VIS2002

Sponsored by IEEE Computer Society Technical Committee on Visualization and Graphics

In cooperation with ACM/SIGGRAPH

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IEEE COMPUTER SOCIETY

IEEE VISUALIZATION 2002 PROGRAM

OCTOBER 27 - NOVEMBER 1, 2002

THE BOSTON PARK PLAZA HOTEL
BOSTON, MASSACHUSETTS

http://vis.computer.org/vis2002

WELCOME

Welcome to IEEE Visualization 2002, the 12th international conference for visualization innovations!

Throughout the week, you can participate in workshops and tutorials, attend the symposium on information visualization (InfoVis 2002) and the symposium on volume visualization (VolVis 2002),or attend one of the many technical sessions offered.

This year, we have a few features that we would like to point out to you:

Keynote and capstone: We are very excited to have Stephen Wolfram and Ray Kurzweil as invited speakers on Wednesday and Friday, respectively. Both talks promise to expand our horizons of how we think about our field.

Full-color proceedings: We believe you will like the look of our new proceedings with color figures on each page.

Best papers awards: For the first time, the best technical paper at Vis will be selected by a small panel of experts.

Posters: An international panel of experts accepted 48 high quality posters out of more than 120 submissions. Posters will be displayed during Monday and Wednesday's receptions. You will find the poster abstracts in your registration package and on the conference DVD.

Workshops: If you are registered for Sunday, you can attend any of the tutorials and participate in two workshops. The workshops consist of 20-minute presentations by experts in the field, followed by ample time for discussion.

Of course there is more! Do not miss the industry exhibition,the birds-of-a-feather sessions, the panels, or the interactive demonstrations lab.

Thank you for coming, and enjoy the conference!

Hanspeter Pfister, *Mitsubishi Electric Research Labs*
Mike Bailey, *San Diego Supercomputer Center*

IEEE Visualization 2002 Conference Chairs

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ABOUT BOSTON

Boston is a city full of history and culture, and the conference hotel is located right in the center of it all. It is a great city for walking. The public transit system,the "T," can get you just about anywhere and is only a block from the hotel. Nearby are the beautiful Public Garden and Boston Common (where you can still graze your cattle). Popular neighborhoods include Back Bay's Newbury Street with galleries and bistros, Beacon Hill with stately colonial architecture and gaslight streets, the North End with Italian eateries, and Chinatown.

As "the birthplace of the American Revolution," Boston possesses many unique historical attractions that can be visited while walking along the Freedom Trail, such as the restored USS Constitution ("Old Ironsides" – undefeated in battle and the oldest commissioned warship in the world), the Old North Church, and Bunker Hill. You can cover more ground by taking the popular Trolley Tours (actually a bus),or the Duck Tours– a retrofitted World War II amphibious vehicle.

Boston has world-class museums: the Museum of Fine Arts contains exceptional Impressionist and Egyptian Art collections;the New England Aquarium is built around a huge coral reef tank; the Museum of Science has many interactive exhibits, a planetarium, and OMNIMAX theatre. The Isabella Stewart Gardner Museum and Harvard University's Fogg Art Museum both have impressive collections. All are easily accessible via the T.

Fall is a special season in Boston,and the conference week is peak foliage time in the area. The visual delights will not be limited to the technical sessions!

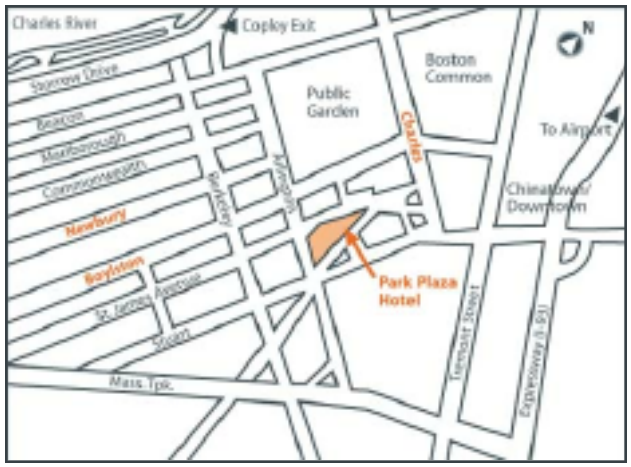
For the latest Boston news and travel information, consult:
www.bostonusa.com
www.boston.com
www.timeout.com/boston

Hotel Block Restaurants

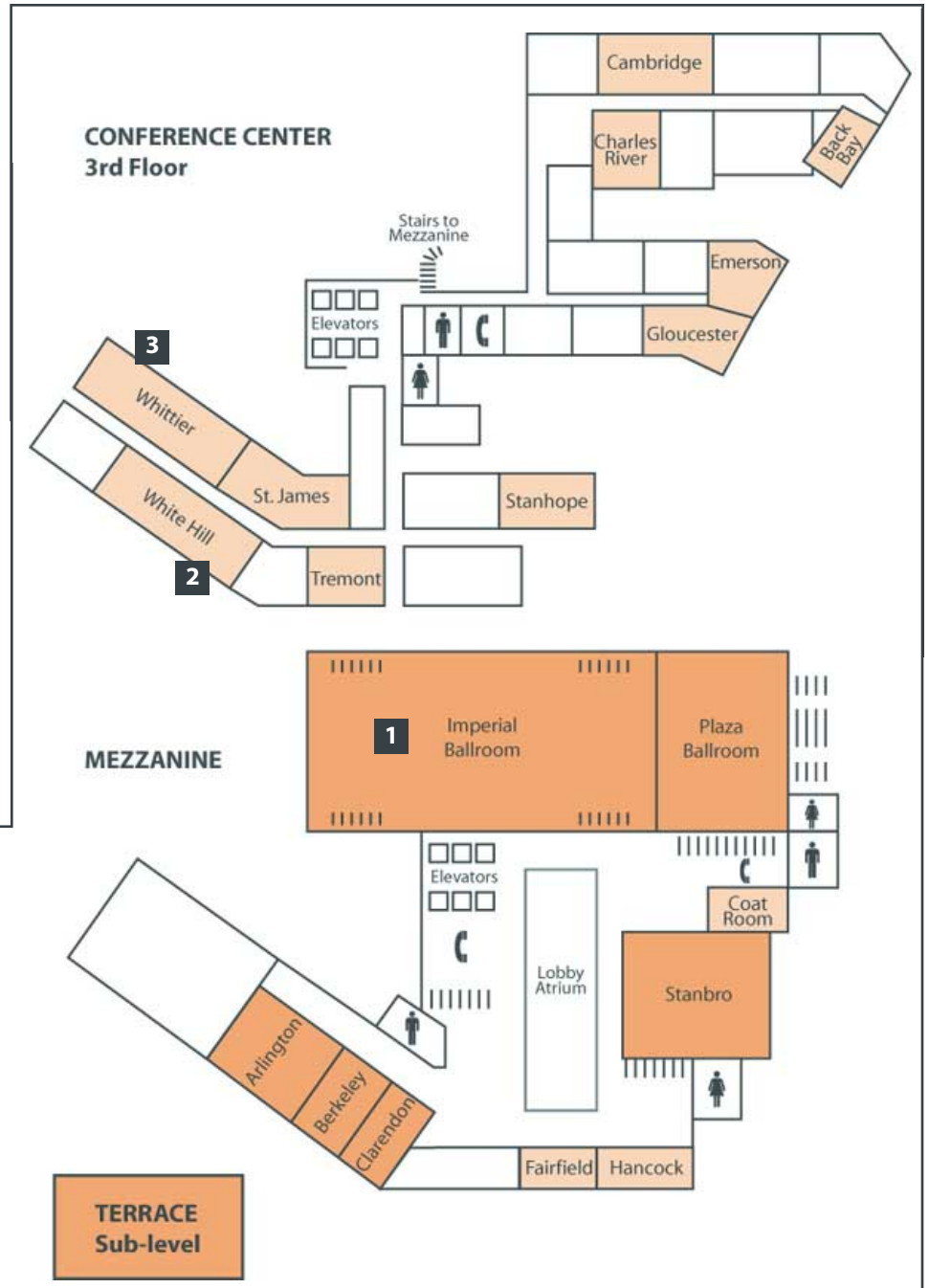
Au Bon Pain – *Coffee, pastries, quick lunches*
Swan's Court – *In-hotel continental fare, formal tea service*
Todd's English Bonfire – *Euro-American Steakhouse*
McCormack & Schmick's – *Fresh seafood and more*
Maggiano's Little Italy – *Italian cuisine*
Fleming's Prime Rib Steakhouse & Wine Bar – *Stylish steak & wine*
Whiskey Park – *Eclectic cocktails*
Finale – *The best dessert bar in town!*

