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SIGGRAPH 95

Course Notes CD-ROM



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**Donation of DigitalFILMTM and ThunderSTORMTM cards
is gratefully acknowledged**

Kurt Stoehr, SuperMacTM/RadiusTM

Source Material

To all the Course Organizers and Speakers, their support and donation of materials that made these CD-ROMs possible is gratefully acknowledged.



The SIGGRAPH 95 Courses Committee

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Advice on Acrobat™

Installing Acrobat Reader

All Adobe Acrobat™ Readers may be found under the folder acrobat.

To install Acrobat Reader 2.0 for Macintosh or Windows, follow these steps:

Macintosh Users:

Double-click the S95CN1 disk icon. The S95CN1 disk window opens. Double-click the ACRO_V2 folder, double-click the folder with the language of your choice, and double-click on the ACROMAC folder, double-click the ACROREAD.MAC icon.

Windows Users:

From the Windows Program Manager, choose Run from the File menu, type (your CD-ROM drive letter): \acro_v2\[language]\acrowin\acroread.exe and press Enter. If you are using drive e:, type e: and press Enter.

To install Acrobat Reader 1.0 for DOS or UNIX, follow these steps (Reader 2.0 is not available for these platforms at this time):

DOS Users:

1. Make the CD-ROM drive the default drive. If you are using drive d:, type d: and press Enter. If you are using drive e:, type e: and press enter.
2. type cd ACRO_V1\ACRODOS and press Enter.
3. Type install and press Enter.

UNIX Users:

1. Become superuser (root account).
2. Mount the CD on /cdrom:
3. Then type:
`cd cdrom/s95cn1/acro_v1/acrounix/acroread`
4. Then type: `./install_rdr`

More detailed instructions for the UNIX Reader are included in the Getting Started Guide (PostScript and PDF formats) location in s95cn1/acrobat/acro_v1/acrounix/





Advice on QuickTime™ and MPEG

The digital video files which may be found on disc S95CN2 will either be in Apple's proprietary format QuickTime™, or in MPEG.

QuickTime™

The majority of digital video files were produced from video submitted by the authors. A few digital video files were produced from a sequence of the original computer graphics images. Because these did not get degraded by going to NTSC then back to digital, they were created with no noise, and are very high quality QuickTime™ movies. See the notes below for more information regarding this.

Each QuickTime™ video was produced in a standard way. Here are the specifications:

- Image: 320x240
- Color: millions
- Frames per second: 15
- Codec: Cinepak™
- Quality: 3 to 5



Most previous movies have been produced at 160x120 image resolution, but these are so small as to be hard to view. I decided to go to four times the image size, as the technology is only getting better, and 160x120 digital videos will be seen as ridiculously small only a few years from now, if not already. To view these in their full glory, you will need a 16-bit controlled monitor. 8-bit systems will show all Cinepak™ movies as grainy and badly solarized.

Cinepak™ provides the highest compression possible, but it has the disadvantage of enhancing noise. Cinepak also reduces the required transmission rate. Most of the QuickTime™ movies require a data transmission of roughly 250 Kilobytes to 350 Kilobytes. A single speed CD-ROM drive will read a CD-ROM at 150 KB, a double-speed CD-ROM drive will read a CD-ROM at 300 KB, and so on. If you are going to view these digital movies from a CD-ROM drive, and they stutter, freeze, or hiccup, you might try copying the file to your hard disk drive, and playing it from there.

How the QuickTime™ movies were produced

Most of the QuickTime™ movies on S95CN2 came from SIGGRAPH 95 Course Organizer video tape submissions. Some were produced from TIFF images (see discussion below). These videos were played from a high quality video VHS or Super Hi-8 tape player. The video and audio signals were fed into a DigitalFilm™ video processor installed in a Quadra 840AV, at a resolution of 640x480, at 15 frames per second, using the Codec NONE (no compression, just raw data). These raw digital video files were reprocessed down to 320x240 resolution, highest quality, using the Cinepak™ Codec, at 15fps. The processing software used for video and audio digital data acquisition, and for conversion to Cinepak™, was Adobe Premiere 4.0. We used several ThunderSTORM™ acceleration cards for Cinepak™ compression.

The DigitalFilm™ and ThunderSTORM™ cards were applied to these projects from a gracious donation to SIGGRAPH from SuperMac™. SuperMac™ has recently merged with Radius™, now as one company indentified as Radius™.

What I Found Out

I did some extensive studies on how long it would take to compress raw video to Cinepak™. Here are some very general statistics, subject to change depending upon your platform. My platform is a Quadra 840AV, using a DigitalFilm™ card, a ThunderSTORM™ card, 57MB of RAM, and two 2GB drives. Keep in mind that we are going from 640x480 resolution video, 15fps, no compression, to 320x240 resolution video, 15fps, high quality.

- It takes roughly 18 hours to compress 2.5 minutes of raw video.
- Roughly 50 minutes of Cinepak™ compressed video can be put on one CD-ROM
- Roughly 1 minute of video is 12.5MB to 14MB of disk space.'

Others within SIGGRAPH have been doing experiments with video compression on a variety of platforms. It the opportunity arises, we will collect this information and publish it ... somewhere.

