

ACM SIGGRAPH 2001 Course Notes Disc #1 Courses 1 - 32



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The Effect of Public Policy on Computer Graphics

Abstract The implications of policy issues that are particularly relevant to computer graphics, such as intellectual property, digital copy protection, deployment of broadband telecommunications, convergence of computing and television, and research support. Broader policy issues such as free speech, privacy, and Internet taxation are also covered.

Organizer(s) Robert Ellis, ACM SIGGRAPH Public Policy Program Chair
Barbara Simons, ACM Past President and USACM
(ACM U.S. Public Policy Committee) Co-chair

Notes 320 KB Adobe Acrobat PDF



Obtaining 3D Models With a Hand-Held Camera

Abstract Using advanced automatic techniques that avoid camera calibration and a priori scene knowledge to derive 3D models from images acquired with a hand-held camera. Topics include: interest-point extraction and matching, computation of image relations, projective calibration, self-calibration, dense matching and 3D modeling in applications ranging from archaeology to planetary exploration.

Organizer(s) Marc Pollefeys, Katholieke Universiteit Leuven

Notes 14.7 MB Adobe Acrobat PDF



Performance OpenGL: Platform-Independent Techniques

Abstract Techniques for optimizing OpenGL programs with respect to OpenGL's operation, and not a particular computing platform. Topics include: OpenGL's state management, considerations for minimizing OpenGL state changes, and other performance estimation techniques.

Organizer(s) Dave Shreiner, SGI

Notes 112 KB Adobe Acrobat PDF



A Survey of Color for Computer Graphics

Abstract Color disciplines relevant to computer graphics, from color vision to color design. Attendees should leave with a clear overview of the world of digital color and pointers to in-depth references on a wide range of color topics.

Organizer(s) Maureen Stone, StoneSoup Consulting

Notes 6.1 MB Adobe Acrobat PDF



Visualizing Quaternions

Abstract An introduction to the alternative quaternion method for rotation manipulation. Topics include: intuitive visualizable properties of quaternions themselves, orientation splines, curve framing, and related quaternion visualizations.

Organizer(s) Andrew Hanson, Indiana University

Notes 10.2 MB Adobe Acrobat PDF



Object Space Visibility

Abstract A survey of object space visibility algorithms from early development of the problem definitions and solutions in CAD applications to development of visibility as a problem of fundamental importance to radiosity computation. Topics include: known algorithms for object space visibility and gaps that should be addressed in future research.

Organizer(s) Sherif Ghali, Max-Planck-Institut für Informatik

Notes 116 KB Adobe Acrobat PDF



A Primer on Shapes: Curves and Surfaces

Abstract Curve and surface representations that are effective for shape design and shape recovery, including Bezier, B-spline, rational Bezier, non-uniform rational B-spline (NURBS), dynamic NURBS, thin-plate spline, rational Gaussian representations, and methods for grouping and parametrizing scattered points. Technical concepts are presented through imagery rather than formal mathematics, and attendees are directed to the relevant literature for further study.

Organizer(s) Ardeshir Goshtasby, Wright State University
Alyn Rockwood, Mitsubishi Electric Research Laboratory
Demetri Terzopoulos, New York University

Notes 5.4 MB Adobe Acrobat PDF



An Introduction to the Kalman Filter

Abstract A basic introduction to the Kalman filter, a mathematical power tool that is playing an increasingly important role as computer graphics involves sensing of the real world.

Organizer(s) Gregory Welch, University of North Carolina at Chapel Hill
Gary Bishop, University of North Carolina at Chapel Hill

Notes 1.3 MB Adobe Acrobat PDF



Media-Rich Programming With OpenML

Abstract An overview of OpenML, a standard, cross-platform environment that supports creation and display of digital media, including audio, video, and graphics. The tutorial emphasizes new features: the OpenML digital media library, OpenGL extensions, video back end control, and synchronization primitives.

Organizer(s) Randi Rost, 3Dlabs, Inc.

Notes 22.9 MB Adobe Acrobat PDF



State of the Art in Modeling and Measuring of Surface Reflection

Abstract A survey of recent computer graphics research on measurement and modeling of surface reflection properties. Presentations cover new measurement techniques as well as physics-based and empirical reflection models developed during the last few years.