Nearby Restaurant Locations

Boylston Street – *numerous eateries as you walk away from the Public Garden*
Newbury Street – *mostly upscale, trendy bistros and restaurants*
Charles Street – *Starbucks, a market, and restaurants*



MAP OF THE BOSTON PARK PLAZA HOTEL



1 SYMPOSIA/CONFERENCE RECEPTIONS AND POSTERS

Symposia Reception and InfoVis Interactive Posters:
Monday: 7:00 pm - 9:00 pm

Conference Reception and Vis Posters:
Wednesday: 7:00 pm - 9:00 pm

2 INTERNET ACCESS

Sunday-Thursday: 8:00 am - 7:00 pm
Friday: 8:00 am - 12:00 pm

3 INTERACTIVE DEMONSTRATIONS LAB

Monday-Thursday: 10am - 5pm
Friday: 10am - 12pm
Walk-in demos are welcome.

VIS 2002 TUTORIALS AND WORKSHOPS

INFOVIS AND VOLVIS SYMPOSIA

SUNDAY

- *Arlington* — **Tutorial 1:** Info Vis, Visual Data Mining, Applied to Drug Design (full day)
- *Berkeley* — **Tutorial 2:** High-Quality Volume Graphics on Consumer PC Hardware (full day)
- *Plaza* — **Workshop 1:** Commodity-Based Visualization Clusters (full day)
- Coffee Break
- Lunch Break
- Coffee Break
- *Plaza* — **Workshop 2:** Visualization in Bioinformatics and Chem-informatics

MONDAY

- *Terrace* — **Tutorial 3**: State of the Art in Data Representation for Visualization (full day)
- *Stanbro* — **Tutorial 4:** Out-of-Core Algorithms for Scientific Vis & Computer Graphics (half day)
- *Imperial* — **INFOVIS** — **Opening Remarks and Keynote Address:** William Cleveland
- *Plaza* — **VOLVIS** — **Opening Remarks and Keynote Address:** Ken Perlin
- Coffee Break
- *Imperial* — **Papers 1:** Databases, Frameworks, and Visualization
- *Plaza* — **Papers 1:** Unstructured Grids
- **Tech Notes 1:** Cartograms and Uncertainty
- Lunch Break
- *Stanbro* — **Tutorial 5:** Integrating Vis with Modeling and Simulation for Biomedical Applications (half day)
- *Imperial* — **Papers 2:** Empirical Studies
- *Plaza* — **Papers 2:** Multi-Resolution Representations
- Break
- *Imperial* — **Cases 1:** Process & BioVis
- Coffee Break
- *Imperial* — **Introducing the InfoVis Contest**
- **Interactive Posters Preview**
- *Plaza* — **Papers 3:** Haptics
- *Imperial* — **Symposia Reception and InfoVis Interactive Posters**
- *Plaza* — **InfoVis 2003 Open Meeting**

TUESDAY

- *Terrace* — **Tutorial 6:** Visualizing the Human Body with ITK and VTK (full day)
- *Arlington* — **Tutorial 7:** Psychometrics 101 (half day)
- *Imperial* — **INFOVIS** — **Papers 3:** Visualizing Hierarchies
- *Plaza* — **VOLVIS** — **Papers 4:** Reconstruction and Triangulation
- Coffee Break
- *Imperial* — **Papers 4:** Sequences, Patterns, and Huge Data Sets
- *Plaza* — **Papers 5:** Time-Varying Datasets and Remote Rendering
- **Tech Notes 2:** Brushing & Drill-Down
- Lunch Break
- *Imperial* — **Papers 5:** Graph Drawing and Force-Directed Placement
- *Plaza* — **Papers 6:** Volume Rendering
- Break
- *Imperial* — **Cases 2:** Finance/Web Vis
- Coffee Break
- *Imperial* — **Capstone Address**: Stephen Kosslyn; **Closing Remarks**
- *Plaza* — **Closing Remarks**

Stanbro — EXHIBITION

VIS 2002 CONFERENCE AT-A-GLANCE

WEDNESDAY

Imperial
Welcome and Introduction

Keynote Session: Stephen Wolfram
Author of "A New Kind of Science"

Coffee Break

Imperial **Papers 1:** Medical Visualization

Plaza **Papers 2:** Large Data Sets

Terrace **Cases 1:** Volume Rendering

Lunch Break

Imperial **Papers 3:** Volume Visualization I

Plaza **Papers 4:** Compression and Simplification

Terrace **Cases 2:** Information Visualization

Coffee Break

Imperial **Papers 5:** Point Primitives for Visualization

Plaza **Panel 1:** Future Trends for Oil and Gas Visualization

Imperial
Conference Reception and Vis Posters

Stanbro EXHIBITION

THURSDAY

Imperial **Papers 6:** Level Sets and Isovalues

Plaza **Panel 2:** Combining Sensory Information to Improve Visualization

Terrace **Papers 7:** Volume Visualization II

Coffee Break

Imperial **Papers 8:** Nature Visualization

Plaza **Papers 9:** View-Dependent Visualization

Terrace **Cases 3:** Mesh and Flow Visualization

Lunch Break

Plaza
Vis 2003 Open Meeting
12:30pm -1:30pm

Imperial **Papers 10:** Vectors, Colormaps, and Textures

Plaza **Papers 11:** Visualization Systems and Image-based Visualization

Terrace **Cases 4:** Multi-Scale Techniques

Coffee Break

Imperial **Papers 12:** Meshes

Plaza **Panel 3:** Volume Rendering in Medical Applications

Stanbro EXHIBITION

FRIDAY

Imperial **Papers 13:** Tensor Visualization

Plaza **Panel 4:** Evolving Visual Metaphors & Dynamic Tools for Bio-informatics Vis

Terrace **Papers 14:** Terrain Rendering

Coffee Break

Imperial **Papers 15:** Multi-dimensional, Motion,and Information Visualization

Plaza **Papers 16:** Isosurfaces

Terrace **Cases 3:** Mesh and Flow Visualization

Lunch Break

Imperial
Closing Remarks

Best Papers Awards

Capstone Session: Ray Kurzweil
Author of "The Age of Spiritual Machines"

Whittier
INTERACTIVE DEMONSTRATIONS LAB
Monday-Thursday: 10am – 5pm
Friday: 10am – 12pm
Walk-in demos are welcome.

