Tutorial: Seeing in 3D

Level: Beginner

Most people, even technical draftsmen, designers and computer graphics programmers, find it very difficult to visualise 3D shapes well enough to reason about them. This course demonstrates the problem and takes attendees through a series of exercises that help them acquire this important practical skill.

“Stand a cube on its corner. What is the shape of a horizontal cross-section taken at half the height of this object?” About four percent of human beings can reason about 3D space well enough to answer this question easily and with confidence. Most of us enter a state of panic when confronted by 3D problems. Yet it is possible to train yourself to think and visualize in 3D. This course helps attendees start thinking in 3D. Once they have the basic principles, they can develop the skill independently.

Prerequisites

Familiarity with some basic geometric ideas (for example, two planes meet in a straight line). Also helpful: awareness of how to find distances with Pythagoras’ theorem, but this is used for only a few exercises, and the course can be understood without mathematics.

Intended Audience

Graphic artists, engineers, designers, computer graphics programmers, and students interested in graphics, drawing, or sculpture.

Instructor Bio

Geoff Wyvill, University of Otago

Well known in SIGGRAPH circles, Geoff Wyvill has contributed technical presentations, artworks, and animation to many conferences. He is director of computer graphics research at the University of Otago and a director of Animation Research Limited, which makes commercial animation and animation software for sports. He has a BA in physics from Oxford University and an MSc and PhD in computer science from Bradford University. Over many years, he has encouraged scientists to develop artistic pursuits and artists to learn science. He has published over 100 technical articles and papers, and given numerous invited talks and courses.

Runs from 9:15 to 16:30, Lunch at 12:15

CGI Welcome Reception at 19:00

Harbour Room, hors d’oeuvres will be served.
8:45 — 9:15 CGI Opening

9:15 — 10:40 CGI Keynote Speaker
Gavin Miller, Adobe

10:45 — 12:15 Papers

Incorporating object-centered sampling and Delaunay tetrahedrization for visual hull reconstruction Xin Liu, Marina L. Gavrilova, Jon Rokne

Creating MPU Implicit Surfaces from Unoriented Point Sets with Orientation Inference Yi-Ling Chen, Shang-Hong Lai

Variational tetrahedral mesh generation from discrete volume data J. Dardenne, S. Valette, N. Siauve, N. Burais, R. Prost

Streaming Surface Sampling using Gaussian Epsilon-nets Pablo Diaz-Gutierrez, Jonas Bösch, Renato Pajarola, M. Gopi

Maximal Independent Set Graph Partitions for Representations of Body-Centered Cubic Lattices Kenny Erleben

12:30 — 13:50 Lunch

14:00 — 15:30 Papers

Dynamic Collage - A New Method for Browsing Massive Photo Collections Yingzhen Yang, Yichen Wei, Chunxiao Liu, Qunsheng Peng, Yasuyuki Matsushita

Automatic View Selection through Depth-Based View Stability Analysis Pere-Pau Vázquez

An information theoretic approach to camera control for crowded scenes Cagatay Turkay, Emre Koc, Selim Balci soy

Pick-by-Vision: Augmented Reality supported Order Picking Rupert Reif, Willibald A. Günthner

Realistic Real-Time Sound Re-Synthesis and Processing for Interactive Virtual Worlds Fernando Trebien, Manuel M. Oliveira

16:00 — 17:30 Papers

Fragment Based Responsive Character Motion for Interactive Games Xi Cheng, Gengdai Liu, Zhigeng Pan, Bing Tang

Real-time falling animation with active and protective responses Zhigeng Pan, Xi Cheng, Wenzhi Chen, Gengdai Liu, Bing Tang

Efficient motion data indexing and retrieval with local similarity measure of motion strings Shuangyuan Wu, Shihong Xia, Zhaoqi Wang, Chunpeng Li

Motion Constraint Daniel Raunhardt, Ronan Boullic

18:30–20:00 CAe / CGI Opening Reception

Ballroom Foyer, hors d’oeuvres will be served.

20:00-21:30 Art Show

Ascot room
9:15 — 10:40  **Shared Keynote Speaker**
Carlo H. Séquin, UC Berkeley

10:45 — 12:15  **Papers**

- **Fluid-based Hatching for Tone Mapping in Line Illustrations**  
  Afonso Paiva, Emilio Vital Brazil, Fabiano Petroneto, Mario Costa Sousa

- **An extended GPU radiosity solver including diffuse and specular reflectance and transmission**  
  Günter Wallner

- **High-Quality Brightness Enhancement Functions for Real-Time Reverse Tone Mapping**  
  Rafael Pacheco Kovaleski, Manuel M. Oliveira

- **Towards Multi-perspective Rasterization**  
  Xuan Yu, Jingyi Yu, Leonard McMillan