Cinepak™ versus Video Codec Experiments

I mentioned that there were some digital videos created from the original computer graphics. There are two sets of videos, one that uses the Video Codec, at highest quality (5), and the other which uses the Cinepak™ Codec from SuperMac™, now part of Radius™. The video based movies have a data rate of 750KB, and will be difficult even under the best circumstances to view. You will have to copy these to your hard disk drive to view. They will prove to be of very high quality. The Cinepak™ based videos were compressed at highest quality (5), but have a data rate of about 275KB. You will note that these look slightly grainy and sparkle. They are nonetheless of pretty good quality.

How to View

To view the QuickTime™ movies, you will need MoviePlayer. Version 2.0 has been included on this CD-ROM. Look under software tools (swtools/mac/qt). Look for archive qt2.sea. For the PC, QuickTime™ for windows is included. Look under software tools for it as well (swtools/pc directories qt4w1of2 and qt4w2of2).

MPEG

There are some MPEG movies on these discs. The are identified with the extension "mpg". There exist MPEG players for UNIX systems, Macintoshes, and PC's. The only MPEG player on this disc is a Macintosh based program identified as sparkle, and you would use it to view *.mpg files.

Sincerely

Stephan R. Keith
Production Editor
SIGGRAPH 95 Course Notes CD-ROM



Acrobat Reader System Requirements

Macintosh

- Macintosh computer with 68020 or greater processor.
- Apple® System Software version 7.0 or greater.
- 2 MB of Application RAM.
- CD-ROM drive.

Windows

- 386- or 486-based personal computer (486 recommended).
- Microsoft® Windows 3.1 or greater.
- 4 MB of RAM
- CD-ROM drive.

DOS


- 386- or 486-based personal computer (486 recommended).
- DOS version 3.3 or greater
- 2 MB of application RAM (4 MB recommended).
- 5 MB hard disk space
- CD-ROM drive

UNIX

- Sun™ SPARCstation® workstation
- Solaris® 1.1 operating system software (SunOS™ version 4.1.3) or Solaris 2.3 or greater.
- OpenWindows™ (version 3.0 or greater) or Motif™ window manager (version 1.1.2 or greater)
- 8 MB of application RAM
- 14 MB hard disk space
- CD-ROM drive





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- Course 1 Ashdown**
Realistic Input for Realistic Images
- Course 2 Lantz**
Graphics Design and Production of Hemispheric Project
- Course 3 Gomes**
Warping and Morphing of Graphical Objects
- Course 4 Apodaca**
Using RenderMan in Animation Production
- Course 5 Weil**
Tricks of the Trade: Computer Graphics Production
- Course 6 Helman**
Designing Real-Time 3D Graphics for Entertainment
- Course 7 Terzopoulos**
Artificial Life for Graphics, Animation, and Virtual Reality
- Course 8 Lastra**
Programming Virtual Worlds
- Course 9 Bryson**
Developing Advanced Virtual Reality Applications
- Course 10 Hahn**
Sound for Animation and Virtual Reality
- Course 11 Badler**
Dynamic Behaviors for Real-Time Synthetic Humans
- Course 12 Hardenberg**
VRML: Using 3D to Surf the Web



- Course 13** **Cunningham**
Electronic Publishing on CD-ROM

- Course 14** **Judd**
**Practical Guide to Recording Video Animation from
Computer Graphics**

- Course 15** **Elson**
Making Multimedia: From Vaporware to Goldrush

- Course 16** **Daniel**
Introduction to Video and Audio Compression Techniques

- Course 17** **Woo**
Programming with OpenGL: An Introduction

- Course 18** **Kilgard**
Programming OpenGL with X

- Course 19** **Mott**
**Programming Open Inventor: An Object-Oriented
OpenGL Toolkit**

- Course 20** **Nickel**
From Start-up to Success: Strategic Marketing of Technology Products

- Course 21** **Bailey**
Introduction to Computer Graphics

- Course 22** **Marcus**
Graphic Design for Usable GUIs

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- Course 24 Rockwood**
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- Course 27 Inselberg**
Visualizing Multi-Dimensional Geometry and Applications to Multi-Variate Problems
- Course 28 Rhyne**
Visualizing and Examining Large Scientific Datasets: A Focus on the Physical and Natural Sciences
- Course 29 Banks**
Visualizing Mathematics
- Course 30 Crawfis**
Advanced Techniques for Scientific Visualization
- Course 31 Levkowitz**
Perception-Based Visualization
- Course 32 Brechner**
Interactive Walkthrough of Large Geometric Databases
- Course 33 Ebert**
Procedural Modeling, Texturing, and Animation Techniques
- Course 34 Witkin**
Physically Based Modeling



Graphics Design and Production for Hemispheric Projection

Course 2 / Sunday / Half Day
Intermediate Level

Course Description

Graphics production techniques for hemispheric projection for use in planetaria and other advanced hemispheric environments. Technical overview of the latest developments in hemispheric multi-image, film, video, and laser graphics.

Who Should Attend

Anyone interested in the process of generating images for hemispheric projection for use in theme parks, planetaria, museums, and other scientific venues.