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SUNDAY, OCTOBER 27

8:30 a.m.- 5:30 p.m.

Arlington

Tutorial 1: Information Visualization, Visual Data Mining, and Its Application to Drug Design

Georges Grinstein, *University of Massachusetts at Lowell*, Daniel Keim, *University of Constance, Germany* and Matthew Ward, *Worcester Polytechnic Institute*

This tutorial will provide the necessary background to understand the issues in the development and usage of visualization integrated with data mining and knowledge discovery systems with focus on drug discovery. We will provide a brief history and overview of data visualization and data mining techniques and systems, discuss specific examples of integrated visualization and data mining, and examine both sample commercial and academic drug discovery systems that integrate visualization and data mining. Videotapes and demonstrations will also be shown.

Berkeley

Tutorial 2: High-Quality Volume Graphics on Consumer PC Hardware

Markus Hadwiger, *VRVis Research Center*, Joe Michael Kniss and Gordon Kindlmann, *University of Utah*, Christof Rezk-Salama, *University of Erlangen-Nuremberg*, and Rüdiger Westermann, *Aachen University of Technology*

Volume rendering has become one of the most important visualization modalities for science and medicine. Until recently, volume rendering was an off-line process or required ultra high-end supercomputers to provide interactive frame rates. Recent advancements in commodity level graphics hardware have made it possible to render reasonably sized volumes at interactive frame rates using a $300 graphics card. In addition to the huge strides made in performance, these graphics cards offer a great deal of programmability, which permit image quality that rivals sophisticated software lighting and classification models. Course participants will learn to leverage new features of modern graphics hardware to build high-quality volume rendering applications using OpenGL. Beginning with basic texture-based approaches, the algorithms are improved and expanded incrementally covering illumination, non-polygonal isosurfaces, transfer function design, interaction, volumetric effects, and hardware accelerated filtering. The course is aimed at scientific researchers who wish to gain an understanding of modern volume rendering techniques and the new features available on programmable graphics hardware. Course participants are provided with documented source code covering details usually omitted in publications.

Plaza

Workshop 1: Commodity-Based Visualization Clusters

Chair: Allen McPherson, *Los Alamos National Laboratory*

Clusters of commodity computers are rapidly becoming a viable alternative to traditional "big iron" for both visualization research and the delivery of production visualization tools. Clusters are cost effective, flexible, and exhibit superior performance when applied to visualization and rendering algorithms in a parallel or distributed fashion. The workshop will consist of 20-minute presentations on specific commodity technologies as applied to scientific visualization. We will allot time for discussion with other presenters and those in the audience that are not presenting.

6:00 p.m.- 9:00 p.m.

Plaza

Workshop 2: Visualization in Bioinformatics and Cheminformatics

Chairs: Georges Grinstein, *University of Massachusetts, Lowell,* and John Peter Lee, *AstraZeneca R&D, Boston*

Bioinformatics, cheminformatics, and their computational relatives, computational biology and chemistry, are at the forefront of modern drug discovery, as their techniques are central to the identification of new drugs that address critical needs. Biological data is extremely complex and richly interconnected. Chemical databases are often massive in dimensionality and cardinality. Both data types must be analyzed in concert. This workshop will provide a forum to discuss the role of visualization in bioinformatics and cheminformatics, and for the presentation, discussion, and evaluation of systems (conceptual, prototype, or products) that attempt to integrate visualization in bioinformatics and cheminformatics. We invite researchers in the academic and commercial communities, along with application developers, to join us in enlightening discussions on creating visualization tools for the management, exploration, and analysis of complex data and systems.

MONDAY, OCTOBER 28

8:30 a.m.- 5:30 p.m.

Terrace

Tutorial 3: State of the Art in Data Representation for Visualization

Arie Kaufman and Klaus Mueller, *State University of New York at Stony Brook*, Baoquan Chen, *University of Minnesota at Twin Cities*, and Amitabh Varshney, *University of Maryland*

This course provides a unified framework,based on principles from signal processing, to define, compare, and contrast different graphics representations available to date, including polygons, points, volumes, images, and free-form representations. We will provide a comprehensive overview of these representations and their hybrids using a unified conceptual framework. We will further demonstrate several practical examples of major applications, available tools, and techniques. The course provides a fresh look on the subject and examines current challenges and future research directions in data representation for visualization. The course material is moderately advanced. Basic knowledge of computer graphics rendering, sampling theories and mathematics is recommended.

8:30 a.m.- 12:15 p.m.

Stanbro

Tutorial 4: Out-of-Core Algorithms for Scientific Visualization and Computer Graphics

Cláudio T. Silva, *OGI/Oregon Health & Science University*, Yi-Jen Chiang, *Polytechnic University*, Jihad El-Sana, *Ben Gurion University of The Negeve,* and Peter Lindstrom, *Lawrence Livermore National Laboratory*

This course will focus on describing techniques for handling datasets larger than main memory in scientific visualization and computer graphics. Recently, several external memory techniques have been developed for a wide variety of graphics and visualization problems, including surface simplification, volume rendering, isosurface generation, ray tracing, surface reconstruction,etc. This work has had significant impact given that in recent years there has been a rapid increase in the raw size of datasets. Another important push for this kind of technology is the growing speed gap between main memory and caches. Because of these reasons, much research in computer graphics focuses on developing out-of-core (and often cache-friendly) techniques.

This course reviews fundamental issues, current problems, and unresolved solutions, and presents an in-depth study of external memory algorithms developed in recent years. Its goal is to provide knowledge of current techniques, as well as the foundation to develop novel techniques.

1:30 p.m.- 5:30 p.m.

Stanbro

Tutorial 5: Integrating Visualization with Modeling and Simulation for Biomedical Applications

David Weinstein, Rob MacLeod, and Marty Cole, *University of Utah*, Dana Brooks, *Northeastern University*, Chris Johnson, *University of Utah*, Robert McCarley, *Harvard Medical School*, Steven Parker, *University of Utah,* and Craig Henriquez, *Duke University*

In this course, we will begin by motivating the integration of modeling, simulation, and visualization tools into a common problem solving environment. We will describe the design of the Biomedical Problem Solving Environment, BioPSE, and will briefly review the underlying concepts of dataflow and computational steering. We will conclude the first portion of our course by demonstrating the BioPSE system, and providing an overview of the visualization capabilities of the system.

For the second part of the course, we will dive deeper into the functionality of BioPSE in the context of examining several real-world bioelectric field problems. Scientists currently using BioPSE to model,simulate, and visualize their data will describe both their driving application and how they are presently using BioPSE to investigate their research. Each speaker will conclude by presenting a demonstration of his application running in BioPSE.

INFOVIS SYMPOSIUM

Imperial Ballroom

8:30 a.m.- 10:00 a.m.

Opening Remarks
Chairs: Pak Chung Wong, *PNNL*, and Keith Andrews, *Graz Univ. of Technology*

InfoVis 2002 Best Paper Award
Chair: Bob Spence, Imperial College

Keynote Address
Chair: Steve Eick, Visintuit
Internet Traffic:Visualization, Discovery, and Very Large Displays, William Cleveland, *Bell Labs*

BREAK 10:00 a.m.- 10:30 a.m.

