



*IEEE Visualization 1999
Celebrating Ten Years*

FINAL PROGRAM

October 24 • October 29, 1999
San Francisco Airport Hyatt
San Francisco, California



Sponsored by IEEE Computer Society Technical Committee on Visualization and Graphics In Cooperation with ACM/SIGGRAPH

CONFERENCE - AT - A - GLANCE

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
7:00am	REGISTRATION	REGISTRATION	REGISTRATION	REGISTRATION		
8:00am				Keynote Session <i>Grand Peninsula Ballroom D</i>	REGISTRATION	REGISTRATION
9:00am	Tutorials	Information Visualization Symposium Parallel Visualization and Graphics Symposium	Information Visualization Symposium Parallel Visualization and Graphics Symposium	Papers Papers Case Studies	Papers Papers Hot Topics	Papers Hot Topics Panel
10:00am						
11:00am				Panel Papers Case Studies	Panel Papers Case Studies	Papers Papers Case Studies
12:00pm						
1:00pm						Capstone Session <i>Grand Peninsula Ballroom D</i>
2:00pm				Papers Papers Hot Topics		
3:00pm						
4:00pm				Papers Case Studies Hot Topics	Papers Case Studies	
5:00pm						
6:00pm					Vis 2000 Open Meeting <i>Grand Peninsula Ballroom D</i>	
7:00pm		Symposium & Tutorial Reception <i>Poolside Pavilion</i>		Conference Reception <i>Grand Peninsula Ballroom D</i>	BOFs	
8:00pm			VizLies			
9:00pm						

Sessions on Large Scale Data Set Visualization, Medical Data Visualization, Features, Images, and Metrics, Rendering Techniques, Flow Visualization, Virtual Reality, Volume Rendering, Visualization Systems, Sensory Design Issues, Vector and Tensor Visualization, Airspace/Terrain and Sea-bed Visualization, Terrain Visualization, Volume Visualization, Information Visualization, Mesh Techniques and Compression, Flow Visualization, Volume Rendering, and Parallel Visualization and Graphics

Get complete, up-to-date listings of program information from

URL: <http://www.erc.msstate.edu/vis99>

<http://davinci.informatik.uni-kl.de/vis99>

PVG99 URL: <http://www.acl.lanl.gov/PVG99/pvg99.html>

InfoVis 99 URL: <http://www.infovis.org/infovis99/>

or contact: Steve Bryson, NASA Ames Research Center, 650-604-4524, bryson@nas.nasa.gov
Theresa-Marie Rhyne, Lockheed Martin/U.S. EPA Sci Vis Center, 919-541-0207, rhyne.theresa@epa.gov

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WELCOME TO IEEE VISUALIZATION '99

Welcome to the 10th annual IEEE Visualization conference! Please join us in our celebration of 10 years of leading edge research in scientific visualization by returning to the city where we started, San Francisco, California. In the past decade the field of scientific visualization and the IEEE visualization conference have grown in both size and sophistication. Reflecting this growth, our keynote talk will describe a series of workshops by the leaders in the scientific visualization field, resulting in "Data and Visualization Corridors". This talk will lay out some of the greatest problems facing our field today and strategies for their solution. Our capstone speaker, Rick Stevens, looks into the future with a presentation of "ActiveSpaces: The Access Grid, ActiveMural and Advanced Visualization Systems". Between these two talks you will find reports on the state of the art in data visualization, including new research, case studies and vociferous and opinionated panels. You will also be able to see and try the new technologies close up in the demonstration area and the Creative Applications Lab (CAL).

Preceding the main conference on Wednesday through Friday are the Sunday through Tuesday sessions. In these sessions you will find several tutorials by leaders in the field, providing you with an opportunity for learning the background of their research, as well as studying their new work in depth. You will also find two symposia, the symposium on information visualization, where techniques for the visualization of abstract information will be studied, and the symposium on parallel visualization and graphics, where you will see new work in the application of parallel computer systems to our field.

Our 10th conference celebration will be loudest at the Wednesday night reception, where we will have special entertainment as well as recognition of those who started the visualization conference and nurtured it to its current success.

Please join us in San Francisco, California October 24 through 29, to make this celebration memorable at the 10th visualization conference!

Steve Bryson, *NASA Ames Research Center*

Theresa-Marie Rhyne, *Lockheed Martin/U.S. EPA Scientific Visualization Center*

IEEE Visualization '99 Conference Co-Chairs

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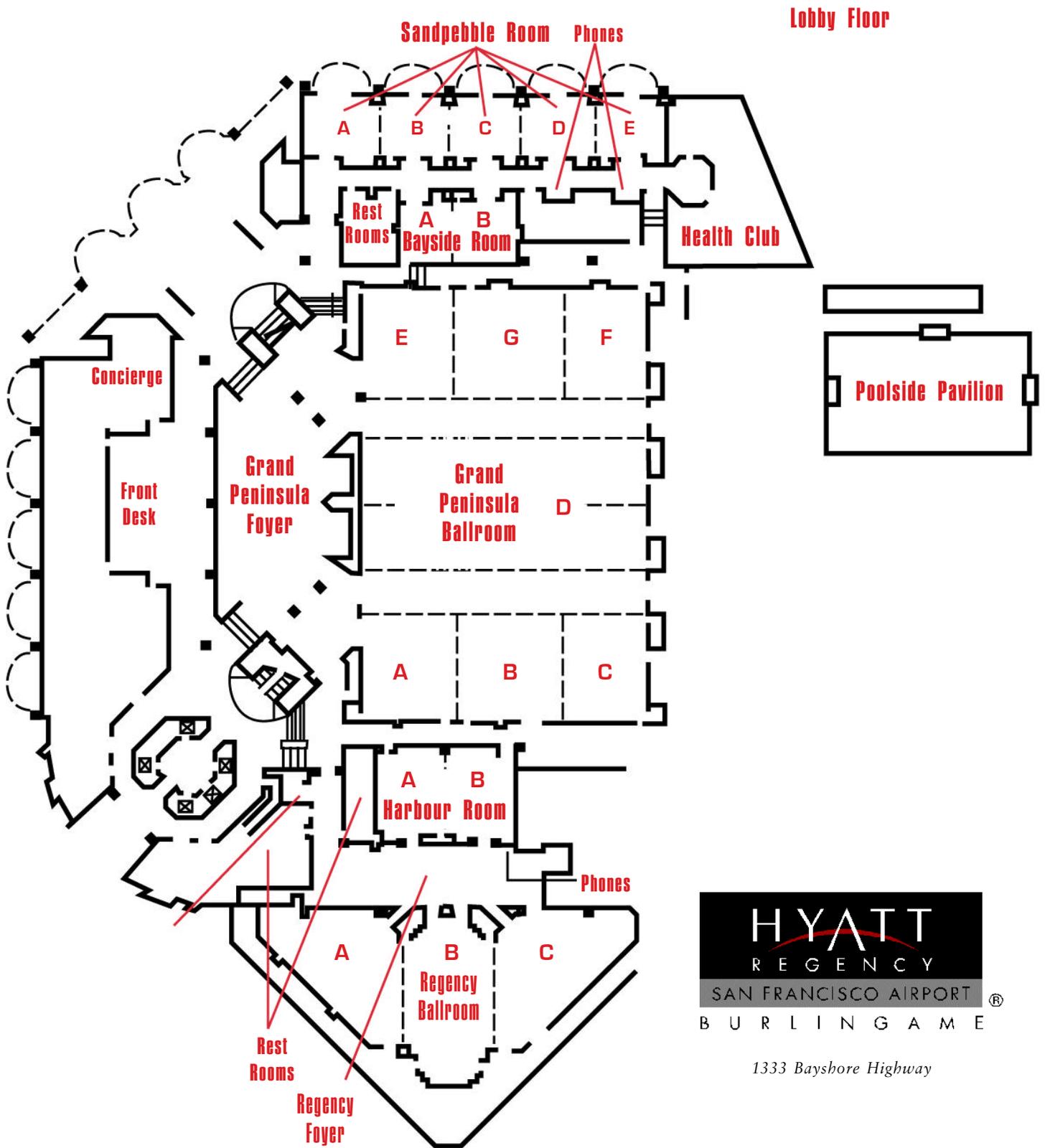
Mike Bailey, *SDSC/UC San Diego*
Chandrajit Bajaj, *University of Texas, Austin*
David Banks, *Florida State University*
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HOTEL FLOORPLAN