Organizer

ED LANTZ
Astronaut Memorial Planetarium & Observatory

Lecturers

MICHAEL HUTTON
Astronaut Memorial Planetarium & Observatory

STEVEN SAVAGE
Sky-Scan, Inc.

CHRIS WARD
Lightspeed Design Inc.

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pt1.pdf

pt2.pdf
pt3.pdf
pt4.pdf

pt5.pdf
pt6.pdf
readme.pdf



VRML: Using 3D to Surf the Web

Course 12 / Sunday / Half Day
Intermediate Level

Course Description

This course presents VRML (Virtual Reality Markup Language) and its use in the World Wide Web. Attendees learn about presenting 3D data on the Web, the viewers that are available, and the issues involved in creating a viewer. In addition, attendees are exposed to current developments in VRML applications.

Who Should Attend

Researchers who would like to present 3D datasets to large audiences, modeling tool providers who want to harness the Web, and Web enthusiasts who are also 3D graphics enthusiasts.

Organizer

JAN HARDENBERGH
Oki Advanced Products

Lecturer

GAVIN ALEXANDER BELL
Silicon Graphics, Inc.

COVER.PDF
GAVIN1.PDF
GAVIN2.PDF

VISIONS.PDF
VRML1_0.PDF
VRMLEQN.PDF

VRMLTCF.PDF
YON1.PDF
YON2.PDF



Programming with OpenGL: An Introduction

Course 17 / Sunday / Half Day
Beginning Level

Course Description

This course is an introduction to programming with the OpenGL API for interactive graphics programs on a variety of systems. Emphasis is on computer graphics basics.

Who Should Attend

Programmers who want to write interactive graphics applications and who have little or no experience with OpenGL. A low level of graphics literacy is assumed.

Organizer

MASON WOO
Silicon Graphics, Inc.

Lecturer

LESLEY KALMIN
Silicon Graphics, Inc.

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design1.pdf

design2.pdf



From Start-up to Success: Strategic Marketing of Technology Products

Course 20 / Sunday / Half Day
Beginning Level

Course Description

This course discusses concepts, examples, and applications of strategic marketing that are critical to the success of start-up companies and all firms marketing high technology products. The course is focused on the elements of marketing strategy, rather than programs or tactics, that executives and managers of high-technology companies need to understand and apply to their organizations.

Who Should Attend

This course is suitable for all product or engineering managers and executives who are involved with defining or directing the strategy of their organizations.

Organizer

RANDY NICKEL
Technology Marketing Consulting

Lecturer

CHRIS HALLIWELL
Technology Marketing Consulting

course20.pdf



Introduction to Curves and Surfaces

Course 24 / Sunday / Half Day
Beginning Level

Course Description

The most commonly encountered concepts from CAGD are introduced, including Bezier and B-spline curves and surfaces. Their salient properties and methods to handle them are also described. Also included: a short review of application domains and a brief survey of other concepts and techniques from CAGD. Many of the concepts are conveyed through animations and demonstrations.

Who Should Attend

CAD developers, programmers, analysts, animators, researchers, and educators who want an introduction to curve and surface modeling.

Organizer

ALYN ROCKWOOD
Arizona State University

Lecturer

HANS HAGEN
Universitat Kaiserslautern

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cagd5.pdf

cagd6.pdf



Visualizing Multi-Dimensional Geometry and Applications to Multi-Variate Problems

Course 27 / Sunday / Half Day
Intermediate Level

Course Description

This course explores methods of augmenting human 3D perception to improve visualization of multi-dimensional geometry and multi-variate relationships. Theoretical material is applied to a variety of areas including statistics, finance, air traffic control, computer vision, instrumentation, and process control.

Who Should Attend

This course is for people working on multi-variate problems: statisticians, engineers, commodity traders and financial analyst, physicists, chemists, control theorists, optimization and OR specialists, human factors engineers, decision makers, and medical researchers. In general, people working in fields where multi-variate data are collected and analyzed, who would like to visualize the multi-variate relations arising in their areas.

Organizer

ALFRED INSELBERG
IBM T. J. Watson Research Center

Lecturers

A. CHATTERJEE
University of Southern California

K. ESBENSEN
SINTEF

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Realistic Input for Realistic Images

Course 1 / Monday / Full Day
Intermediate Level

Course Description

Achieving realism in synthetic images requires realistic input data. This course examines the need for such data and various models to represent them, including physically realistic light sources, surface reflectance characteristics, and participating media. The models are discussed within a framework of practical implementation techniques for software developers and illustrated with examples from real-world applications.

Who Should Attend

Anyone interested in the science and art of synthesizing photorealistic images, including graphics researchers, computer graphics artists and software developers, lighting designers and architects, and people from related fields.

Organizer

IAN ASHDOWN
Ledalite Architectural Products, Inc.