10:30 a.m.- 11:45 a.m.

Papers 1: Databases, Frameworks, and Visualization
Chair: Daniel Keim, *University of Constance,Germany*

InfoVis 2002 Best Paper
Multiscale Visualizations Using Data Cubes, Chris Stolte, Diane Tang, and Pat Hanrahan, *Stanford University*

VOLVIS SYMPOSIUM

Plaza Ballroom

8:30 a.m.- 10:00 a.m.

Opening Remarks
Chairs: Chris Johnson, *University of Utah,* and Klaus Mueller, *SUNY at Stony Brook*

Keynote Address
Procedurally Generated Volumes, Ken Perlin, *New York University*

10:30 a.m.- 12:15 p.m.

Papers 1: Unstructured Grids
Chair: Cláudio Silva, *OGI/Oregon Health & Science University*

Tetrahedral Projection Using Vertex Shaders, Brian Wylie, Kenneth Moreland, Lee Ann Fisk, and Patricia Crossno, *Sandia National Laboratories*

INFOVIS SYMPOSIUM
Imperial Ballroom

Visualization Schemas for Flexible Information Visualization, Chris North, Nathan Conklin, and Varun Saini, *Virginia Tech*

Building a Visual Database for Example-Based Graphics Generation, Michelle Zhou, Min Chen, *IBM T.J. Watson Research Center,* and Ying Feng, *Indiana University*

11:45 a.m.- 12:15 p.m.

Technical Notes 1: Cartograms and Uncertainty
Chair: Bob Spence, *Imperial College*

Efficient Cartogram Generation: A Comparison, Daniel Keim, *University of Constance,* Stephen North, *AT&T Labs,* Christian Panse, *University of Constance,* and Joern Schneidewind, *University of Halle*

Visualizing Data with Bounded Uncertainty, Chris Olston, *Stanford University,* and Jock Mackinlay, *Palo Alto Research Center*

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Hardware-Based View-Independent Cell Projection, Manfred Weiler, Martin Kraus, and Thomas Ertl, *University of Stuttgart*

A Two-Step Approach for Interactive Pre-Integrated Volume Rendering of Unstructured Grids, Stefan Röttger and Thomas Ertl, *University of Stuttgart*

LUNCH BREAK 12:15 p.m.- 1:45 p.m.

1:45 p.m.- 3:00 p.m.

Papers 2: Empirical Studies
Chair: Jock Mackinlay, *PARC*

Graphical Encoding for Information Visualization: An Empirical Study, Lucy Nowell, *Pacific Northwest National Labs,* Robert Schulman and Deborah Hix, *Virginia Tech*

The Illusion of Perceived Metric 3D Structure, Mats Lind, *Uppsala University,* Geoffrey Bingham, *Indiana University,* and Camilla Forsell, *Uppsala University*

SpaceTree: Design Evolution of a Node Link Tree Browser, Catherine Plaisant, Jesse Grosjean, and Ben Bederson, *University of Maryland*

1:45 p.m.- 3:45 p.m.

Papers 2: Multi-Resolution Representations
Chair: Dirk Bartz, *University of Tübingen*

Time-Critical Multiresolution Volume Rendering Using 3D Texture Mapping Hardware, Xinyue Li and Han-Wei Shen, *The Ohio State University*

Interactive Visualization of Unstructured Grids Using Hierarchical 3D Textures, Joshua Levin, Jason Corso, Subodh Kumar, and Jonathan Cohen, *Johns Hopkins University*

INFOVIS SYMPOSIUM
Imperial Ballroom

BREAK 3:00 p.m.- 3:15 p.m.

3:15 p.m.- 3:45 p.m.

Case Studies 1: Process and Bio Vis
Chair: Steve Roth, *MAYA Viz*

Process Visualization with Levels of Detail, Krešimir Matkovic, Helwig Hauser, *VRVis Research Center,* Reinhard Sainitzer, *Imagination Computer Services,* and M. Eduard Gröller, *Vienna University of Technology*

Visualizing Sets of Evolutionary Trees, Nina Amenta and Jeff Klingner, *University of Texas, Austin*

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OpenGL Volumizer: A Toolkit for High Quality Volume Rendering of Large Data Sets, Praveen Bhaniramka and Yves Demange, *SGI*

BREAK 3:45 p.m.- 4:15 p.m.

4:15 p.m.- 5:45 p.m.

Introducing the InfoVis Contest
Chairs: Jean-Daniel Fekete, *INRIA,* Catherine Plaisant, *University of Maryland*, and Graham Wills, *SPSS*

Interactive Posters Preview
Chairs: Alan Keahey, *Visintuit*, and Tamara Munzner, *University of British Columbia*

4:15 p.m.- 5:30 p.m.

Papers 3: Haptics
Chair: Lisa Sobierajski, *Kitware, Inc.*

Haptics-based Volumetric Modeling Using Dynamic Spline-Based Implicit Functions, Jing Hua and Hong Qin, *SUNY at Stony Brook*

Real-Time Volume Haptic Rendering with Shape-Retaining Chain Mail Model, Sang-Youn Kim, Dong-Soo Kwon and Jinah Park , *Korea Advanced Institute of Science and Technology*

7:00 p.m.- 9:00 p.m.

RECEPTION AND INFOVIS INTERACTIVE POSTERS
Imperial

Chairs: Alan Keahey, *Visintuit*, and Tamara Munzner, *University of British Columbia*

9:00 p.m.- 10:00 p.m.

Plaza

InfoVis 2003 Open Meeting
Chairs: Daniel Keim, *University of Constance,Germany*, Stephen North, *AT&T Labs,* and Tamara Munzner, *University of British Columbia*

Future directions for the InfoVis Symposium. Bring ideas, feedback, and input.

TUESDAY, OCTOBER 29

8:30 a.m.- 5:30 p.m.

Terrace

Tutorial 6: Visualizing the Human Body with ITK and VTK

Stephen R. Aylward, *University of North Carolina at Chapel Hill,* Josh Cates, *University of Utah,* Luis Ibanez, *Kitware, Inc.,* Bill Lorensen, *GE Corporate R&D Center,* Ross Whitaker, *University of Utah,* and Terry Yoo, *National Library of Medicine, NIH*

This tutorial introduces the concepts required for making use of the open-source toolkits ITK and VTK for visualizing anatomical structures. ITK (also known as Insight) is the Registration and Segmentation toolkit developed by the initiative of the National Library of Medicine with the aim of supporting the Visible Human Project. Visualizing anatomical structures from volume data such as CT scans, MRI,and Cryogenic data requires a combination of visualization algorithms with registration and segmentation algorithms. VTK is a mature open-source library that offers the functionality required for performing sophisticated visualizations. It is well-known,however, that high-quality visualization approaches like volume-rendering can produce much better results when they are accompanied of anatomically correct segmentations of the volume data. The tutorial will also present the mechanisms by which ITK can be used to register medical data sets that are then visualized using VTK. Real-life applications of VTK / ITK to medical image data visualization will be presented.

8:30 a.m.-12:15 p.m.