1333 Bayshore Highway

VISUALIZATION '99 TUTORIALS

Sunday, Monday, Tuesday

TUTORIAL 1

Sandpebble A and B

Sunday 8:30-5:30

Volume Graphics

Instructors: Arie Kaufman, Rick Avila, Sarah Gibson, Jan Hardenbergh, Hanspeter Pfister, Lisa Sobierajski Avila, Milos Sramek, J. Edward Swan II

Level: Advanced

Course Description:

Volume graphics is an approach to handling conventional graphics applications with volumetric techniques. This course provides an overview of volume graphics, with a focus on volume modeling, volume manipulation, volume rendering, and their applications.

The course is divided into two portions, and can be viewed or structured as two half-day courses. The morning is devoted to fundamentals of volume graphics, modeling and the associated applications.

The afternoon is devoted to volume rendering, manipulation and the associated applications. The course will cover the technology and several major applications, available tools and techniques, the challenges confronting the field of volume graphics, and some of the advanced topics in the field.

Who Should Attend:

Course material is moderately difficult, due to the level of detail of the algorithms and methodologies. Basic knowledge of hidden-surface methods, rendering models (including basic volume rendering), and computer organization is recommended.

TUTORIAL 2

Sandpebble C and D

Sunday 8:30-5:30

Introduction to Graphics Programming with Java3D

Instructors: David R. Nadeau (Organizer and Speaker), Henry A. Sowizral

Level: Intermediate

Course Description:

Java 3D is a new cross-platform API for developing 3D graphics applications in Java. Java 3D's feature set has been designed to enable quick development of complex 3D applications, and at the same time enable fast and efficient implementations on a variety of platforms, from PCs to workstations. Using Java 3D, software developers can build cross-platform applications that build 3D scenes programmatically, or via loading 3D content from VRML, OBJ, and/or other external files. The Java 3D API includes a rich feature set for building shapes, composing behaviors, interacting with the user, and controlling rendering details.

Who Should Attend:

Participants in this tutorial learn the concepts behind Java 3D, the Java 3D class hierarchy, typical usage patterns, ways of avoiding common mistakes, animation and scene design techniques, and tricks for increasing performance and realism.

TUTORIAL 3

Grand Peninsula Ballroom E

Monday 8:30-5:30

Interactive Visualization and Web-based Exploration in the Physical and Natural Sciences

Instructors: Theresa Marie Rhyne (Organizer and Speaker), Mike Botts, Bill Hibbard, Lloyd Treinish

Level: Intermediate

Course Description:

The visual presentation of large amounts of scientific information and data often requires the merging of image processing methods with computer-generated color displays. The exploration of complex physical and natural sciences data sets involves the application of interactive computer graphics tools and techniques. Visualization tools are just one component of an integrated decision support system for scientists, educators, and the general public.

In this tutorial, we intend to highlight the convergence of visualization environments with the World Wide Web, multi-media tools for desktop videoconferencing, statistical and plotting functions, computer algorithm exploration, perceptual thinking and computer animation techniques. The visual display criteria for research, policy analysis, decision making and science education are not necessarily the same. Therefore, visualization tools need to be flexible in their design to support these different viewpoints and interpretations of data. Our tutorial will thus address the design of visualization systems the support a wide class of users with distinct goals, expectations, capabilities and resources

Who Should Attend:

Scientific researchers, educators, and computer graphics specialists interested in exploring particular issues associated with handling the visual display of scientific information and large scientific data sets. Experience with scientific visualization systems and terminology is helpful as well as understanding of computer graphics programming.

TUTORIAL 4

Grand Peninsula Ballroom F

Monday 8:30-5:30

Clifford Algebra, Quaternions and Their Use in Physics and Visualization

Instructors: Hans Hagen, Alyn Rockwood, and Gerik Scheuermann

Level: Intermediate

Course Description:

Quaternions build a four-dimensional algebra for three-dimensional geometry. They give the best way to deal with rotations in 3-space. In Scientific Visualization, one has used them to deal with vector fields in space and for animations because of their nice interpolation properties.

Clifford algebra is a mathematical language for geometry extending the usual vector space description. It incorporates such important concepts as complex numbers, quaternions and matrices which are widely used in physics, modern computer graphics and Visualization. The central idea is defining elements of different grades like scalars, vectors, bivectors, trivectors and quaternions together with a multiplication of different graded elements that unifies scalar multiplication, scalar product, vector product, quaternion and matrix multiplication. Its extension to Clifford analysis results in a coordinate invariant differential operator unifying gradient, divergence, and rotation. It opens new ways to understand geometry and physics making it an excellent choice for new Scientific Visualization algorithms.

Who Should Attend:

We expect that most people are new to parts of the subject and want to provide an introduction. Parts of the material are of a higher mathematical level, so some people may regard it as advanced. We included question sessions to overcome this problem.

TUTORIAL 5

Grand Peninsula Ballroom E

Tuesday 8:30-5:30

Visualization Toolkits: Applications and Techniques

Instructors: Kenneth M. Martin (Organizer and Speaker), Lisa Sobierajski Avila, William E. Lorensen, James V. Miller, William J. Schroeder

Level: Intermediate

Course Description:

In this tutorial we will discuss fundamental issues regarding the design, implementation and application of 3D graphics and visualization systems. We will describe and contrast some current systems such as Open Inventor, Java3D, Data Explorer and the Visualization Toolkit. We will examine in more detail the implementation of the Visualization Toolkit. This will be used to illustrate important design issues such as graphics portability, interpreted versus compiled languages, multiple versus single inheritance, data flow models, and user interaction methods. In the remainder of this tutorial we will focus on applying visualization techniques and toolkits to solve problems from a selection of application domains.

Who Should Attend:

Attendees should have a basic understanding of computer graphics principles, software development techniques, and visualization algorithms such as color mapping and contouring. This course is intended for users, developers, researchers and practitioners of 3D graphics and data visualization.

TUTORIAL 6

Grand Peninsula Ballroom F

Tuesday 8:30-5:30

Feature Extraction and Visualization of Time-Dependent Flow Fields

Instructors: David C. Banks, David N. Kenwright, Frits H. Post, Deborah Silver

Level: Beginning

Course Description:

Time-dependent simulations are rapidly becoming more common for studying dynamic phenomena such as fluid flows. But visualization of the resulting data sets is hard because of the huge amount of data generated. Feature-based visualization is an approach to deal with this problem, extracting salient features and events from the data. The extraction is done in a separate preprocessing step, as it often involves intensive computations. After extraction the features can be represented in a very compact way, allowing interactive exploration and real-time visualization.