Lecturers

DAVID L. DILAURA
University of Colorado

JOHN MARDAIJEVIC
Aberdeen University

HOLLY RUSHMEIER
National Institute of Standards and Technology

ROBERT SHAKESPEARE
Indiana University

KENNETH TORRANCE
Cornell University

GREG WARD
Lawrence Berkeley Laboratory

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SECTION1.pdf

SECTION8.pdf



Warping and Morphing of Graphical Objects

Course 3 / Monday / Full Day
Intermediate Level

Course Description

This course starts from the concept of graphical objects and moves on to study the theory and techniques behind warping and morphing of these objects. This provides a common framework upon which an integrated discussion of warping and morphing in 1D, 2D, and 3D can be built, comprising, among others, drawings, images, volumetric, and boundary objects. Special emphasis is on image morphing and morphing of geometric and volumetric 3D models, and their applications in the entertainment industry.

Who Should Attend

The course is specially designed for people interested in both the theoretical and practical issues associated with applications of warping and morphing techniques in the entertainment industry. It is aimed at researchers, educators, designers, and computer animators interested in conceptual issues as well as general use of warping and morphing techniques.

Organizer

JONAS GOMES
Instituto de Matematica Pura e Aplicada

Lecturers

JOHN BERTON
Industrial Light & Magic

BRUNO COSTA
State University of New York at Stony Brook

LUCIA DARSA
State University of New York at Stony Brook

LUIZ VELHO
Instituto de Matematica Pura e Aplicada

GEORGE WOLBERG
City College of New York

[morph.pdf](#)

[readme.pdf](#)

[speakers.pdf](#)



Using RenderMan in Animation Production

*Course 4 / Monday / Full Day
Intermediate Level*

Course Description

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.

This entertaining and informative course teaches people how to use RenderMan. We 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 available today. We also examine 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.

Who Should Attend

Graphics programmers, advanced graphics users, and CGI production personnel who want to learn the details of how to use RenderMan.

Organizer

TONY APODACA
Pixar

Lecturers

LARRY GRITZ
The George Washington University

M. J. TURNER
Walt Disney Feature Animation

OREN JACOB
Pixar

JOE LETTERI
Industrial Light & Magic

ELLEN POON
Industrial Light & Magic

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[rispec31_4.pdf](#)



Artificial Life for Graphics, Animation, and Virtual Reality

Course 7 / Monday / Full Day
Intermediate Level

Course Description

This course investigates the increasingly important role that concepts from the field of artificial life are playing in the construction of advanced graphics models for animation and virtual reality. Attendees are exposed to techniques for realistically modeling and animating complex living things. Subsuming physics-based modeling, these techniques also model the mechanisms of living systems. They thus enable practitioners to progress beyond the simulation of lifeless physical “objects” to synthesize autonomously self-animating “subjects.” Topics include modeling and animation of plants, animals, and people, behavioral animation, communication and interaction with autonomous agents in virtual worlds, and artificial evolution for graphics and animation.

Who Should Attend

Graphics researchers and practitioners, including animators and VR enthusiasts, who want to experience and explore “life” at the cutting edge of graphics modeling.

Organizer

DEMETRI TERZOPOULOS
University of Toronto

Lecturers

PATTIE MAES
Massachusetts Institute of Technology

PRZEMYSŁAW PRUSINKIEWICZ
University of Calgary

CRAIG REYNOLDS
Silicon Studios

KARL SIMS
Thinking Machines Corporation

DANIEL THALMANN
Swiss Federated Institute of Technology

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2ks1.pdf 160 K	4dt1b.pdf	5thal1_0.pdf	5thal4_0.pdf
3cwr1.pdf	4dt1err.pdf	5thal1_1.pdf	5thal4_1.pdf
3cwr2.pdf	4dt1p1.pdf	5thal2_0.pdf	6pm1.pdf
3cwr3.pdf	4dt1p2.pdf	5thal2_1.pdf	6pm2.pdf
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Programming Virtual Worlds

*Course 8 / Monday / Full Day
Beginning Level*

Course Description

This course provides an introduction to virtual reality using immersive displays. It covers system requirements, hardware, design of applications and implementation of virtual worlds. Emphasis is on the practical issues that must be addressed to begin working in virtual environments.

Who Should Attend

Those who wish to create immersive virtual environments.

Organizer

ANSELMO LASTRA
University of North Carolina at Chapel Hill

Lecturers

HENRY FUCHS
University of North Carolina at Chapel Hill

STEPHEN GHEE
Division Limited

MARK MINE
University of North Carolina at Chapel Hill

RANDY PAUSCH
University of Virginia

KENNETH PIMENTEL
Sense8

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Description.pdf
Schedule.pdf

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sec2_ppt.pdf
sec3.pdf
sec4_ppt.pdf
sec5.pdf

sec6.pdf
sec7_ppt.pdf



Electronic Publishing on CD-ROM

Course 13 / Monday / Full Day
Beginning Level

Course Description

The course covers all aspects of electronic publishing on CD-ROM from the content, technology, and business points of view. The attendee should come away from the course with a sufficient understanding of the process to be able to evaluate a potential CD-ROM title's costs, technical challenges, production and manufacturing processes, and distribution options.

Who Should Attend

Persons who are interested in multimedia and electronic publishing, particularly those who want to consider multimedia or technical titles on CD-ROM.

Organizer

STEVE CUNNINGHAM
California State University

Lecturers

STEVE LANGER
Disc Manufacturing Inc.

