assault, Indiana Jones and the Fate of

Atlantis Monkey Island 1 and 2 Loom Pipe Dream and Putt Putt Joins the Parade Eric graduated from U C Berkeley with a B S in EE and CS A former windsurfing instructor he currently spends too much of his spare time on the flying trapeze

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Scott Watson
Walt Disney

Scott Watson is Walt Disney Imagineering s VR Studio Technology Director Scott started programming at 9 years of age In 5th grade IBM loaned him their first portable (75lbs) computer the 5100 in exchange for writing games and demos to show it off In his college days when 8 bit machines where all the rage Scott wrote multi tasking OSes device drivers cross compilers and RF communications stacks as a day job His free time was dedicated to his band "The Loved Ones and Fanzine "The Pig Paper

Upon joining Disney s R&D department, his first assignment was to write the control software for the Indiana Jones Ride Vehicle An eclectic spectrum of projects has followed Examples range from creating audio and image processing technology for theme park films to helping design a computer keyboard for dolphins For several years Disney com was the machine on his desk Since the beginning of Disney s exploration of Virtual Reality Scott has been at the heart of the technology and is the principal designer of the Disney*Vision Player Disney*Vision is an interactive VR story development system that supports real time Disney quality character animation and the SAL scripting language Scott holds several patents and is an avid fan of The Monkees

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Wes Hoffman
Paradigm Simulation

Wes Hoffman is the founder of Paradigm Simulation Inc Paradigm Simulation was started five years ago and has positioned itself as a leader in the real time 3D market The database and programs he has worked on are well known by those in the industry such as the Performer town database and the Magic Edge location based entertainment experience Mr Hoffman is currently leading the database development effort for Paradigm s Nintendo Ultra 64 game Before working at Paradgim he worked at Merit Technology building a real time simulation toolkit Mr Hoffman graduated from Syracuse University with a Bachelor of Fine Art and a major in computer graphics His other interests include making crop-circles

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Angel Studios

Michael Limber is COO at Angel Studios and serves as its Production Director He has a degree in Architecture from U C Berkeley and a Masters in Industrial Design from Pratt Institute His professional computer graphics career began in 1985 after getting a job at Digital Productions in Los Angeles Beginning as a modeler and progressing to the position of Technical Director Michael spent two intense years at the trailblazing computer graphics company using a Cray XMP and state of the art proprietary software to create commercials film effects visualizations and music videos After serving as Head Animator at the fully digital Post Perfect

in 1989 he moved to San Diego to work as Director of Computer Animation at Angel Studios with another Digital Productions veteran and colleague Brad Hunt

Michael worked as Animator and Technical Director on 'The Lawnmower Man and Peter Gabriel s MindBlender among a multitude of other unique projects Since that time, Angel Studios has become a significant developer of real time interactive entertainment for companies like Sega Hasbro and most recently Nintendo

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