Important features in flows are for example vortices and eddies, recirculation zones, separation and reattachment structures, and shock waves. Important events occur when new features originate or disappear, or when features interact, split, merge, or collide. Detection of these features and events allows scientists to study these phenomena, discarding any irrelevant or redundant low-level information, and concentrating entirely on high-level information that is close to the physical concepts. Approaches to feature detection and tracking integrate concepts from several fields, such as image processing and computer vision, morphology, physical concepts from fluid dynamics, differential geometry, and topology.

This course presents an overview of contemporary techniques for extracting high-level information from time-dependent flow data fields, covering the fundamentals, a collection of recent results and advanced techniques, and applications of feature-based visualization. The explanations will not require an advanced level of mathematics or physics as a background, but will be largely intuitive and richly illustrated.

Who Should Attend:

Visualization, computer graphics, or CFD users and professionals interested in the state-of-the-art in feature-based flow visualization and visual analysis of large time-dependent data sets. A basic knowledge of scientific visualization and numerical simulation is a prerequisite.

INTERNET ACCESS

Bayside Room

Monday - Thursday 8:00am - 7:00pm
Friday 8:00am - Noon

VIZLIES '99

Tuesday Evening Special Session - PARTY

Tuesday 7:30pm • Grand Peninsula Ballroom A, B and C
How to Lie and Confuse with Visualization

IEEE SYMPOSIUM ON INFORMATION VISUALIZATION (INFOVIS '99)

Sponsored by the IEEE Computer Society Technical Committee on Visualization and Graphics

October 25-26, 1999 • Grand Peninsula Ballroom D

Monday, October 25

- 8:30 - 10:00 **Keynote Address:** *Crossing the Information Visualization Chasm: From Innovation to Adoption*, Ben Shneiderman
- 10:00 - 10:30 Coffee break
- 10:30 - 12:00 **Papers I: *Understanding Time Dependent and Evolving Information***
- (1) **Cluster and Calendar Based Visualization of Time Series Data**, J. van Wijk, and E. van Selow
 - (2) **Visualizing Application Behaviour on SuperScalar Processors**, C. Stolte, R. Bosch, P. Hanrahan, and M. Rosenblum
 - (3) **Sensemaking of Evolving Web Sites Using Visualization Spreadsheets**, E. Chi, S. Card, and P. Pirolli
- 12:00 - 1:30 Lunch
- 1:30 - 3:00 **Papers II: *Evaluation and Design of Visualization Systems***
- (1) **Does Animation Help Users Build Mental Maps of Spatial Information?**, B. Bederson, and A. Boltman
 - (2) **Evaluating a Visualization of Image Similarity as a Tool for Image Browsing**, K. Rodden, W. Basalaj, D. Sinclair, and K. Wood
 - (3) **Short paper: Domain Analysis: A Technique to Design a User-Centered Visualization Framework**, O. Espinosa, C. Hendrickson, and J. Garrett Jr.
 - (4) **Short paper: A Framework for Focus+Context Visualization**, S. Bjork, L. Holmquist, and J. Redstrom
- 3:00 - 3:30 Coffee Break
- 3:30 - 5:00 **Papers III: *Investigating Hierarchies and Graphs***
- (1) **Navigating Hierarchies with Structure-Based Brushes**, Y-H. Fua, M. Ward, and E. Rudensteiner
 - (2) **Dynamic Hierarchy Specification and Visualization**, R. Wilson, and R. Bergeron
 - (3) **Short paper: Cushion Treemaps**, J. van Wijk, and H. van de Wetering
 - (4) **Short paper: 3D Interactive Visualization for Inter-Cell Dependencies of Spreadsheets**, H. Shiozawa, K. Okada, and Y. Matsushita
- 5:15 - 6:00 **Late Breaking Hot Topic Case Studies**
- (1) **Visualizing Situation Data Uncertainty Using Dempster-Shafer Evidential Reasoning**, P. Tinker, K. Resier, M. Daily, Y. Chen, and J. Fox
 - (2) **Terrain Surface Visualization Using the Open GL API**, K. Matson and D. McAllister
 - (3) **Virtual Hazard Anaysis: A Methodology For The Chemical Industry**, R. Hale, B. Chadwell, G. Holderbaum, and L. Modisette
 - (4) **A Combined Visualization Approach for WWW-Search Results**, T. Mann, H. Reiterer
 - (5) **Perceptual Cognition and The Design of Air Traffic Control Interfaces**, B. Fisher, J. Dill, and M. Liljefors

Tuesday, October 26

- 8:30 - 10:00 **Papers IV: *Techniques for Broad-Scope Problems***
- (1) **Efficient Multi-Object Dynamic Query Histograms**, M. Derthick, A. Moore, and S. Roth
 - (2) **Aggregate Towers: Scale Sensitive Visualization And Decluttering of GeoSpatial Data**, J. Rayson
 - (3) **VisageWeb: Visualizing WWW Data in Visage**, M. Higgins, P. Lucas, and J. Senn
- 10:00 - 10:30 Coffee Break
- 10:30 - 12:00 **Late Breaking Hot Topics**
- (1) **Navigating Desktop GeoVirtual Environments**, S. Fuhrmann, and A. MacEachren
 - (2) **Ordering Categorical Data to Improve Visualization**, S. Ma, and J. Hellerstein
 - (3) **InfoStill: A Task-Oriented Framework for Analyzing Data Through Information Visualization**, K. Cox, S. Hibino, L. Hong, A. Mockus, and G. Wills
 - (4) **ThemeRiver: In Search of Trends, Patterns, and Relationships**, S. Havre, B. Hetzler, and L. Nowell
 - (5) **A Multiple-Focus Visualization Technique Using Heat Models and Force-Directed Layout**, N. Osawa
 - (6) **Space Series: Simulation Display of Spatial and Temporal Data**, D. Glaser, M. Hearst
 - (7) **Evaluating Space-Filling Visualizations for Hierarchical Structures**, J. Stasko, M. Guzdial, and K. McDonald
 - (8) **Visualizing Causal Relations**, C. Ware, E. Neufeld, and L. Bartram
 - (9) **Visualization of Temporal Distances**, G. Scheuerman, and T. Wischgol
- 12:00 - 1:30 Lunch
- 1:30 - 3:00 **Papers VI: *Data Mining and High Dimensional Visualization***
- (1) **The Automated Multidimensional Detective**, A. Inselberg, and T. Avidan
 - (2) **Short paper: Visualizing Association Rules for Text Mining**, P. Wong, P. Whitney, and J. Thomas
 - (3) **Short paper: A Java-based Visual Mining Infrastructure and Applications**, M. Hao, U. Dayal, M. Hsu, J. Baker, and R. D'Eletto
 - (4) **Short paper: The Sunflower Visual Metaphor, a New Paradigm for Dimensional Compression**, S. Rose
 - (5) **Short paper: Constellation: A Visualization Tool for Linguistic Queries from MindNet**, T. Munzner, F. Guimbretiere, and G. Robertson
- 3:00 - 3:30 Coffee Break
- 3:30 - 5:00 **Capstone Address: *Cognitive Origins of Graphic Displays***, Barbara Tversky

Symposium Chair

Stephen G. Eick, *Visual Insights*,
Lucent Technologies Bell Labs

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For further information see <http://www.infovis.org/infovis99/>

Late-Breaking Hot Topics

Nahum Gershon, *MITRE*
John Dill, *Simon Fraser University*

PARALLEL VISUALIZATION AND GRAPHICS SYMPOSIUM (PVG '99)

October 25-26, 1999 • Grand Peninsula Ballroom A, B and C

PVG '99 KEYNOTE SESSION

Challenges in Building and Using Large-Format Displays

Speaker: Kai Li, Princeton University

Several new-generation display technologies have the potential to become ubiquitous in the next decades. These devices can be attached to almost any surface and they are capable of delivering an enormous amount of visual information. We believe that ubiquitous, large-format displays will revolutionize the way we use computers, making us rethink the relationship between information technology and our society. There are a large number of interesting research issues and challenges. This talk gives an overview of several display technologies, and addresses some of the research challenges in building and using large-format display systems.