JUDSON ROSEBUSH
Judson Rosebush Company

Notes.pdf



Practical Guide to Recording Video Animation from Computer Graphics

Course 14 / Monday / Full Day
Beginning Level

Course Description

Video is used in a growing number of computing areas, from presentations to scientific visualization to education to art. The incredible rate of growth in WWW and other on-line information systems has created yet another outlet for desktop video recording. With the emergence of multimedia computers and multimedia as a “hot” topic in computing, the role of video production is increasingly important. This course is a basic introduction to video recording of computer-generated images from a variety of data sources. We present a practical “nuts and bolts” approach to building a computer video animation recording system, and we discuss techniques that aid in producing a polished, professional-looking video.

Who Should Attend

People starting or planning to build a computer-based video animation recording system, including desktop video or visualization centers for industrial and presentation uses.

Organizer

ROBERT JUDD
Los Alamos National Laboratory

Lecturers

JIM COSTIGAN
Extron Electronics

ROSS GAUNT
Lawrence Livermore National Laboratory

JON MAREDA
Sandia National Laboratories

ANDY MARTINEZ
Los Alamos National Laboratory

course14.pdf



Introduction to Computer Graphics

Course 21 / Monday / Full Day

Beginning Level

Course Description

This course discusses the fundamentals of computer graphics from a technical perspective. Special emphasis is on the “how-to” and “why-do-I-care” aspects of a variety of topics. Taking this course enables novice attendees to get much more enjoyment from the rest of the conference.

Who Should Attend

This course is geared toward technical people who need a few topics explained or a few pointers to get started in the computer graphics field.

Organizer

MIKE BAILEY

San Diego Supercomputer Center and
University of California at San Diego

Lecturers

ANDREW GLASSNER

Microsoft Corporation

PATRICIA WENNER

Bucknell University

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Graphic Design for Usable GUIs

*Course 22 / Monday / Full Day
Beginning Level*

Course Description

This course introduces participants to the terminology, theory, and practical principles of good design for all platforms and applications. With case studies that show the design process, we provide guidance for research and commercial product development, and we give participants actual experience through the use of pen and paper design exercises.

Who Should Attend

Product development engineers, software engineers, product marketers, scientists, technical staffs, applications developers, human factors specialists, graphic designers, industrial designers, technical editors, system integrators, and applications analysts.

Organizer

AARON MARCUS
Aaron Marcus and Associates, Inc.

Lecturers

JOHN ARMITAGE
Aaron Marcus and Associates, Inc.

WOLFGANG HEIDRICH
Aaron Marcus and Associates, Inc.

FRANK VOLKER
Aaron Marcus and Associates, Inc.

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Wavelets and Their Application to Computer Graphics

Course 26 / Monday / Full Day
Advanced Level

Course Description

This course is intended to give the necessary mathematical background on wavelets and explore the main applications, both current and potential, to computer graphics. The emphasis is on the connection between wavelets and the tools and concepts which should be familiar to any skilled computer graphics person: Fourier techniques, pyramidal schemes, spline representations, and solution of linear systems.

Who Should Attend

Researchers and advanced practitioners in computer graphics who are currently trying to solve problems in image representation and compression, curve and surface representation, light representation and propagation, shading, and illumination models.

Organizer

ALAIN FOURNIER
University of British Columbia

Lecturers

MICHAEL COHEN
Microsoft Corporation

TONY DEROSE
University of Washington

MICHAEL LOUNSBERY
University of Washington

LEENA-MAIJA REISSELL
University of British Columbia

PETER SCHRODER
University of South Carolina at Columbia

WIM SWELDENS
Belgian National Science Foundation

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notes1.pdf

notes2.pdf
notes3.pdf



Visualizing and Examining Large Scientific Datasets: A Focus on the Physical and Natural Sciences

*Course 28 / Monday / Full Day
Intermediate Level*

Course Description

This course demonstrates the use of visualization tools and interactive techniques for examination and interpretation of large scientific datasets. Highly illustrative atmospheric, oceanographic, and geographic examples are demonstrated in real time. The process of developing effective visualization paradigms for supporting high-speed networking, database management, heterogeneous computing platforms, user interface design, collaborative computing, science education, and application of animation techniques are highlighted.

Who Should Attend

Scientific researchers, educators and computer graphics specialists interested in exploring particular issues associated with handling large scientific datasets. Experience with scientific visualization systems and terminology is helpful as well as some understanding of graphics programming.

Organizer

THERESA-MARIE RHYNE
Martin Marietta / U.S. EPA Scientific Visualization Center

Lecturers

BILL HIBBARD
University of Wisconsin at Madison

KEVIN HUSSEY
Jet Propulsion Laboratory

LLOYD TREINISH
IBM T. J. Watson Research Center

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hibbard

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hibbard1.pdf
hibbard2.pdf
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anim.pdf
intro.pdf

VISTAS.pdf
rhyn
pdf
notes3.pdf
study1_2.pdf
treinish

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tutor
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Advanced Techniques for Scientific Visualization

*Course 30 / Monday / Full Day
Advanced Level*

Course Description

This course describes the latest algorithms used to enhance understanding of complex 3D datasets typical in scientific environments. Advanced issues covering a wide range of scientific visualization problems are addressed. Special emphasis is on reducing the geometric complexity of contour surfaces, volume rendering, vector field visualization, multi-resolution techniques, and parallel rendering.