Arlington

Tutorial 7: Psychometrics 101: How to Design, Conduct, and Analyze Perceptual Studies of Computer Graphics Visualization Techniques

James Ferwerda, *Cornell University,* Holly Rushmeier, *IBM T.J. Watson Research Center,* and Benjamin Watson, *Northwestern University*

As the field of Visualization matures, there's a trend to move away from the use of ad-hoc graphics techniques and toward algorithms that are based on a formal understanding of how people perceive visual representations of information. Psychometric methods from experimental psychology can be used to quantify the relationships between the properties of images and what people perceive. The results of psychometric experiments can be used to create predictive models of visual perception that can guide the development of effective and efficient visualization algorithms and enabling graphical interfaces.

This course will provide an introduction to the use of pschometric methods in computer graphics visualization,and will teach attendees how to design perceptual experiments that can be used to advance visualization research and applications.

INFOVIS SYMPOSIUM

Imperial Ballroom

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8:30 a.m.- 10:00 a.m.

Papers 3:Visualizing Hierarchies

Chair: George Robertson, *Microsoft Research*

InterRing: An Interactive Tool for Visually Navigating and Manipulating Hierarchical Structures, Jing Yang, Matthew Ward, and Elke Rundensteiner, *Worcester Polytechnic Institute*

A Space-Optimized Tree Visualization, Quang Vinh Nguyen and Mao Lin Huang, *University of Technology, Sydney*

Beamtrees: Compact Visualization of Large Hierarchies, Frank van Ham and Jarke J. van Wijk, *Eindhoven University of Technology*

Papers 4:Reconstruction and Triangulation

Chair: Baoquan Chen, *University of Minnesota*

Dynamic Triangulation of Variational Implicit Surfaces Using Incremental Delaunay Tetrahedralization, Benoit Crespin, *Université Claude Bernard Lyon 1*

Efficient Estimation of 3D Euclidean Distance Fields from 2D Range Images, Sarah Frisken and Ronald Perry, *MERL*

BREAK 10:00 a.m.- 10:30 a.m.

10:30 a.m.- 11:45 a.m.

Papers 4: Sequences, Patterns, and Huge Data Sets

Chair: Stuart Card, *PARC*

Visualizing Biosequence Data Using Texture Mapping, Praveen Thiagarajan and Guang Gao, *University of Delaware*

Arc Diagrams: Visualizing Structure in Strings, Martin Wattenberg, *IBM Research*

Interactive Information Visualization of a Million Items, Jean-Daniel Fekete and Catherine Plaisant, *University of Maryland*

10:30 a.m.- 12:15 p.m.

Papers 5: Time-Varying Datasets and Remote Rendering

Chair: Kwan-Liu Ma, *University of California, Davis*

Feature Based Volumetric Video Compression for Interactive Playback, Bong-Soo Sohn, Chandrajit Bajaj, and Vinay Siddavanahalli, *University of Texas at Austin*

Space-Time Points:4D Splatting on Efficient Grids, Neophytos Neophytou and Klaus Mueller, *SUNY at Stony Brook*

INFOVIS SYMPOSIUM
Imperial Ballroom

11:45 a.m.- 12:15 p.m.

Technical Notes 2:Brushing and Drill-Drown
Chair: Matt Ward, *Worcester Polytechnic Institute*

Angular Brushing of Extended Parallel Coordinates, Helwig Hauser, Florian Ledermann, and Helmut Doleisch, *VRVis Research Center*

Multiple Foci Drill-Down Through Tuple and Attribute Polyarchies in Tabular Data, Nathan Conklin, Sandeep Prabhakar, and Chris North, *Virginia Tech*

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Feature Estimation for Efficient Streaming, Naveen Kumar Polapally, Raghu Machiraju, and Dhabhaleshwar Panda, *The Ohio State University*

LUNCH BREAK 12:15 p.m.- 1:45 p.m.

1:45 p.m.- 3:00 p.m.

Papers 5: Graph Drawing and Force-Directed Placement
Chair: Stephen North, *AT&T Labs*

ACE:A Fast Multiscale Eigenvectors Computation for Drawing Huge Graphs, Yehuda Koren,Liran Carmel,and David Harel, *Weizmann Institute of Science*

Visual Unrolling of Network Evolution and the Analysis of Dynamic Discourse, Ulrik Brandes, *University of Constance,* and Steven R. Corman, *Arizona State University*

A Hybrid Layout Algorithm for Sub-Quadratic Multidimensional Scaling, Alistair Morrison, Greg Ross, and Matthew Chalmers, *University of Glasgow*

1:45 p.m.- 3:45 p.m.

Papers 6: Volume Rendering
Chair: Nelson Max, *University of California, Davis*

Accelerating Volume Rendering with Textures Hulls, Wei Li and Arie Kaufman, *SUNY at Stony Brook*

A Hardware-Assisted Hybrid Rendering Technique for Interactive Volume Visualization, Brett Wilson, Kwan-Liu Ma,and Patrick McCormick, *University of California, Davis*

Shading for Fourier Volume Rendering, Alireza Entezari, Randy Scoggins, and Torsten Möller, *Simon Fraser University* and Raghu Machiraju, *The Ohio State University*

INFOVIS SYMPOSIUM
Imperial Ballroom

BREAK 3:00 p.m.- 3:15 p.m.

3:15 p.m.- 3:45 p.m.

Case Studies 2: Finance and Web Vis
Chair: Martin Wattenberg, *IBM Research*

Demystifying Venture Capital Investing - Mei Chuah, *Accenture Technology Labs*

Visual Path Analysis - Alan Keahey and Stephen Eick, *Visintuit*

VOLVIS SYMPOSIUM
Plaza Ballroom

BREAK 3:45 p.m.- 4:15 p.m.

4:15 p.m.- 5:30 p.m.

Capstone Address
Chair: Nahum Gershon, *MITRE*

Display Design for the Eye and Mind, Stephen Kosslyn, *Department of Psychology, Harvard University*

Closing Remarks
Chair: John Dill, *Simon Fraser University*

Closing Remarks
Chair: Roger Crawfis, *The Ohio State University*

12:15 p.m.-6:00 p.m.

EXHIBITION *Stanbro*

VIS 2002 CONFERENCE PROGRAM

WEDNESDAY, OCTOBER 30 - FRIDAY, NOVEMBER 1

WEDNESDAY, OCTOBER 30

8:30 a.m.- 8:45 a.m.

Imperial

Introduction

Conference Chair: Hanspeter Pfister, *Mitsubishi Electric Research Labs*

8:45 a.m.- 10:15 a.m.

Imperial

Keynote: Stephen Wolfram
Author of "A New Kind of Science"

Stephen Wolfram is a well-known scientist and the creator of Mathematica. He is widely regarded as one of the world's most original scientists, as well as an important innovator in computing and software technology.

Born in London in 1959, Wolfram was educated at Eton, Oxford, and Caltech. He published his first scientific paper at the age of 15, and had received his Ph.D. in theoretical physics from Caltech by the age of 20. Wolfram's early scientific work was mainly in high-energy physics, quantum field theory, and cosmology, and included several now-classic results. Having started to use computers in 1973, Wolfram rapidly became a leader in the emerging field of scientific computing, and in 1979 he began the construction of SMP–the first modern computer algebra system–which he released commercially in 1981.

After more than ten years of highly concentrated work, Wolfram finally described his achievements in his 1200-page book A New Kind of Science. Released on May 14, 2002, the book was widely acclaimed and immediately became a bestseller. Its publication has been seen as initiating a paradigm shift of historic importance in science.