Monday, October 25

- 8:50 - 9:00 **Opening Remarks**
9:00 - 10:00 **Keynote: *Challenges in Building and Using Large-Format Displays***, Kai Li
10:00 - 10:20 **Coffee Break**
10:20 - 11:40 **Rendering**
Chair: Jamie Painter
- (1) **Parallel Lumigraph Reconstruction**, Peter-Pike Sloan, Charles Hansen
 - (2) **Parallel Visualization of Large Scale Aerodynamics Calculations: A Case Study on the Cray T3E**, Kwan-Liu Ma and Tom Crockett
- 11:40 - 1:40 **Lunch Break**
1:40 - 3:00 **Ray Tracing**
Chair: Kadi Bouatouch
- (1) **Hybrid Scheduling for Parallel Rendering using Coherent Ray Tasks**, E. Reinhard, A. Chalmers, and F. Jansen
 - (2) **Exploiting Frame Coherence with the Temporal Depth Buffer in a Distributed Computing Environment**, Timothy A. Davis and Edward W. Davis
- 3:00 - 3:30 **Coffee Break**
3:30 - 4:50 **Frameworks**
Chair: Sam Uselton
- (1) **Transparent Distributed Processing for Rendering**, P. Kipfer and P. Slusallek
 - (2) **Web-based Collaborative Visualization of Distributed and Parallel Simulation**, C. Bajaj, S. Cutchin

Tuesday, October 26

- 8:30 - 9:50 **Hardware**
Chair: David Ellsworth
- (1) **A Scalable COTS Image Combining Architecture**, A. Heirich and L. Moll
 - (2) **Interactive Volume Segmentation with the PAVLOV Architecture**, Kevin Kreeger and Arie Kaufman
- 9:50 - 10:20 **Coffee Break**
10:20 - 11:40 **Radiosity**
Chair: Erik Jansen
- (1) **On the Partitionability of Hierarchical Radiosity**, Robert Garmann
 - (2) **Overlapping Multi-Processing and Graphics Hardware Acceleration: Performance Evaluation**, Xavier Cavin, Laurent Alonso, and Jean-Claude Paul
- 11:40 - 1:40 **Lunch Break**
1:40 - 3:00 **Partitioning and Isosurface**
Chair: Kwan-Liu Ma
- (1) **Dynamic View-Dependent Partitioning of Grids with Complex Boundaries for Object-Order Rendering Techniques**, Lance C. Burton, Raghu Machiraju, and Donna S. Reese
 - (2) **Parallel Accelerated Isocontouring for Out-of-Core Visualization**, C.L. Bajaj, V.Pascucci, D. Thompson, and X.Y. Zhang
- 3:00 - 3:30 **Coffee Break**
3:30 - 5:00 **Panel: State of the Art in Parallel and Distributed Visualization Systems**
Chair: Peter Williams
- Greg Abram
Robert Haimes
Mike Krogh
Will Schroeder
- 5:00 **Closing Remarks**

For more information, see: <http://www.acl.lanl.gov/PVG99/pvg99.html>

Symposium Co-Chairs

James Ahrens, *Los Alamos National Laboratory*
Alan Chalmers, *University of Bristol*
Han-Wei Shen, *MRJ/NASA Ames, The Ohio State University*

Peggy Li, *JPL*
Kwan-Liu Ma, *University of California, Davis*
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Arie Kaufman, *SUNY Stony Brook*
Kai Li, *Princeton*

SYMPOSIUM & TUTORIAL RECEPTION

Monday Evening 7:00pm - 9:00pm

Poolside Pavilion

VISUALIZATION '99 BOFS

IRIS EXPLORER USER'S MEETING

Thursday, October 28, 1999 • 7:00pm-8:30pm

Grand Peninsula Ballroom E, F, and G

Jeremy Walton, *The Numerical Algorithms Group Ltd*

jeremyw@nag.co.uk

http://www.nag.co.uk/Welcome_IEC.html

IRIS Explorer is a visualization toolkit and application builder available from The Numerical Algorithms Group (NAG) for major Unix platforms (including Linux) and Windows NT. The latest release (4.0) incorporates a variety of new features, including collaborative visualization (originally presented at IEEE visualization '96), improved VRML output and an enhanced user interface. This meeting gives users - and prospective users - a chance to hear the latest news about the system and user resources (such as the web-based module repository) from the development team itself.

VISUALIZATION TOOLKIT (VTK)

Thursday, October 28, 1999 • 7:00pm-8:30pm

Grand Peninsula Ballroom A, B, and C

The Visualization Toolkit (VTK) is an open source, freely available software system for 3D computer graphics, image processing, and visualization. VTK includes a textbook published by Prentice-Hall ("The Visualization Toolkit, An Object-Oriented Approach To 3D Graphics, 2nd edition" ISBN 0-13-954694-4), a C++ class library, and several interpreted interface layers including Tcl/Tk, Java, and Python. VTK has been implemented on nearly every Unix-based platform and PC's (Windows NT and Windows95/98). The design and implementation of the library has been strongly influenced by object-oriented principles. VTK is used around the world by academic, commercial, and government agencies.

IEEE Visualization '99 BOF Objectives:

- Review recent changes to VTK
- Discuss upcoming changes to VTK (version 2.4 & 3.0)
- Solicit ideas and proposals from the VTK community regarding future directions
- Meet with the VTK community and interested developers to exchange information
- Demonstrate selected VTK-based software

For information on the Technical Committee on
Visualization and Graphics conferences, publications, and programs, check

<http://www.cc.gatech.edu/gvu/tccg/>

CREATIVE APPLICATIONS LAB

Wednesday, 12:15pm - 8:00pm and Thursday, 9:00am - 4:00pm

Sandpebble Room

The Creative Applications Lab (CAL) is designed to let conference attendees interact with presentors on an individual basis. The CAL will have a variety of computers on which contributors can install their materials for attendees' experimentation and enjoyment. The CAL will be open in conjunction with demonstrations at Visualization '99. This is a unique opportunity for conference attendees to interface directly with conference contributors. Please come visit the CAL while you are at Vis '99!