Who Should Attend

This course is intended for anyone interested in understanding effective solutions for representing 3D datasets, from the theoretical to the practical. The ideal participant is currently developing visualization software and wants to learn more advanced techniques than those provided by typical visualization environments.

Organizer

ROGER CRAWFIS
Lawrence Livermore National Laboratory

Lecturers

CHARLES HANSEN
Los Alamos National Laboratory

NELSON MAX
University of California at Davis

GREGORY M. NIELSON
Arizona State University

WILLIAM SCHROEDER
General Electric Corporation

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Procedural Modeling, Texturing, and Animation Techniques

*Course 33 / Monday / Full Day
Advanced Level*

Course Description

This course imparts a working knowledge of procedural approaches in modeling, shading, rendering, and animation. Procedural approaches include solid texturing, hypertextures, volume density functions, fractals, artificial evolution, L-systems, and implicit surfaces. The course provides participants with details often omitted from technical papers and explores how the speakers design such procedures.

Who Should Attend

Individuals interested in procedural modeling, shading, and texturing techniques, the procedural design approaches of several researchers, and a toolbox of procedures for producing realistic images.

Organizer

DAVID EBERT
University of Maryland Baltimore County

Lecturers

JOHN HART
Washington State University

F. KENTON MUSGRAVE
The George Washington University

KEN PERLIN
New York University

KARL SIMS
Thinking Machines Corporation

BRIAN WYVILL
University of Calgary

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Programming OpenGL with X

*Course 18/ Monday / Half Day
Intermediate Level*

Course Description

Learn programming of OpenGL with the X Window System. This course focuses on the window system integration issues for writing clean OpenGL programs for X. It also covers the use of OpenGL with the Motif and Xlib APIs.

Who Should Attend

X or OpenGL programmers who want to learn how to write OpenGL programs that cleanly interface with the X Window System.

Organizer

MARK KILGARD
Silicon Graphics, Inc.

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Tricks of the Trade: Computer Graphics Production

*Course 5 / Tuesday / Full Day
Intermediate Level*

Course Description

This course is specifically designed to help those involved in computer animation production become better animators and technical directors. It covers various aspects of production, from tricks for animating and lighting to ways of efficiently organizing large projects. Emphasis is on solving common production problems that many of us encounter every day.

Who Should Attend

Creators and managers of computer graphics in a production environment.

Organizer

JERRY WEIL
Metrolight Studios

Lecturers

NEIL ESKURI
Disney Feature Animation

ANDY KOPRA
VIFX

JOHN MCLAUGHLIN
Digital Domain

KATHY WHITE
Rhythm and Hues Studios

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Designing Real-Time 3D Graphics for Entertainment

Course 6 / Tuesday / Full Day
Intermediate Level

Course Description

This course covers the issues involved in creating real-time 3D games on platforms ranging from home game consoles up to high-performance image generators used in theme park and location-based entertainment systems. Topics include hardware and software architectures, multiprocessing, performance trade-offs, visual simulation tricks, 3D modeling, real-time character animation, game prototyping, and programming. Speakers draw examples from their development of actual games, attractions, and real-time rendering toolkits.

Who Should Attend

Programmers, modelers, and individuals with a technical background in computer graphics who are interested in what goes on inside entertainment systems using real-time computer imagery.

Organizer

JAMES HELMAN
Silicon Graphics, Inc.

Lecturers

SHARON CLAY
Silicon Graphics, Inc.

WES HOFFMAN
Paradigm Simulation

ERIC JOHNSTON
Lucas Arts

MICHAEL JONES
Silicon Graphics, Inc.

MICHAEL LIMBER
Angel Studios

PHILIPPE TARBOURIECH
Electronic Arts

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Developing Advanced Virtual Reality Applications

*Course 9 / Tuesday / Full Day
Intermediate Level*

Course Description

This course discusses the issues encountered in implementation of complex interactive virtual reality applications. Emphasis is on the design process leading to implementation of useful virtual environments. Human factors, optimization, augmented reality, and intuitive interface techniques are among the topics addressed.

Who Should Attend

This course is intended for those who have developed simple virtual reality applications and are facing the considerable difficulties of extended these applications to greater degrees of complexity. Those who have taken introductory courses in virtual reality will also benefit from this course.

Organizer

STEVE BRYSON
NASA Ames Research Center

Lecturers

RONALD AZUMA
University of North Carolina at Chapel Hill

RANDY PAUSCH
University of Virginia

DENNIS PROFFITT
University of Virginia

HENRY SOWIZRAL
Boeing Computer Services

ANDRIES VAN DAM
Brown University

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Sound for Animation and Virtual Reality

Course 10 / Tuesday / Full Day
Intermediate Level

Course Description

Sound is an integral part of the experience in computer animation and VR. In this course, we present some of the important technical issues in sound modeling, rendering, and synchronization as well as the “art” and business of sound that are being applied in animations, feature films, and virtual reality. The central theme is to bring leading researchers and practitioners from various disciplines together to share their experiences in this interdisciplinary field.