Organizer(s) Michael Ashikhmin, University of Utah

Notes 33.5 MB Adobe Acrobat PDF



Tracking: Beyond 15 Minutes of Thought

Abstract Nearly everyone who thinks about tracking for graphics for 15 minutes or so believes the solution is easy? Why don't you just ...? This course moves beyond those first few minutes and looks "under the hood" to see how these systems work. It delivers a basic understanding of tracking technologies, their fundamental limitations, and how to achieve improved results.

Organizer(s) Gary Bishop, University of North Carolina at Chapel Hill
Gregory Welch, University of North Carolina at Chapel Hill

Notes 6.0 MB Adobe Acrobat PDF



Developing Efficient Graphics Software

Abstract Methods for developing high-performance interactive graphics software. Topics include: machine architecture; software design, implementation, and performance; graphics and system analysis tools; software optimization case studies; methods for eliminating bottlenecks; and optimizing techniques with a particular emphasis on practical software development.

Organizer(s) Keith Cok, SGI

Notes 1.4 MB Adobe Acrobat PDF



Interactive Ray-Tracing

Abstract Current research activities that explore interactive ray-tracing as an alternative to traditional triangle rasterization. Topics include: advantages and challenges of interactive ray-tracing, recent implementations on systems ranging from PCs to supercomputers, new ideas for ray-tracing hardware, and the potential and challenges of using ray-tracing in an interactive context.

Organizer(s) Philipp Slusallek, Universität des Saarlandes

Notes HTML / PDF Presentation



Image-Based Lighting

Abstract A comprehensive review of lighting computer-generated scenes with real-world illumination, from the theory behind the techniques to detailed examples of using image-based lighting on real production projects with commercially available software. Topics include: high dynamic range imagery, methods for capturing illumination, using global illumination and/or traditional renderers to light synthetic objects with real light, real-time techniques, image-based lighting of people, and photoreal compositing.

Organizer(s) Paul Debevec, USC Institute for Creative Technologies

Notes 35.7 MB Adobe Acrobat PDF



Visualizing Relativity

Abstract An intuitive, geometric approach to relativity, a discussion of the properties of light under the extreme conditions of relativity, and a practical survey of relativistic rendering techniques. This course is designed for attendees who are interested in visualizing relativistic physics and extending computer graphics technology to the domain of relativity.

Organizer(s) Andrew Hanson, Indiana University
Daniel Weiskopf, Universität Stuttgart

Notes 11.0 MB Adobe Acrobat PDF



Gaming Techniques for Designing Compelling Virtual Worlds

Abstract The world-building tricks of the computer-game trade, a multi-billion dollar competition to build the most enticing and immersive virtual environments. Speakers describe their approaches to designing environments, review their experiences (both good and bad), and showcase their latest technologies.

Organizer(s) Michael Capps, Naval Postgraduate School

Notes 47.4 MB Adobe Acrobat PDF



Geometric Signal Processing on Large Polygonal Meshes

Abstract Today's more efficient methods for denoising, editing, compressing, transmitting, and animating very large polygonal models generated by 3D scanning, scientific visualization, and photogrammetry systems; the different theories supporting them; and practical implementations.

Organizer(s) Leif Kobbelt, Rheinisch-Westfälische Technische Hochschule Aachen
Gabriel Taubin, California Institute of Technology

Notes 34.3 MB Adobe Acrobat PDF



Using Tensor Diagrams to Represent and Solve Geometric Problems

Abstract An introduction to tensor diagrams, a really cool algebraic manipulation tool that can help solve many problems in analytic geometry.

Organizer(s) Jim Blinn, Microsoft Research

Notes 1.6 MB Adobe Acrobat PDF



“Shrek”: The Story Behind the Screen

Abstract An inside look at the planning, creative, and production processes for “Shrek,” this year’s major computer-generated, 3D animated feature from PDI/DreamWorks.

Organizer(s) Linda Rae Sande, PDI/DreamWorks

Notes 6.5 MB Adobe Acrobat PDF



Advanced Global Illumination

Abstract An overview of advanced topics in global illumination. Topics include: the fundamentals of radiometry and material properties, the physics of light transport, and algorithms such as Monte Carlo ray-tracing, stochastic radiosity techniques, and finite-element methods.

Organizer(s) Philip Dutre, Cornell University
Kavita Bala, Cornell University

Notes 16.5 MB Adobe Acrobat PDF



Seeing is Believing: Reality Perception in Modeling, Rendering, and Animation

Abstract The problems associated with creating and evaluating realism in static and dynamic images. Topics include: the fundamentals of perception metric design for evaluation by both humans and computational models, fidelity, relevant psychophysics, visual perception, shape, and state-of-the-art metrics.