In addition to leading his company to break new ground with its innovative technology, Wolfram is now developing a series of research and educational initiatives in the science he has created.

BREAK 10:15 a.m.- 10:30 a.m.

10:30 a.m.- 12:15 p.m.

Imperial

Papers 1: Medical Visualization

Chair: Bill Lorensen, *GE Corporate R&D Center*

Integration of Measurement Tools in Medical 3d Visualizations, Bernhard Preim, Christian Tietjen, Wolf Spindler, and Heinz-Otto Peitgen, *MeVis, Bremen*

Fast Visualization of Plane-Like Structures in Voxel Data, Steffen Prohaska and Hans-Christian Hege, *Zuse Institute, Berlin*

Direct Surface Extraction from 3D Freehand Ultrasound Images, Youwei Zhang, Robert Rohling, and Dinesh K. Pai, *University of British Columbia*

CPR - Curved Planar Reformation, Armin Kanitsar, *Vienna University of Technology*, Dominik Fleischmann, *University of Vienna*, Rainer Wegenkittl and Petr Felkel, *VRVis Research Center*, and Eduard Gröller, *Vienna University of Technology*

Plaza

Papers 2: Large Data Sets

Chair: Markus Gross, *ETH Zürich*

Interactive Rendering of Large Volume Data Sets, Stefan Guthe, Michael Wand, Julius Gonser, and Wolfgang Straßer, *WSI/GRIS, University of Tübingen*

Semotus Visum: A Flexible Remote Visualization Framework, Eric J. Luke and Charles D. Hansen, *University of Utah*

Out-of-Core Rendering of Massive Geometric Environments, Gokul Varadhan and Dinesh Manocha, *University of North Carolina at Chapel Hill*

Optimized View-Dependent Rendering for Large Polygonal Datasets, Jihad El-Sana and Eitan Bachmat, *Ben-Gurion University of the Negev*

Terrace

Case Studies1: Volume Rendering

Chair: David Laidlaw, *Brown University*

Christmas Tree Case Study: Computed Tomography as a Tool for Mastering Complex Real World Objects with Applications in Computer Graphics, Armin Kanitsar, Thomas Theußl, Lukas Mroz, Miloš Srámek, Anna Vilanova Bartrolí, Balázs Csébfalvi, Jirí Hladùvka, Dominik Fleischmann, Michael Knapp, Rainer Wegenkittl, Petr Felkel, Stefan Röttger, Stefan Guthe, Werner Purgathofer, and Eduard Gröller, *Vienna University of Technology*

Case Study: Hardware-Accelerated Selective LIC Volume Rendering, Yasuko Suzuki, *Mitsubishi Electric Corp.*, Issei Fujishiro, *Ochanomizu University*, Li Chen, *RIST*, and Hiroko Nakamura, *Ochanomizu University*

Case Study: Visualization and Analysis of High Rayleigh Number — 3D Convection in the Earth's Mantle, Gordon Erlebacher, David A. Yuen, and Fabien Dubuffet, *School of Computational Science & Information Technology, Florida State University*

Immersive Volume Visualization of Seismic Simulations: A Case Study of Techniques Invented and Lessons Learned, Prashant Chopra, Joerg Meyer, and Antonio Fernandez, *Mississippi State University*

LUNCH BREAK 12:15 p.m.- 1:45 p.m.

1:45 p.m.- 3:45 p.m.

Imperial

Papers 3: Volume Visualization I

Chair: Klaus Mueller, *State University of New York at Stony Brook*

Volumetric Shadows Using Splatting, Caixia Zhang and Roger Crawfis, *The Ohio State University,*

Volume Clipping via Per-Fragment Operations in Texture-Based Volume Visualization, Daniel Weiskopf, Klaus Engel,and Thomas Ertl, *University of Stuttgart*

Interactive Spectral Volume Rendering, Steven Bergner, *University of Magdeburg,* Torsten Möller and Mark S. Drew, *Simon Fraser University*, and Graham D. Finlayson, *University of East Anglia*

Interactive Translucent Volume Rendering and Procedural Modeling, Joe Kniss, *Scientific Computing and Imaging Institute,* Simon Premoze, *University of Utah,* Charles Hansen, *Scientific Computing and Imaging Institute,* and David Ebert, *Purdue University*

Plaza

Papers 4: Compression and Simplification

Chair: Greg Turk, *Georgia Institute of Technology*

A Multiphase Approach to Efficient Surface Simplification, Michael Garland and Eric Shaffer, *University of Illinois at Urbana-Champaign*

Geometric Surface Smoothing via Anisotropic Diffusion of Normals, Tolga Tasdizen and Ross Whitaker, *University of Utah,* Paul Burchard and Stanley Osher, *UCLA*

TetFusion: An Algorithm For Rapid Tetrahedral Mesh Simplification, Prashant Chopra and Joerg Meyer, *Mississippi State University, ERC*

Compressing Polygon Mesh Geometry with Parallelogram Prediction, Martin Isenburg, *University of North Carolina at Chapel Hill,* and Pierre Alliez, *INRIA, Sophia-Antipolis*

Terrace

Case Studies 2:Information Visualization

Chair: Tamara Munzner, *University of British Columbia*

A Look of Performance Expression, Rumi Hiraga, *Bunkyo University*

Case Study: Interactive Visualization for Internet Security, Soon Tee Teoh, Kwan-Liu Ma,S. Felix Wu, and Xiaoliang Zhao, *University of California, Davis*

PRIMA: A Case Study of Using Information Visualization Techniques for Patient Record Analysis, Donna L. Gresh, David A. Rabenhorst, Amnon Shabo, and Shimon Slavin, *IBM T.J. Watson Research Center*

Case Study: A Virtual Environment for Genomic Data Visualization, R. Mark Adams, Blaze Stancampiano, Michael McKenna,and David Small, *Variagenics, Inc.*

BREAK 3:45 p.m.- 4:00 p.m.

4:00 p.m.- 5:30 p.m.

Imperial

Papers 5: Point Primitives for Visualization

Chair: Baoquan Chen, *University of Minnesota*

Probabilistic Surfaces: Point Based Primitives to Show Surface Uncertainty, Gevorg Grigoryan and Penny Rheingans, *University of Maryland Baltimore County*

PMR: Point to Mesh Rendering, A Feature-Based Approach, Tamal K. Dey and James Hudson, *The Ohio State University*

Efficient Simplification of Point-Sampled Surfaces, Mark Pauly and Markus Gross, *ETH,Zürich*, and Leif P. Kobbelt, *RWTH Aachen*

Plaza

Panel 1: Future Trends for Oil and Gas Visualization

Panelists:
Francine Evans, *Schlumberger*
William Volz, *ChevronTexaco Exploration Production Technology*
Geoffrey Dorn, *BP Center for Visualization*
Bernd Fröhlich, *Bauhaus University Weimar*
David M. Roberts, *BP Exploration*

7:00 p.m.- 9:00 p.m.

Imperial

RECEPTION AND VIS POSTERS

12:15 p.m.- 9:00 p.m.

Stanbro

EXHIBITION

THURSDAY, OCTOBER 31

8:30 a.m.- 10:00 a.m.