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VISUALIZATION '99 CONFERENCE PROGRAM

Wednesday, Thursday, Friday

TECHNICAL CONFERENCE PROGRAM

	Wednesday			Thursday			Friday		
	<i>Grand Peninsula Ballroom D</i>	<i>Grand Peninsula Ballroom A, B, & C</i>	<i>Grand Peninsula Ballroom E, F, & G</i>	<i>Grand Peninsula Ballroom D</i>	<i>Grand Peninsula Ballroom A, B, & C</i>	<i>Grand Peninsula Ballroom E, F, & G</i>	<i>Grand Peninsula Ballroom D</i>	<i>Grand Peninsula Ballroom A, B, & C</i>	<i>Grand Peninsula Ballroom E, F, & G</i>
8:00am	Keynote Session			P5 <i>Papers: Isosurfaces, Glyphs, and Volumes</i>	P6 <i>Papers: Virtual Reality</i>	HT3 <i>Hot Topics: Data Capture, Modification, Mining and Transmission</i>	N3 <i>Panel: Automation or Interaction</i>	P11 <i>Papers: Mesh Techniques and Compression</i>	HT4 <i>Hot Topics: Visualization Systems and Virtual Reality</i>
9:00am	<i>Paul Smith & John van Rosendale</i> <i>Grand Peninsula Ballroom D</i>								
10:00am	N1 <i>Panel: Why the PC most pervasive visualization platform in 2001</i>	P1 <i>Papers: Large Scale Data Visualization</i>	C1 <i>Cases: Medical Data Visualization</i>	N2 <i>Panel: Sensory Design Issues as a Driving Problem for Visualization</i>	P7 <i>Papers: Volume Rendering</i>	C3 <i>Cases: Visualization Systems</i>	P12 <i>Papers: Flow Visualization</i>	P13 <i>Papers: Volume Rendering</i>	C5 <i>Cases: Information Visualization</i>
11:00am									
12:00pm									
1:00pm							Capstone Session <i>Rick Stevens</i> <i>Grand Peninsula Ballroom D</i>		
2:00pm	P2 <i>Papers: Mesh Compression Techniques</i>	P3 <i>Papers: Features, Images, and Metrics</i>	HT1 <i>Hot Topics: Volume Visualization</i>	P8 <i>Papers: Visualization Systems</i>	P9 <i>Papers: Vector and Tensor Visualization</i>	C4 <i>Cases: Airspace/Terrain and Sea-bed Visualization</i>			
3:00pm									
4:00pm	P4 <i>Papers: Rendering Techniques</i>	C2 <i>Cases: Flow Visualization</i>	HT2 <i>Hot Topics: Flow, Vector, and String Visualization</i>	P10 <i>Papers: Terrain Visualization</i>	C6 <i>Cases: Volume Visualization</i>				
5:00pm									

VIS'99 DEMONSTRATIONS & CAL open at 12:15pm Wednesday (*Sandpebble Room*)

Wednesday, 8:30 - 10:00am

KEYNOTE *Keynote Session: Data and Visualization Corridors, Paul Smith and John van Rosendale*

Wednesday, 10:15 - 12:15pm

N1 *Panel: "Why the PC will be the most pervasive visualization platform in 2001"*
Chair: Hanspeter Pfister
Panelists: Michael Cox
Peter N. Glaskowsky
Bill Lorensen
Richard Greco

P1 *Papers: Large Scale Data Visualization*
Chair: Hans Hagen
(1) Construction of Vector Field Hierarchies, Bjoern Heckel, Gunther H. Weber, Bernd Hamann, and Kenneth I. Joy
(2) Large Field Visualization With Demand-Driven Calculation, Patrick J. Moran, and Chris Henze
(3) Simplified Representation of Vector Fields, Alexandru Telea, and Jarke J. van Wijk,
(4) Hierarchical Parallel Coordinates for Exploration of Large Datasets, Ying-Huey Fua, Matthew O. Ward, and Elke A. Rundensteiner

C1 *Cases: Medical Data Visualization*
Chair: Kelly Gaither
(1) Interactive Exploration of Extra- and Intracranial Blood Vessels, Dirk Bartz, Wolfgang Straßer, Martin Skalej, and Dorothea Welte
(2) Digital Design of a Surgical Simulator for Interventional Magnetic Resonance Imaging, Terry Yoo, and Penny Rheingans
(3) Volume Rendering Based Interactive Navigation within the Human Colon, Ming Wan, Qingyu Tang, Arie Kaufman, Zhengrong Liang, and Mark Wax
(4) A Computer Animation Representing the Molecular Events of G protein-coupled Receptor Activation, Zoya Maslak, Douglas Steel, and Robert McDermott

KEYNOTE SESSION

Data and Visualization Corridors

Speakers: Paul Smith and John van Rosendale,
United States Department of Energy

In 1999, three workshops on data manipulation and visualization of large-scale scientific datasets were held. The workshop series, sponsored by the Department of Energy and the National Science Foundation, brought together experts in high-performance computing, scientific visualization, emerging computer technologies, physics, chemistry, materials science, and engineering. These experts worked to assess the needs of the scientific and engineering community, to identify current and projected capabilities, and to outline a federal research and development agenda in scientific visualization, human interfaces, and the manipulation of massive scientific datasets. The emerging concept, known as “Data and Visualization Corridors,” or DVCs, could transform the way science is practiced.

This talk will summarize the results of these workshops, laying out a vision for research and development aimed at dramatically improving data handling, scientific visualization, and collaborative scientific environments. First and foremost, the goal here is to meet the driving needs of large-scale simulation. A second goal is advancing scientific computing and scientific visualization more broadly. The trend toward improved computing and visualization environments needs to be nurtured now with tools and capabilities emerging from the information age.

One outcome of this series of workshops was the set of findings and recommendations:

- Scientific visualization is the best means available for making sense of large, complex scientific datasets.
- Current graphics and visualization technology cannot effectively cope with the volume or complexity of new scientific data; the gap between our ability to compute and our ability to make good use of the data is widening.
- There is a real need for design of effective human interfaces for 3D immersive environments, where conventional keyboards and mice are ineffective.
- I/O and data handling more generally remain fundamental bottlenecks.
- The private sector will not adequately address these problems in a reasonable time frame.
- A balanced, multi-agency federal program leveraging current commercial technologies and accelerating the research, development, and subsequent deployment of critical technologies could have major benefits to a number of critical federal mission areas.

There is a clear opportunity here for federal agencies to partner across disciplines in the development of Data and Visualization Corridors. Collaboration between agencies could avoid duplication of effort, lessons learned could be shared, and the economic clout of multiple agencies could be used to focus industrial research and development in nationally important directions. The need for DVCs and the scientific advances they will support can be clearly demonstrated. The achievement of the capabilities shown in the report is neither impossibly difficult nor prohibitively expensive—merely challenging. The issue is simply following through in a sustained way, and focusing the right resources in a timely fashion to achieve our objectives, following the technology road maps and timelines contained in this report.

CAPSTONE SESSION

ActiveSpaces: The Access Grid, Active Mural and Advanced Visualization Systems

Speaker: Rick Stevens, *Mathematics and Computer Science Division, Argonne National Laboratory, and Department of Computer Science, University of Chicago*

At Argonne, Chicago and elsewhere work has begun to explore the concept of integrated whole room scale visual environments. These environments consist of group work rooms that have been augmented with multiple displays including: large-format whole wall displays (e.g. ActiveMural our high-resolution rear projected tiled display), driven by PC clusters, or multi-processor visualization engines, semi-immersive or immersive displays (Workbenches, ImmersaDesks, CAVEs), multiple desktop devices, and multiple front projection systems. These rooms may also have active or passive tracking systems, multiple channels of audio support, and support for multiple wireless hand-held controllers and navigation devices. These room-sized environments can be linked via the national “Grid” to form compelling collaborative visualization environments (e.g. “The Access Grid”). We believe these systems represent a new type of visual application development target and delivery mechanism. We call these ensembles ActiveSpaces. In this talk I will explore with the audience some of the ideas we are working on to facilitate the delivery of high-end scientific visualization to groups of users and to create new types of electronically augmented spaces explicitly designed to support rapid collaborative exploration and visual analysis of complex data.