Who Should Attend

Scientists and animators interested in expanding their understanding of sound for computer animation and virtual reality.

Organizer

JAMES HAHN
The George Washington University

Lecturers

PETE DOCTER
Pixar

SCOTT FOSTER
Crystal River Engineering Inc.

MARK MANGINI
Weddington Productions

TOM MYERS
Skywalker Sound

ELIZABETH WENZEL
NASA Ames Research Center

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Dynamic Behaviors for Real-Time Synthetic Humans

*Course 11 / Tuesday / Full Day
Advanced Level*

Course Description

This course is intended to demonstrate the state of the art in motion synthesis for simulated humans. Applications of human animation include simulation and training, intelligent agents, sports analysis, biomedical modeling, trajectory following, low-level behaviors, and realistic motion synthesis for entertainment characters. The course covers the essential elements for synthetic (non-performance) animation via kinematic, inverse kinematic, dynamic, control theory, and sensing/acting motion control techniques, including: balance, collision avoidance, postural transitions, locomotion by walking or running, and other dynamics-driven motions. Additional modeling techniques for realistic human body motion include deformable primitives, finite element techniques, and physics-based models including parallel transition networks for coordination of sensing, behaviors, and acting; dynamic constraints; and grouping and obstacle avoidance behaviors. Interactive and real-time implementations are emphasized.

Who Should Attend

Animators, managers, software developers, students, and scientists interested in synthesizing human motions.

Organizer

NORMAN BADLER
University of Pennsylvania

Lecturers

JESSICA HODGINS
Georgia Tech

DIMITRI METAXAS
University of Pennsylvania

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Making Multimedia: From Vaporware to Goldrush

Course 15 / Tuesday / Full Day
Intermediate Level

Course Description

This course provides insight into current research, development, and production techniques associated with multimedia. We seek to demystify the multimedia creation process as well as to clarify the aesthetic intent of multimedia as an emerging communications medium. Published titles and their developmental history will be used as examples of what works and what doesn't work in this highly volatile medium.

Who Should Attend

Anyone interested in multimedia as an emerging form of communication and in the development of production techniques for multimedia.

Organizer

MATT ELSON
Magnet Interactive Studios, Inc.

Lecturers

JOHN BLAKELEY
Magnet Interactive Studios, Inc.

BRAD GEAGLEY
Magnet Interactive Studios, Inc.

GREG JOHNSON
Magnet Interactive Studios, Inc.

LAWRENCE SCHICK
Magnet Interactive Studios, Inc.

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Introduction to Video and Audio Compression Techniques

*Course 16 / Tuesday / Full Day
Beginning Level*

Course Description

This course begins with an introduction to compression and lays out the individual techniques that together form the basis for most compression algorithms. Emphasis is on understanding the impact on performance and quality of each individual technique. This is followed by detailed descriptions of current and future video and audio compression algorithms, with particular emphasis on JPEG and MPEG.

Who Should Attend

Developers who would like a better understanding of the choices available for compression. Designers who would like a quick start in understanding compression algorithms. Content providers who would like to understand the limitations of compression technology.

Organizer

ANDY DANIEL
Alliance Semiconductor Corporation

Lecturers

DOUG BAILEY
Integrated Information Technology

PERRY COOK
Stanford University

BJORN JAWERTH
University of South Carolina at Columbia

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Programming Open Inventor: An Object-Oriented OpenGL Toolkit

*Course 19 / Tuesday / Full Day
Intermediate Level*

Course Description

This course shows how to write interactive 3D graphics applications using Open Inventor, an object-oriented OpenGL toolkit. The course discusses Inventor's programming interface and architecture as well as how to use Inventor in various operating system environments. Topics include 3D scene construction, rendering, picking, animation, 3D interaction, data monitoring, the Inventor file format, performance tips, and system extensibility.

Who Should Attend

This course is intended for applications programmers who wish to write interactive 3D graphics applications; programmers who wish to employ direct manipulation and animation; developers familiar with other 3D libraries who want to learn about the Inventor programming interface; and people interested in object-oriented, extensible graphics systems.

Organizer

DAVID MOTT
Silicon Graphics, Inc.

Lecturers

ERIC ENDERTON
Industrial Light & Magic

ERIC GREGORY
Strata G Systems

MIKE HECK
Template Graphics Software

PAUL STRAUSS
Silicon Graphics, Inc.

TIM WIEGAND
University of Cambridge

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Practical 3D User Interface Design

Course 23 / Tuesday / Full Day
Intermediate Level

Course Description

This course covers principles and techniques for creating 3D user interfaces (3D UIs) for modeling, animation, information visualization, multimedia, and other emerging interactive systems with an emphasis on production quality applications. Speakers address their design principles and design processes, the choices they made, and the results of their final implementations. The focus is on real-world 3D UI problems and practical solutions.

Who Should Attend

This course is meant for UI designers and software engineers who wish to create new 3D UIs or extend their current UIs by incorporating 3D UI techniques into production-quality applications. Researchers can also gain an understanding of the demanding 3D UI needs of large systems, including scalability, robustness, consistency, and breadth of functionality.