- **Fast Real-time Caustics from Height Fields**  
  Cem Yuksel, John Keyser

12:30 — 13:50  **Lunch with Speaker**
Werner Purgathofer, Vienna University of Technology

14:00 — 15:30  **Papers**

- **Compact Real-Time Modeling of Seated Humans by Video Sprite Sequence Quantization**  
  Chun Jia, Voicu Popescu

- **Feature-Rich Distance-Based Terrain Synthesis**  
  Brennan Rusnell, David Mould, Mark Eramian

- **Feature Enhancement by Volumetric Unsharp Masking**  
  Yubo Tao, Hai Lin, Hujun Bao, Feng Dong, Gordon Clapworthy

- **Adaptive Smooth Surface Fitting with Manifolds**  
  Cindy Grimm, Tao Ju, Ly Phan, John Hughes

- **Dual-RBF based Surface Reconstruction**  
  Yuxu Lin, Chun Chen, Mingli Song, Zicheng Liu

16:00 — 17:30  **Papers**

- **Mr-SDM: a Novel Statistical Deformable Model for Object Deformation**  
  Qizhen He, Horace H. S. Ip, Jun Feng And Xianbin Cao

- **Generating Anatomical Substructures for Physically-Based Facial Animation Part 1: A Methodology for Skull Fitting**  
  Olusola Aina

- **Interactive skeletonization of intensity volumes**  
  Sasakthi S. Abeyesinghe, Tao Ju

- **Light Source Estimation of Outdoor Scenes for Mixed Reality**  
  Yanli Liu, Xueying Qin, Songhua Xu, Eiichiro Nakamae, Qunsheng Peng

19:30—21:30  **Banquet at University of Victoria**
Transfer at 18:00 to UVic Faculty Club
Speaker: Andrew Glassner
Dinner Entertainment: The Jan Stirling Jazz Trio
8:45 — 9:15 CAe Opening

9:15 — 10:40 Shared Keynote Speaker
Carlo H. Séquin, UC Berkeley

10:45 — 12:15 Using Curves
Magnetic Curves: Curvature-Controlled Aesthetic Curves Using Magnetic Fields Ling Xu and David Mould
A Painterly Rendering on Stroke Profile and Database SangHyun Seo, JinWan Par, and KyungHyun Yoon
Generalized Descriptions for the Procedural Modeling of Ancient East Asian Buildings Soon Tee Teoh

12:30 — 13:50 Lunch with Speaker
Werner Purgathofer, Vienna University of Technology

14:00 — 15:30 Depicting the Natural World
Controlling Color Regions of Leaves with Painting Techniques for Landscape Arts Yasuhiro Akagi, Mitsunori Kataama, and Katsuhiko Kitajima
Automatic Views of Natural Scenes Margarita Bratkova, William B. Thompson, and Peter Shirley
Style Nodes for Hierarchical Tree-Based Implicit Surface Modelling Pauline Jepp, Bruno Rodrigues De Araujo, Joaquim Jorge, Brian Wvill, and Mario Costa Sousa

16:00 — 17:30 Aesthetic Analyses
Comparing the Readability of Graph Layouts using Eyetracking and Task-oriented Analysis Stephan Diehl, Mathias Pohl, and Markus Schmitt
Image Statistics for Clustering Paintings According to Their Visual Appearance Christian Wallraven

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9:15 — 10:40 Shared Keynote Speaker
Andrew Fitzgibbon, Microsoft Research Cambridge

10:45 — 12:15 Papers

Inherent limitations on specular highlight analysis Lorcán Mac Manus, Masa-hiro Iwasaki, Katsuhiro Kanamori, Satoshi Sato, Neil A. Dodgson
Automatic Registration of Multiple Range Images Based on Cycle Space Fei Hou, Yue Qi, Xukun Shen, Shen Yang, Qinqing Zhao
Salient Spectral Geometric Features for Shape Matching and Retrieval Jiaxi Hu, Jing Hua
An Efficient Two Steps Algorithm for Wide Baseline Image Matching Cosmin Ancuti, Cadruta Orniana Ancuti, Philippe Bekaert

12:30 — 13:20 Lunch

13:30 — 15:00 Papers

Physically Based Simulation of Thin-shell Objects Burning Shigang Liu, Qiguang Liu, Tai An, Jizhou Sun, Qunsheng Peng
Real-Time Multi-Band Synthesis of Ocean Water with New Iterative Up-Sampling Technique E. Miandji, M. H. Sargazi Moghadam, Faramarz F. Samavati, M. Emdadi
Simulation of Swirling Bubbly Water Using Bubble Particles Ho-Young Lee, Jeong-Mo Hong, Chang-Hun Kim
Interchangeable SPH and Level set Method In Multiphase Fluid Ho-Young Lee, Jeong-Mo Hong, Chang-Hun Kim
A Fast Method for Simulating Destruction and the Generated Dust and Debris Takashi Imagire, Henry Johan, Tomoyuki Nishita