Biography:

Rick Stevens is the Deputy Associate Laboratory Director for Physical, Biological and Computing Sciences and Director, Mathematics and Computer Science Division at Argonne National Laboratory, Argonne, Illinois. He is also a Professor of Computer Science at the University of Chicago.

Professor Stevens is interested in the development of innovative tools and techniques that enable computational scientists to solve large-scale problems more effectively on the most advanced high-performance computers. Specifically, his research focuses on three principal areas: collaborative scientific visualization environments, high-performance computer architectures, and performance modeling.

In the area of collaborative scientific visualization, he is exploring the use of virtual reality in the visualization of scientific data and processes. His efforts include improving displays, recording, and playback of virtual reality experiences; developing new methods for tracking and control and close coupling with parallel supercomputers; and devising new ways of collaborating in virtual environments. Of particular interest to him is teleimmersion—strategies for synthesizing networking and multimedia technologies to enhance the development of wide-area collaborative computational science.

In the area of high-performance computers, Prof. Stevens is studying approaches to computing at the PetaFLOPs Scale, focusing on analysis, modeling, and simulation tools for these ultra-high-performance computers. He is also particularly interested in scientific algorithms and systems software for large-scale multithreaded computer architectures and for hierarchical processor and memory architectures.

In a related area, he is investigating analytic performance models that will help researchers understand the performance relationship between high-performance computer systems and scientific applications. Prof. Stevens’ goal is to enable scientific simulations to achieve the very high performance potential of next-generation computer architectures with deep memory hierarchies.

Wednesday, 1:45 - 3:45pm

P2 *Papers: Mesh Compression Techniques*
Chair: Greg Nielson

- (1) **Tetrahedral Mesh Compression with the Cut-Border Machine**, Stefan Gumhold, Stefan Guthe, and Wolfgang Straßer
- (2) **New Quadric Metric for Simplifying Meshes with Appearance Attributes**, Hugues H. Hoppe
- (3) **Progressive Compression of Arbitrary Triangular Meshes**, Daniel Cohen-Or, David Levin, and Offir Remez
- (4) **Efficient Compression of Non-Manifold Polygonal Meshes**, Andre P. Guezic, Frank Bossen, Gabriel Taubin, and Claudio Silva

P3 *Papers: Features, Images, and Metrics*
Chair: Frits Post

- (1) **Image Graphs - A Novel Approach to Visual Data Exploration**, Kwan-Liu Ma
- (2) **Forward Image Warping**, Baoquan Chen, Frank Dacheille, and Arie Kaufman
- (3) **Structured Spatial Domain Image and Data Comparison Metrics**, Nivedita Sahasrabudhe, John E. West, Raghu Machiraju, and, J. Mark Janus
- (4) **Feature Comparisons Of 3-D Vector Fields Using Earth Movers Distance**, Rajesh K. Batra, and Lambertus Hesselink

HT1 *Hot Topics Session I : Volume Visualization*
Chair: Markus Gross

- (1) **VOXBLT: An Efficient and High Quality Splat Primitive**, Jian Huang, Klaus Müller, Naeem Shareef, and Roger Crawfis
- (2) **IBR-Assisted Volume Rendering**, Klaus Müller, Naeem Shareef, Jian Huang, and Roger Crawfis
- (3) **RACE II: A State-Of-The-Art Volume Graphics and Volume Visualization Accelerator For PCs**, Harvey Ray, and Deborah Silver
- (4) **Implementation of Algorithmically Optimized Volume Rendering on FPGA-Hardware**, B. Vettermann, J. Hesser, R. Männer, H. Simmler, and A. Kugel
- (5) **Real-time Simulation of Physically Realistic Global Deformation**, Yan Zhuang, and John Canny
- (6) **CellFast: Interactive Unstructured Volume Rendering**, Craig M. Wittenbrink

Wednesday, 4:00 - 5:30pm

P4 *Papers: Rendering Techniques*
Chair: Thomas Ertl

- (1) **Rendering on a Budget: A Framework for Time-Critical Rendering**, James T. Klosowski, and Claudio T. Silva
- (2) **Time Critical Multiresolution Scene Rendering**, Enrico Gobbetti, and Eric Bouvier
- (3) **Skip Strips: Maintaining Triangle Strips for View-dependent Rendering**, Jihad A. El-Sana, Elvir Azanli, and Amitabh Varshney

G2 *Cases: Flow Visualization*
Chair: Bob Haines

- (1) **Visualizing Gridded Datasets with Large Number of Missing Values**, Suzana Djurcilov and Alex Pang
- (2) **Detecting Vortical Phenomena in Vector Data by Medium-Scale Correlation**, H.-G. Pagendarm, B. Henne, and M. Rutten
- (3) **Interactive Visualization of Fluid Dynamics Simulations in Locally Refined Cartesian Grids**, Martin Schulz, Frank Recks, W. Bartelheimer, and Thomas Ertl

HT2 *Hot Topics Session II : Flow, Vector, and String Visualization*
Chair: Craig M. Wittenbrink

- (1) **Topology Based Vector Field Comparisons Using Graph Methods**, Rajesh K. Batra, Kerstin Kling, and Lambertus Hesselink
- (2) **Visualization in string theory**, Stanislav Klimenko, Igor Nikitin, Valery Burkin, and Hans Hagen
- (3) **Visualizing Complicated Dynamics**, D. Bürkle, M. Dellnitz, O. Junge, M. Rumpf, and M. Spielberg
- (4) **Visualization of the Currents on the Printed circuit Boards**, Hiroyuki Takahashi, Seiji Hayano, and Yoshifuru Saito
- (5) **A Texture Mapping Approach for the Visualization of Special Relativity**, Daniel Weiskopf
- (6) **Ranking Strategies in Wavelet Representation of Vector Fields**, Bala Krishna Nakshatrala, Raghu Machiraju, David Thompson, and Michael Cox

CONFERENCE RECEPTION

Wednesday Evening 7:00pm - 9:00pm

Grand Peninsula Ballroom D

Thursday, 8:30 - 10:00am

P5 *Papers: Isosurfaces, Glyphs, and Volumes*
Chair: Bill Lorensen

- (1) **Isosurface Extraction Techniques for Web-based Volume Visualization**, Klaus D. Engel, Rüdiger Westermann, and Thomas Ertl
- (2) **Isosurface Extraction in Time-varying Fields Using a Temporal Branch-on-Need Tree (T-BON)**, Philip M. Sutton, and Charles D. Hansen
- (3) **Interactive Lens Visualization Techniques**, Christopher D. Shaw, James A. Hall, David S. Ebert, and Aaron Roberts

P6 *Papers: Virtual Reality*
Chair: Jeorg Meyer

- (1) **Multi-Projector Displays Using Camera-Based Registration**, Ramesh Raskar, Michael S. Brown, Ruigang Yang, Wei-Chao Chen, Greg Welch, Herman Towles, Brent Seales, and Henry Fuchs
- (2) **Exploring Geo-Scientific Data in Virtual Environments**, Bernd Fröhlich, Stephen Barrass, Bjoern Zehner, John Plate, and Martin Göbel
- (3) **Animating Wrinkles on Clothes**, Sunil Hadap, Endre Bangarter, Pascal Volino, and Nadia Magnenat-Thalmann