Organizer

DANIEL ROBBINS
Brown University

Lecturers

PAUL ISAACS
Silicon Graphics, Inc.

KEVIN MATHEWS
Artifice Inc.

MARK MINE
University of North Carolina at Chapel Hill

ROMAN ORMANDY
Caligari Inc.

KEVIN SMITH
Wavefront Technologies

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Computer Vision for Computer Graphics

Course 25 / Tuesday / Full Day
Advanced Level

Course Description

In recent years, two traditionally separate fields, computer graphics and computer vision, have begun to emerge. This course investigates the increasingly important role that computer vision plays in 3D graphics and model building, animation, user interfaces, and biomedical applications. The course demonstrates how similar computer vision techniques are used in four diverse areas: 3D shape recovery from geometric and photometric properties; user interfaces based on hands, faces, and gestures; 3D modeling from video for animation and modeling perception for animation of humans and other living creatures; and biomedical applications such as 3D serial reconstructions, brain atlases, and the use of computer graphics and computer vision in the operating room.

Who Should Attend

Graphics researchers, software developers, and practitioners who want to augment their arsenal to include computer vision methods.

Organizer

INGRID CARLBOM
DEC Cambridge Research Lab

Lecturers

WILLIAM FREEMAN
Mitsubishi Research Laboratories

GUUDRUN KLINKER
ECRC

WILLIAM LORENSEN
General Electric Corporation

RICHARD SZELISKI
Digital Equipment Corporation

DEMETRI TERZOPOULOS
University of Toronto

KEITH WATERS
Digital Equipment Corporation

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Visualizing Mathematics

Course 29 / Tuesday / Full Day
Intermediate Level

Course Description

Mathematical visualization uses computer graphics to illustrate mathematical concepts and proofs, and motivate new insight into mathematical problems. This course surveys recent work in this budding area of research. The speakers demonstrate visualizations through film, video, and interactive systems.

Who Should Attend

People with an interest in mathematics, visualization, pedagogy, video production, or system design.

Organizer

DAVID BANKS
ICASE

Lecturers

JIM BLINN
California Institute of Technology

SCOTT KIM
Interval Research Corporation

NELSON MAX
University of California at Davis

TAMARA MUNZNER
University of Minnesota

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Perception-Based Visualization

*Course 31 / Tuesday / Full Day
Intermediate Level*

Course Description

Because visualization is an emerging discipline, it is occasionally based on examples and anecdotes that are often detached from scientific theory. As researchers and practitioners address the increasing demands for visualization, they need to relate the theory to human perception. This is becoming perhaps the major requirement for producing effective, information-conveying visualizations. This course introduces the foundations of perception as related to visualization, illustrates their use with examples and case studies, and thereby prepares researchers and practitioners to develop improved perception-based visualizations. Attendees learn how to create, build, and critique visualizations that take advantage of, and enhance, users' perceptions of the data.

Who Should Attend

Visualization researchers, scientists, engineers, visualization systems developers, and users who want to learn the mechanisms of human perception and how they can improve visualizations.

Organizer

HAIM LEVKOWITZ
University of Massachusetts Lowell

Lecturers

STEPHEN EICK
AT&T Bell Laboratories

PENNY RHEINGANS
Martin Marietta

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Interactive Walkthrough of Large Geometric Databases

Course 32 / Tuesday / Full Day
Intermediate Level

Course Description

This course focuses on techniques, algorithms, data-structures, and databases for displaying very large geometric databases interactively (greater than one million polygons drawn at least 10 per second). Beginning with a discussion of basic techniques and leading to state-of-the-art algorithms, the speakers address key issues in walkthrough, including visibility computations, automatic object simplification, and memory management through database subset pre-fetching. Speakers show real applications of these algorithms to a variety of areas, including visual simulation, virtual reality, architecture, and digital mockup.

Who Should Attend

Workers in simulation, animation, virtual reality, architecture, CAD, medical imaging, and scientific visualization who deal with geometric databases much larger than the interactive display capacity of their workstations.

Organizer

ERIC BRECHNER
Boeing Computer Services

Lecturers

THOMAS FUNKHOUSER
AT&T Bell Laboratories

NED GREENE
Apple Computer, Inc.

JAMES HELMAN
Silicon Graphics, Inc.

JAREK ROSSIGNAC
IBM T. J. Watson Research Center

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Physically Based Modeling

*Course 34 / Tuesday / Full Day
Intermediate Level*

Course Description

This course provides a systematic introduction to physically based modeling, including dynamics of particles and mass/spring systems, continuum methods for simulating water and non-rigid objects, simulating systems described by arbitrary parameters, rigid body dynamics, kinematic and dynamic constraints, collision and contact, and control.

Who Should Attend

This course is designed for computer graphics researchers and implementors who wish to develop a solid understanding of physical methods as applied to animation and modeling. The material presented is of particular interest to those who wish to implement physically based modeling techniques and/or read and critically appraise technical papers in the area.

Organizer

ANDREW WITKIN
Carnegie Mellon University

Lecturers

DAVID BARAFF
Carnegie Mellon University

MICHAEL KASS
Apple Computer, Inc.

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