15:30 — 16:30 Shared Keynote Speaker
Andrew Pearce

16:30-16:45 CGI Closing

17:00 — 18:00 Art event: Screenings

20:00 — 24:00 Art event: Performance

CGI delegates are invited to attend the Computational Aesthetics art events this evening
9:15 — 10:40 Shared Keynote Speaker
Andrew Fitzgibbon, Microsoft Research Cambridge

10:45 — 12:15 Using and Modelling Cameras
CubeCam: A Screen-Space Camera Manipulation Tool Cindy Grimm, Nisha Sudarsanan Singh, and Karan Singh
ARTcams: Attributed Rational Tensor Cameras Chuan Li, Peter Hall, and Phillip Willis
Consistent Scene Illumination using a Chromatic Flash Jan Kautz and Min H. Kim

12:30 — 13:20 Lunch

14:00 — 15:30 Image Manipulation
Movie Posters from Video by Example Stephen Brooks
Adding Lighting and Viewing Effects to Digital Images Cindy Grimm
Contrast Brushes: Direct, Local, Contrast Adjustment Neil Dodgson, Mark Grundland, and Rahul Vohra

15:30 — 16:30 Shared Keynote Speaker
Andrew Pearce

17:00 — 18:00 Art event: Screenings

20:00 — 24:00 Art event: Performance
8:45 — 10:15 Automated Synthesis
Automated Landscape Painting in the Style of Bob Ross Craig Kaplan, S. Alex Kalaidjian, and Stephen Mann
Aesthetic Placement of Points Using Generalized Lloyd Relaxation Oliver Deussen

10:45 — 11:45 Aesthetics
Distinctive Parameters of Expressive Motion Lyn Bartram and Ai Nakatani
Aesthetic Appraisal of Art - From Eye Movements to Computers Christian Wallraven

11:45 — 12:45 CAe Keynote Speaker
Sheelagh Carpendale, University of Calgary

12:45 — 13:00 CAe Closing

13:00 — 14:00 Lunch
Art Show: Computer Installations
Opening: Wednesday 18.30-20.00 — Chelsea/Derby room
Running: Thursday and Friday daytime
1. Henrique Roscoe hol
2. Benjamin Forster Drawing Machine
3. Elif Ayiter Anatomia
4. Jerry Hushlak, Jeffrey Boyd, Christian Jacob, Scott Novakowski Intelligent Fans

Art Show: Print
Opening: Wednesday, 18:30–20:00, Foyer
Running: Thursday and Friday, daytimes
1. Murat Germen Chronophotography
2. The Luxury of Protest c/o Peter Crnokrak A_B_peace & terror etc.
3. Penousal Machado and Juan Romero Losing System Signature

Artist Presentations
Wednesday 20:00–22:00, Ascot Room
Each artist gets 20 minutes.
1. Mehrdad Garousi The Dancing Flowers
2. Florian Gruber, Nikolaus Hartmann, Thomas Lorenz and Christina Simmel Stroem — an audiovisual installation
3. Fernando Graca Penousal Machado Informal Stains: gestural painting
4. Jinsook Kim Motion Gestalt Grouping Principles for the Creative Process of Motion Graphics
5. Andres Wanner The Art Machine

Screenings
Fri. 17.00-18.00 – Ascot Room
The Creative Process of Motion Graphics
1. Anabela Costa VORTEX ROOM
2. Julie Andreyev Animal Lover
3. Seung-Chan Yang EXPECTED OR UNEXPECTED
4. Jim Bizzocchi Winterscape

Performance
Friday, 20:00–0:00, Ascot Room
Steve Gibson, Stfan Müller Arisona, Justin Love, Randy Adams, and Jim Olson Exploding, Plastic & Inevitable Redux
**CGI Organization**

*Conference Chairs*
Brian Wyvill, University of Victoria  
Nadia Magnenat-Thalmann (MIRALab, Switzerland)

*Program Chair*
Geoff Wyvill, University of Otago

*Webmaster*
Erwin de Groot

**CAe Organization**

*Conference Chair*
Neil Dodgson University of Cambridge, UK

*Local Organization Chair*
Brian Wyvill, University of Victoria, Canada

*Program Chairs, Technical Program*
Peter Hall, University of Bath, UK  
Oliver Deussen, University of Konstanz, Germany

*Program Chairs, Arts Program*
Steve Gibson, University of Victoria, Canada  
Gerry Hushlak, University of Calgary, Canada  
Jeffrey Shaw, University of New South Wales, Australia

*Publicity Chair*
Tobias Isenberg, University of Groningen, The Netherlands

*Administration (CAe and CGI)*
Shawna Wyvill, Victoria, Canada
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