HT3 *Hot Topics Session III : Data Capture, Modification, Mining, and Transmission*
Chair: Amitabh Varshney

- (1) **Multiple Omni-Directional Vision Sensors (ODVS) Based Visual Modeling Approach**, Kim C. Ng, Hiroshi Ishiguro, and Mohan M. Trivedi
- (2) **Measurement of Perceived Objects**, Wes Bethel and Jacob Bastacky
- (3) **Procedural Generation of Triangulation-Based Visualizations**, Gunther H. Weber, Bjoern Heckel, Bernd Hamann, and Kenneth I. Joy
- (4) **Surface Reconstruction from Unorganized Points Using Self-Organizing Neural Networks**, Yizhou Yu
- (5) **ActiveNews: Automatic creation of dynamic news articles**, Phillip Tionsgon, Louis Weitzman, and Lawrence Wang
- (6) **The Wavelet Stream - Progressive Transmission of Compressed Light Field Data**, Ingmar Peter, and Wolfgang Straßer

Thursday, 10:15 - 12:15pm

N2 *Panel: "Sensory Design Issues as a Driving Problem for Visualization Research"*

Chair: J. Edward Swan II

*Panelists: Victoria Interrante
Theresa-Marie Rhine
David Laidlaw
Tamara Munzner*

P7 *Papers: Volume Rendering*
Chair: Hans-Peter Pfister

- (1) **Hue-Balls and Lit-Tensors for Direct Volume Rendering of Diffusion Tensor Fields**, Gordon L. Kindlmann, and David M. Weinstein
- (2) **Mixing Translucent Polygons with Volumes**, Kevin A. Kreeger, and Arie Kaufman
- (3) **Multi-resolution Multi-field Ray Tracing: A mathematical overview**, Charidimos E. Gasparakis
- (4) **Enabling Classification and Shading for 3D Texture Mapping Based Volume Rendering Using OpenGL and Extension**, Michael Meissner, Ulrich Hoffmann, and Wolfgang Straßer

C3 *Cases: Visualization Systems*
Chair: Leila DeFloriani

- (1) **Visual Debugging of Visualization Software: A Case Study for Particle Systems**, Patricia Crossno, and Edward Angel
- (2) **DELTA's Virtual Physics Laboratory A Comprehensive Learning Platform on Physics & Astronomy**, Sepideh Chakaveh, Udo Zlender, Detlef Skaley, Konstantinos Fostiropoulos, and Dieter Breitschwerdt
- (3) **VizCraft: A Multidimensional Visualization Tool for Aircraft Configuration Design**, A. Goel, C. Baker, C. Shaffer, B. Grossman, R. Haftka, W. Mason, and L. Watson
- (4) **Design and Implementation of an Immersive Geoscience Toolkit**, Christophe Winkler, Fabien Bosquet, Xavier Cavin, and Jean-Claude Paul

Thursday, 1:45 - 3:45pm

P8 *Papers: Visualization Systems*
Chair: Bill Hibbard

- (1) **A Distributed Graphics System for Large Tiled Displays**, Greg Humphreys, and Pat Hanrahan
- (2) **A Multi-Threaded Streaming Pipeline Architecture for Large Structured Data Sets**, Charles Law, Kenneth M. Martin, William J. Schroeder, and Joshua Temkin
- (3) **Interactive Exploration of Volume Line Integral Convolution Based on 3D-Texture Mapping**, Christof Rezk-Salama, Peter Hastreiter, Teitzel Christian, and Thomas Ertl
- (4) **A Framework for Assisted Exploration with Collaboration**, Eric A. Wernert, and Andrew J. Hanson

P9 *Papers: Vector and Tensor Visualization*
Chair: Stas Klimenko

- (1) **Tensorlines: Advection-Diffusion based Propagation through Diffusion Tensor Fields**, David M. Weinstein, Gordon L. Kindlmann, and Eric C. Lundberg
- (2) **Visualizing Planar Vector Fields with Normal Component Using Line Integral Convolution**, Gerik Scheuermann, Holger Burbach, and Hans Hagen
- (3) **The "Parallel Vectors" Operator - A Vector Field Visualization Primitive**, Ronald Peikert, and Martin Roth
- (4) **C1-Interpolation for Vector Field Topology Visualization**, Gerik Scheuermann, Xavier Tricoche, and Hans Hagen

C4 *Cases: Airspace, Terrain and Sea-bed Visualization*
Chair: Robert Moorhead

- (1) **Visualization of Conflicts and Resolutions in a "Free Flight" Scenario**, Ronald Azuma, Howard Neely III, Mike Daily, and Mario Correa
- (2) **Real-Time Visualization of Scalably Large Collections of Heterogeneous Objects**, Douglass Davis, William Ribarsky, T.Y. Jiang, Nickolas Faust, and Sean Ho
- (3) **Geo-Spatial Visualization for Situational Awareness**, Eliot Feibush, Nikhil Gagvani, and Daniel Williams
- (4) **Whole Field Modelling-Effective Real-Time and Post Survey Visualization of Underwater Pipelines**, Paul Chapman, Derek Wills, Peter Stevens, and Graham Brookes

Thursday, 4:00 - 5:30pm

P10 *Papers: Terrain Visualization*
Chair: Daniel Cohen-Or

- (1) Optimal Triangular Haar Bases for Spherical Data, Georges-Pierre Bonneau
- (2) Cracking the Cracking Problem with Coons Patches, Gregory M. Nielson, Dave Holliday, and Tom Roxborough
- (3) LOD-Sprite Technique for Accelerated Terrain Rendering, Baoquan Chen, J. Edward Swan II, Eddy Kuo, and Arie Kaufman

G6 *Cases: Volume Visualization*
Chair: Victoria Interrante

- (1) Automating Transfer Function Design for Comprehensible Volume Rendering Based on 3D Field Topology Analysis, Issei Fujishiro, Taeko Azuma, and Yuriko Takeshima
- (2) Accelerating 3D Convolution using Graphics Hardware, Matthias Hopf, and Thomas Ertl
- (3) Visualizing Simulated Room Fires, Jayesh Govindarajan, Matthew Ward, and Jonathan Barnett

Friday, 8:30 - 10:00am

N3 *Panel: "Automation vs. Interaction: What's Best for Big Data?"*

Chair: David Kenwright
Panelists: David Banks
Steve Bryson
Robert Haimes
Robert van Liere
Sam Uzelton

P11 *Papers: Mesh Techniques and Compression*
Chair: Dan Bergeron

- (1) Implant Sprays: Compression of Progressive Tetrahedral Mesh Connectivity, Renato B. Pajarola, Jarek Rossignac, and Andrzej Szymczak
- (2) Progressive Compression and Transmission of Arbitrary Triangular Meshes, Chandrajit L. Bajaj, Valerio Pascucci, and Guozhong Zhuang
- (3) Spiraling Edge: Fast Surface Reconstruction from Partially Organized Sample Points, Patricia J. Crossno, and Edward S. Angel

HT4 *Hot Topics Session IV : Visualization Systems and Virtual Reality*
Chair: Chris Johnson