Imperial

Papers 6: Level Sets and Isovalues

Chair: Thomas Ertl, *University of Stuttgart*

Exploring Scalar Fields Using Critical Isovalues, Gunther H. Weber, *University of Kaiserslautern and University of California, Davis,* Gerik Scheuermann and Hans Hagen, *University of Kaiserslautern,* and Bernd Hamann, *University of California, Davis*

Level-Set Segmentation From Multiple Non-Uniform Volume Datasets, Ken Museth, David E. Breen,and Leonid Zhukov, *California Institute of Technology*, and Ross T. Whitaker, *University of Utah*

Efficient Computation of the Topology of Level Sets, V. Pascucci and K. Cole-McLaughlin, *Lawrence Livermore National Laboratory*

Terrace

Papers 7: Volume Visualization II

Chair: Torsten Möller, *Simon Fraser University*

Fast and Reliable Space Leaping for Interactive Volume Rendering, Ming Wan, *Boeing, Seattle,* Aamir Sadiq and Arie Kaufman, *SUNY at Stony Brook*

A New Object-Order Ray-Casting Algorithm, Benjamin Mora, Jean-Pierre Jessel,and René Caubet, *IRIT, Toulouse*

Non-Photorealistic Volume Rendering Using Stippling Techniques, Aidong Lu, *Purdue University*, Christopher J. Morris, *IBM T.J. Watson Research Center*, David S. Ebert, *Purdue University*, Penny Rheingans, *University of Maryland-Baltimore County*, and Charles Hansen, *University of Utah*

Plaza

Panel 2: Combining Sensory Information to Improve Visualization

Organizer: Marc Ernst, *Max-Planck-Institute for Biological Cybernetics*

Panelists:
Martin Banks, *University of California, Berkeley*
Felix Wichmann, *Max-Planck-Institute for Biological Cybernetics*
Laurence Maloney, *New York University*
Heinrich Bülthoff, *Max-Planck-Institute for Biological Cybernetics*

BREAK 10:00 a.m.- 10:15 a.m.

10:15 a.m.- 12:15 p.m.

Imperial

Papers 8: Nature Visualization

Chair: Theresa-Marie Rhyne, *North Carolina State University*

Interactive Visualization of Complex Plant Ecosystems, Oliver Deussen and Carsten Colditz, *Dresden University of Technology,* Marc Stamminger and George Drettakis, *REVES/INRIA, Sophia Antipolis*

Simulating Fire with Texture Splats, Xiaoming Wei, Wei Li, Klaus Mueller, and Arie Kaufman, *SUNY at Stony Brook*

Visualizing Dynamic Molecular Conformations, Johannes Schmidt-Ehrenberg, Daniel Baum,and Hans-Christian Hege, *Zuse Institute, Berlin*

GeneVis: Visualization Tools for Genetic Regulatory Network Dynamics, C.A.H. Baker, M.S. T. Carpendale, P. Prusinkiewicz,and M.G.Surette, *University of Calgary*

Plaza

Papers 9: View-Dependent Visualization

Chair: Hans Hagen, *University of Kaiserslautern*

Isometric Embedding by Surface Reconstruction from Distances, Ingrid Hotz, *University of Kaiserslautern*

Fast View-Dependent Level-of-Detail Rendering Using Cached Geometry, Joshua Levenberg, *UC Berkeley*

Visibility-Guided Simplification, Eugene Zhang and Greg Turk, *Georgia Institute of Technology*

Maximum Entropy Light Source Placement, Stefan Gumhold, *WSI/GRIS, University of Tübingen*

Terrace

Case Studies 3: Mesh and Flow Visualization

Chair: Raghu Machiraju, *The Ohio State University*

Case Study: Visual Debugging of Finite Element Codes, Patricia Crossno, David H. Rogers, and Christopher J. Garasi, *Sandia National Laboratories*

Case Study: Interactive Rendering of Adaptive Mesh Refinement Data, Sanghun Park, Chandrajit L. Bajaj, and Vinay Siddavanahalli, *University of Texas, Austin*

A Case Study in Selective Visualization of Unsteady 3D Flow, Dirk Bauer, Ronald Peikert, and Mie Sato, *ETH Zürich,* and Mirjam Sick, *VA Tech Hydro Zürich*

Case Study: Visualizing Ocean Flow Vertical Motions Using Lagrangian, Eulerian Time Surfaces - Josh Grant, Gordon Erlebacher, and James O'Brien, *Center for Ocean Atmospheric Prediction Studies, Florida State University*

LUNCH BREAK 12:15 p.m.- 1:45 p.m.

12:30 p.m.- 1:30 p.m.

Plaza

Vis 2003 Open Meeting

Chair: Jim Thomas, *Pacific Northwest National Laboratory*

1:45 p.m.- 3:45 p.m.

Imperial

Papers 10: Vectors, Colormaps, and Textures

Chair: Kwan Liu Ma, *University of California, Davis*

Computing Singularities of 3D Vector Fields with Geometric Algebra, Stephen Mann, *University of Waterloo,* and Alyn Rockwood, *Colorado School of Mines*

Seamster: Inconspicuous Low-Distortion Texture Seam Layout, Alla Sheffer, *Technion I.I.T., Haifa,* and John C.Hart, *University of Illinois at Urbana-Champaign*

Face-based Luminance Matching for Perceptual Colormap Generation, Gordon Kindlmann, *University of Utah*, Erik Reinhard, *University of Central Florida*, and Sarah Creem, *University of Utah*

Geometric Verification of Swirling Features in Flow Fields, Ming Jian and Raghu Machiraju, *The Ohio State University,* and David Thompson, *Mississippi State University*

Plaza

Papers 11: Visualization Systems and Image-based Visualization

Chair: Penny Rheingans, *University of Maryland, Baltimore County*

Comparative Evaluation of Visualization and Experimental Results Using Image Comparison Metrics, Hualin Zhou, Min Chen,and Mike F. Webster, *University of Wales, Swansea*

A Model for the Visualization Exploration Process, T.J.Jankun-Kelly, Kwan-Liu Ma,and Michael Gertz, *University of California, Davis*

Sea of Images - Daniel G. Aliaga, *Lucent Bell Labs*, Thomas Funkhouser, *Princeton University*, Dimah Yanovsky, *Harvard University*, and Ingrid Carlbom, *Lucent Bell Labs*

Scalable Alignment of Large-Format Multi-Projector Displays Using Camera Homography Trees, Han Chen, *Princeton University,* Rahul Sukthankar, *HP Labs and Carnegie Mellon University,* Grant Wallace and Kai Li, *Princeton University*

Terrace

Case Studies 4: Multi-Scale Techniques

Chair: Rachel Brady, *Duke University*

Case Study on Multiresolution Visualization of Local Rainfall from Weather Radar Measurements, Thomas Gerstner, Dirk Meetschen, Susanne Crewell, Michael Griebel,and Clemens Simmer, *Institute for Applied Mathematics, University of Bonn*

Rendering The First Star In The Universe - A Case Study, Ralf Kähler, Donna Cox, Robert Patterson, Stuart Levy, Hans-Christian Hege, and Tom Abel, *Zuse Institute, Berlin*

NASA's Great Zooms, Gregory W. Shirah and Horace G. Mitchell, *NASA Goddard Space Flight Center*

A Case Study on Automatic Camera Placement and Motion for Visualizing Historical Data, Stanislav L. Stoev and Wolfgang Straßer, *WSI/GRIS, University of Tübingen*

BREAK 3:45 p.m.- 4:00 p.m.

4:00 p.m.- 5:30 p.m.