Organizer(s) Alan Chalmers, University of Bristol
Ann McNamara, Trinity College Dublin

Notes 15.7 MB Adobe Acrobat PDF



Intro to SMIL

Abstract How to use Synchronized Multimedia Integration Language to create interactive presentations on the World Wide Web. Attendees learn SMIL syntax in a hands-on environment.

Organizer(s) Kathy Barshatzky

Notes 936 KB Adobe Acrobat PDF



Motion Dynamics Animation Workshop

Abstract This hands-on workshop on the basic principles and techniques of motion dynamics animation combines lectures, demonstrations, and exercises.

Organizer(s) Michael O'Rourke, Pratt Institute

Notes 23.4 MB Adobe Acrobat PDF



Real-Time Shading

Abstract Real-time procedural shading is no longer a futuristic fantasy. It has been achieved using several different approaches. In this course, researchers on the forefront of this young field present the strengths and weaknesses of their methods.

Organizer(s) Marc Olano, SGI

Notes HTML / PDF Presentation



Physically Based Modeling

Abstract A systematic practical introduction to physically based modeling techniques. Topics include: basic differential equations, dynamics of particles and mass/spring systems, continuum methods for simulating non-rigid objects, rigid body dynamics, kinematic and dynamic constraints, and collision and contact.

Organizer(s) Andrew Witkin, Pixar Animation Studios

Notes 1.8 MB Adobe Acrobat PDF



Internetworked 3D Computer Graphics: Overcoming Bottlenecks, Supporting Collaboration, and Stepping up to Wireless Connectivity

Abstract An introduction to using and developing interactive and collaborative Internet-based graphics applications. Topics include: streaming 3D graphics in mobile and wireless computing situations, interactivity, latency, content distribution, bandwidth, packet management, synchronization, geometry streaming, large-world database management, and personalization.

Organizer(s) Theresa-Marie Rhyne, Consultant
Robert Barton, Fraunhofer Center for Research in Computer Graphics

Notes 15.5 MB Adobe Acrobat PDF



Augmented Reality: The Interface is Everywhere

Abstract A thorough introduction to augmented reality (AR), including a review of AR technology, important research areas, and cutting-edge applications. In hands-on demonstrations with a general-purpose AR toolkit, attendees gain the skills they need to start developing their own AR applications.

Organizer(s) Dieter Schmalstieg, Technischen Universität Wien
Mark Billinghurst, University of Washington

Notes 21.2 MB Adobe Acrobat PDF



Introduction to Computer Graphics

Abstract An introduction to computer graphics and the SIGGRAPH conference experience. Topics include key application areas such as modeling, rendering, animation, visualization, virtual reality, and the World Wide Web.

Organizer(s) Mike Bailey, San Diego Supercomputer Center

Notes 30.0 MB Adobe Acrobat PDF



State of the Art in Monte Carlo Ray Tracing for Realistic Image Synthesis

Abstract An advanced, detailed overview of the state of the art in Monte Carlo ray tracing. Topics include: the fundamentals of Monte Carlo methods, a detailed description of the theory behind the latest techniques and algorithms, path tracing, bidirectional path tracing, Metropolis light transport, scattering equations, irradiance caching, and photon mapping.

Organizer(s) Henrik Wann Jensen, Stanford University

Notes 9.3 MB Adobe Acrobat PDF



Visibility, Problems, Techniques, and Applications

Abstract An in-depth look at visibility and occlusion culling techniques and approaches to building highly interactive, large-scale 3D software, such as networked 3D game engines.

Organizer(s) Daniel Cohen-Or, Tel Aviv University

Notes 20.0 MB Adobe Acrobat PDF



Computer Graphics for Large-Scale Immersive Theaters

Abstract An overview of large-scale immersive video installations for both education and entertainment applications, the course includes a comprehensive summary of how real-time and pre-rendered techniques are used to produce shows for dome theaters.

Organizer(s) Ed Lantz, Spitz Inc.

Notes 25.6 MB Adobe Acrobat PDF



Nonphotorealistic Rendering in Scientific Visualization

Abstract Theoretical and practical issues of nonphotorealistic visualization and visual perception, and how they are applied to image generation and information display in computer graphics. This course is designed for graphics researchers and practitioners who want to create images that are both aesthetically beautiful and perceptually sound.

Organizer(s) Christopher Healey, North Carolina State University

Notes 44.0 MB Adobe Acrobat PDF