- (1) A Function-Based Data Model for Visualization, Lloyd A. Treinish
- (2) Accelerating the AVS/Express multi-block visualization macros, Jean M. Favre
- (3) Virtual Pottery Making, Varol Kaptan, and Veysi Isler
- (4) Visualization of Bayesian Belief Networks, Juan-Diego Zapata-Rivera, Eric Neufeld, and Jim E. Greer
- (5) The AVS Virtual Reality Viewer, Eddy Kuo, Marco Lanzagorta, Rob Rosenberg, Simon Julier, Josh Summers, and Christopher Scannell
- (6) Putting You In The Picture: Enhancing Visualization With A Virtual Environment, D.R.S. Boyd, J.R. Gallop, J.P.R.B. Walton

Friday, 10:15 - 12:15pm

P12 *Papers: Flow Visualization*
Chair: David Banks

- (1) Anisotropic Nonlinear Diffusion in Flow Visualization, Tobias Preusser, and Martin Rumpf
- (2) Visualizing Multivalued Data from 2D Incompressible Flows Using Concepts from Painting, R.M. Kirby, H. Marmanis, and David H. Laidlaw
- (3) PLIC: Bridging the Gap Between Streamlines and LIC, Vivek Verma, David Kao, and Alex Pang
- (4) Collapsing Flow Topology Using Area Metrics, Wim C. de Leeuw, and Robert van Liere

P13 *Papers: Volume Rendering*
Chair: Nelson Max

- (1) Multiresolution Techniques for Interactive Texture-based Volume Visualization, Eric C. La Mar, Bernd Hamann, and Kenneth I. Joy
- (2) Splatting Without The Blur, Klaus Mueller, Torsten Möller, and Roger Crawfis
- (3) A Fast Volume Rendering Algorithm for Time-Varying Fields Using a Time Space Partitioning (TSP) Tree, Han-Wei Shen, Ling-Jen Chiang, and Kwan-Liu Ma
- (4) High Performance Presence-Accelerated Ray Casting, Ming Wan, Arie E. Kaufman, and Steve Bryson

G5 *Cases: Information Visualization*
Chair: George Bonneau

- (1) Visualizing the Evolution of a Subject Domain: A Case Study, Chaomei Chen, and Leslie Carr
- (2) An Interactive Framework for Visualizing Foreign Currency Exchange Options, D.L. Gresh, B.E. Rogowitz, M.S. Tignor, and E.J. Mayland
- (3) Visualizing Large-Scale Telecommunication Networks and Services, Eleftherios E. Koutsofios, Stephen C. North, Russell Truscott, and Daniel A. Keim
- (4) Detecting Null Alleles with Vasarely Charts, Carl Manaster, Elizabeth Nanthakumar, and Phillip Morin

Friday, 1:00 - 3:00pm

CAPSTONE *Capstone Session: Awards for Best Paper, Best Panel, Best Hot Topics, and Best Case Study*
Capstone Address: Active Spaces: the Access Grid, Active Mural and Advanced Visualization Systems, Rick Stevens

VISUALIZATION '99 DEMONSTRATIONS

Wednesday, 12:15pm - 8:00pm and Thursday, 9:00am - 4:00pm

Sandpebble Room

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We invite you to participate in IEEE Visualization 2000 by submitting your original research through papers, panels, case studies, late breaking hot topics, and demonstrations. Share your perspectives through panels and workshops, or your experience through tutorials. Please select the forum appropriate to your submission, where it will be considered by your peers for presentation. Particular focus on volume visualization and information visualization are addressed in special two-day symposia.

For further information on the conference, evolving symposia, or on submissions, contact:

Charles Hansen, Conference Co-Chair, *University of Utah* • 801-581-3154 • Fax: 801-581-5843 • hansen@cs.utah.edu

Chris Johnson, Conference Co-Chair, *University of Utah* • 801-581-0207 • Fax: 801-581-0056 • crj@cs.utah.edu

Steve Bryson, Conference Co-Chair, *NASA Ames Research Center* • 650-604-4524 • Fax: 650-604-3957 • bryson@nas.nasa.gov

or see: URL: <http://www.erc.msstate.edu/vis00>

Paper Submissions (*due March 31, 2000*)

Papers are solicited that present research results related to all areas of visualization. Original papers should be limited to 5,000 words. The submission of NTSC VHS video (up to 5 minutes in length) to accompany the paper is strongly recommended. Please submit 7 copies of all materials. An electronic abstract must be sent through the conference website for each submission. Accepted papers will be included in the conference proceedings; the videos will be included in the conference video proceedings.

Panel Proposals (*due March 31, 2000*)

Panels should address the most important issues in visualization today. Panelists should be experts in their fields who can discuss the challenges of visualization, and engage the audience and fellow panel members in a stimulating, interactive debate. Panel proposals should describe the topic to be addressed and identify the prospective panelists. Each panelist should include a position statement on the topic and a short biography, the total of which should be limited to 500 words. The statements will be included in the conference proceedings.

Case Study Proposals (*due March 31, 2000*)

Case studies are reports on how visualization has contributed to the analysis of data in actual applications or studies of the visualization process. A short paper limited to 2500 words (maximum 4 pages B/W plus 1 page color) will be included in the conference proceedings. Images and/or NTSC VHS video to accompany the paper are recommended; the video will be included in the conference video proceedings. Please submit six copies of all materials.

Late-Breaking Hot Topics Proposals

Submissions will be accepted on Late Breaking "Hot Topics" that pertain to all areas of Visualization. These submissions must be original, may show work in progress, and may not exceed 2000 words or a maximum of 4 pages including images. Images and/or NTSC VHS video to accompany the paper are recommended; the video will be included in the conference video proceedings. Accepted papers will be published and distributed at the conference. Authors of accepted papers will have an opportunity to submit a revised paper. Submissions will be done electronically.

Tutorial Proposals (*due March 31, 2000*)

Half-day and full-day course proposals are invited for visualization systems, methods, and application areas. Tutorials will be offered Sunday, Monday, and Tuesday.

Mini-Workshop and Birds-of-a-Feather Proposals

(*due March 31, 2000*)

Proposals may be submitted for Mini-Workshops and evening Birds-Of-A-Feather (BOF) gatherings on visualization methods or application areas. They should deal with state-of-the-art topics and involve experts in the field. Discipline-focused proposals devoted to a particular discipline's methods and needs are encouraged.

Demonstration Proposals

IEEE Visualization 2000 is a unique opportunity to present your products or research to visualization experts from a wide variety of fields. We invite demonstrations of commercial hardware, software, integrated systems peripherals, and literature, as well as academic research. We encourage demonstrators to have technical representatives in attendance.

Creative Applications Lab (*due July 15, 2000*)

The Creative Applications Lab (CAL) is designed to let presenters interact with conference attendees on an individual basis. The CAL will have a variety of computers on which the contributors can install their materials for attendees' experimentation and enjoyment. The CAL will be open in conjunction with the demonstrations at Visualization 2000.

Co-located with IEEE Visualization 2000 are:

IEEE/SIGGRAPH 2000 Symposium on Volume Visualization (VoVis 2000) (*submission deadline March 31, 2000*)

Papers in all areas of volume visualization and graphics are solicited for the 2000 Volume Visualization and Graphics Symposium. <http://www.cis.ohio-state.edu/volviz/volviz00.html>

IEEE 2000 Symposium on Information Visualization (InfoVis 2000) (*submission deadline March 31, 2000*)

Papers, panels and case studies concentrating on issues specific to abstract information visualization. <http://www.infovis.org/infovis00>