Imperial

Papers 12: Meshes

Chair: Cláudio Silva, *OGI/Oregon Health & Science University*

Efficient Compression and Rendering of Multi-Resolution Meshes, Zachi Karni, Alexander Bogomjakov, and Craig Gotsman, *Technion - Israel Institute of Technology*

Bounded-Distortion Piecewise Mesh Parameterization, Olga Sorkine and Daniel Cohen-Or, *Tel Aviv University,* Rony Goldenthal and Dani Lischinski, *Hebrew University of Jerusalem*

XFastMesh: Fast View-Dependent Meshing from External Memory, Christopher DeCoro and Renato Pajarola, *University of California,Irvine*

Plaza

Panel 3: Volume Rendering in Medical Applications: We've got pretty images, what's left to do?

Organizer: Michael Meissner, *Viatronix*

Panelists:
Bill Lorensen, *GE Corporate R&D Center*
Karel Zuiderveld, *Vital Images*
Vikram Simha, *TeraRecon*
Rainer Wegenkittl, *Tiani*

10:00 a.m.-1:45 p.m.

Stanbro

EXHIBITION

FRIDAY, NOVEMBER 1

8:30 a.m.- 10:00 a.m.

Imperial

Papers 13: Tensor Visualization

Chair: Han-Wei Shen, *The Ohio State University*

Tensor Field Visualization Using Adaptive Filtering of Noise Fields Combined with Glyph Rendering, Andreas Sigfridsson, Tino Ebbers, Einar Heiberg, and Lars Wigström, *Linköpings Universitet, Sweden*

Volume Deformation For Tensor Visualization, Xiaoqiang Zheng and Alex Pang, *University of California, Santa Cruz*

Oriented Tensor Reconstruction: Tracing Neural Pathways from Diffusion Tensor MRI, Leonid E. Zhukov and Alan H. Barr, *California Institute of Technology*

Terrace

Papers 14: Terrain Rendering

Chair: Craig Gotsman, *Technion*

QuadTIN: Quadtree Based Triangulated Irregular Networks, Renato Pajarola, *University of California,Irvine,* Marc Antonijuan, *La Salle University,* and Roberto Lario, *Universidad Complutense Madrid*

Horizon Occlusion Culling for Real-Time Rendering of Hierarchical Terrains, Brandon Lloyd and Parris Egbert, *Brigham Young University*

Evaluation of a Multimodal Interface for 3D Terrain Visualization, David M. Krum, Olugbenga Omoteso, William Ribarsky, Thad Starner, and Larry F. Hodges, *Georgia Institute of Technology, Atlanta*

Plaza

Panel 4: Evolving Visual Metaphors and Dynamic Tools for Bioinformatics Visualization

Organizer: Theresa-Marie Rhyne, *North Carolina State University*

Panelists:
Thomas H. Dunning Jr., *MCNC/North Carolina Supercomputing Center*
Gus Calapristi, *Pacific Northwest National Laboratory*
Chris North, *Virginia Polytechnic Institute and State University*
Donna Gresh, *IBM T.J. Watson Research Center*

BREAK 10:00 a.m.- 10:15 a.m.

10:15 a.m.- 12:15 p.m.

Imperial

Papers 15: Multidimensional, Motion,and Information Visualization

Chair: Rob Erbacher, *State University of New York at Albany*

Assisted Navigation for Large Information Spaces, Brent M. Dennis and Christopher G. Healey, *North Carolina State University*

BM3D: Motion Estimation in Time Dependent Volume Data, Wim de Leeuw and Robert van Liere, *CWI, Amsterdam*

Kinetic Visualization - A Technique for Illustrating 3D Shape and Structure, Eric B. Lum, Aleksander Stompel,and Kwan-Liu Ma, *University of California, Davis*

A Radial Focus+Context Visualization for Multi-Dimensional Functions, Sanjini Jayaraman and Chris North, *Virginia Tech*

Plaza

Papers 16: Isosurfaces

Chair: Kelly Gaither, *University of Texas*

BLIC: Bi-Level Isosurface Compression, Gabriel Taubin, *IBM T.J.Watson Research Center*

Approximating Normals for Marching Cubes Applied to Locally Supported Isosurfaces, Gregory M.Nielson, Adam Huang, and Steve Sylvester, *Arizona State University*

Volume Warping for Adaptive Isosurface Extraction, Laurent Balmelli, Christopher J. Morris, Gabriel Taubin,and Fausto Bernardini, *IBM T.J. Watson Research Center*

Interactive View-Dependent Rendering of Large IsoSurfaces, Benjamin Gregorski, *Lawrence Livermore Nat. Lab and University of California, Davis,* Mark Duchaineau, *Lawrence Livermore Nat. Lab,* Peter Lindstom, *Lawrence Livermore Nat. Lab,* Valerio Pascucci, *University of California, Davis,* and Kenneth I. Joy, *Lawrence Livermore Nat. Lab*

Terrace

Case Studies 5:Interactive Techniques

Chair: Dirk Bartz, *University of Tübingen*

A Case Study on the Adaptation of Interactive Visualization Applications to Web-Based Production for Operational Mesoscale Weather Models, Lloyd A. Treinish, *IBM T. J. Watson Research Center*

Exploring Surface Characteristics with Interactive Gaussian Images (A Case Study), Bradley Lowekamp and Penny Rheingans, *University of Maryland, Baltimore County,* and Terry S. Yoo, *National Library of Medicine*

A Case Study on the Applications of a Generic Library for Low-Cost Polychromatic Passive Stereo, Simon Stegmaier, Dirc Rose, and Thomas Ertl, *Visualization and Interactive Systems Group, University of Stuttgart, Germany*

"Case Study: The Office of Real Soon Now" for Visualization, Samuel P. Uselton, *Lawrence Livermore National Lab*

LUNCH BREAK 12:15 p.m.- 1:45 p.m.

1:45 p.m.- 3:45 p.m.

Imperial

Capstone: Ray Kurzweil
Author of "The Age of Spiritual Machines"

Ray Kurzweil was the principal developer of the first omni-font optical character recognition,the first print-to-speech reading machine for the blind, the first CCD flat-bed scanner, the first text-to-speech synthesizer, the first music synthesizer capable of recreating the grand piano and other orchestral instruments, and the first commercially marketed large vocabulary speech recognition. Ray has successfully founded, developed, and sold four AI businesses in OCR,music synthesis, speech recognition,and reading technology. All of these technologies continue today as market leaders.

Ray Kurzweil received the $500,000 Lemelson-MIT Prize, the world's largest award in invention and innovation. He also received the 1999 National Medal of Technology, the nation's highest honor in technology, from President Clinton in a White House ceremony. He has also received scores of other national and international awards, including the 1994 Dickson Prize (Carnegie Mellon University's top science prize),Engineer of the Year from Design News, Inventor of the Year from MIT, and the Grace Murray Hopper Award from the Association for Computing Machinery. He has received ten honorary Doctorates and honors from three U.S.presidents. He has received seven national and international film awards. His book, *The Age of Intelligent Machines*, was named Best Computer Science Book of 1990.His current best-selling book, *The Age of Spiritual Machines, When Computers Exceed Human Intelligence,* has been published in 9 languages and achieved the #1 best selling book on Amazon.com in the categories of "Science" and "Artificial Intelligence."

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Jim Thomas, *Pacific Northwest National Laboratory*
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