COMPUTER GRAPHICS

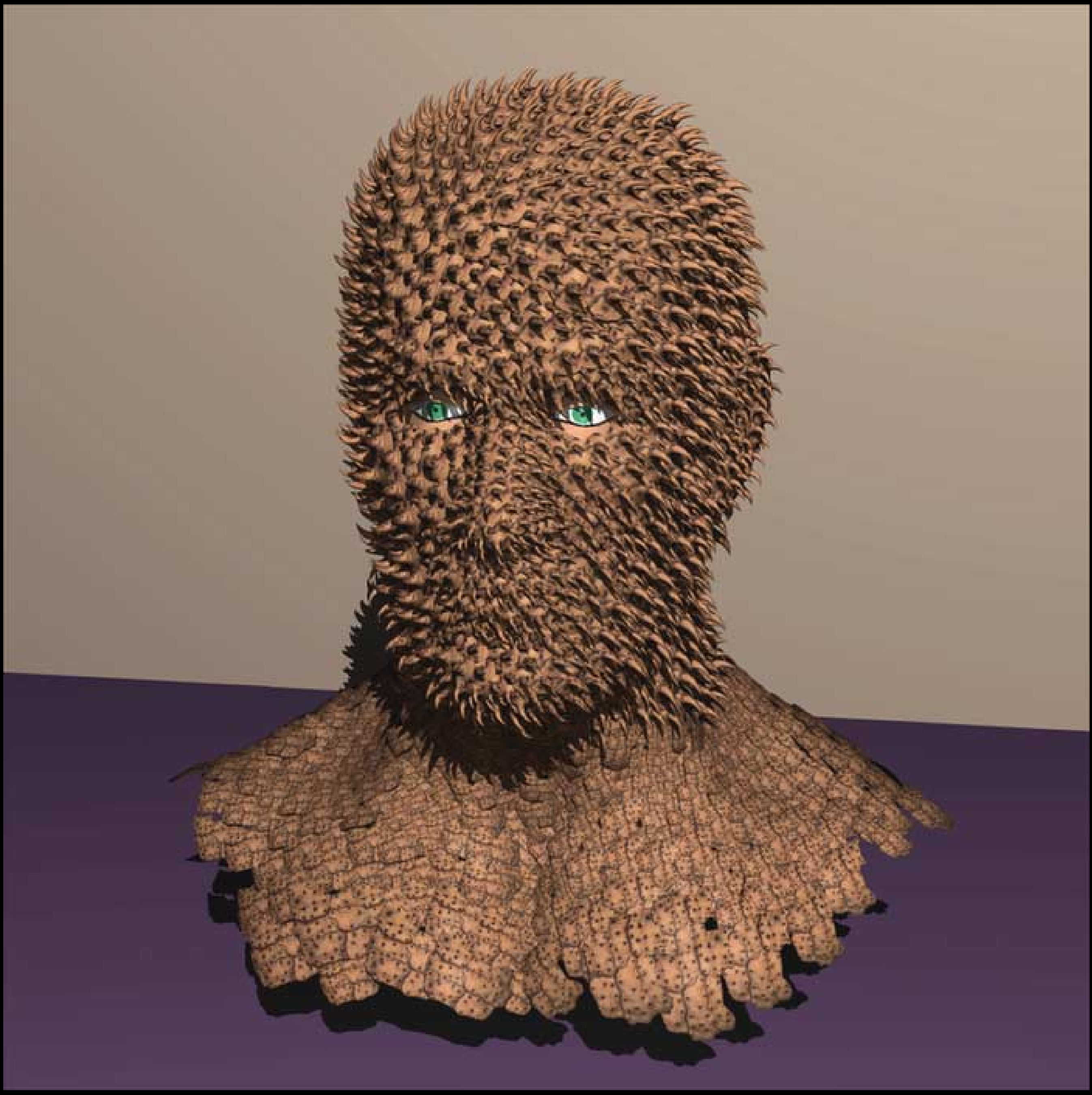
Annual Conference Series 1995

SIGGRAPH 95
Conference Proceedings
August 6 - 11, 1995
Edited by Robert Cook
Panels Chair Leo Hourvitz

A publication of ACM SIGGRAPH

Sponsored by the Association for Computing Machinery's Special Interest Group on Computer Graphics

PROCEEDINGS



Cover Image Credits

Front Cover

"Spike"
Copyright © 1995, Kurt W. Fleischer, David H. Laidlaw, Bena L. Currin, Alan H. Barr, and the Caltech Graphics Group.
To create this image of a thorn-covered bust, we used thousands of interacting geometric elements constrained to lie on a surface defined by a polygonal dataset. Each element tries to match the orientation of its neighbors, creating a flow field. The elements are then rendered as thorns (on the head) or patches (on the neck and chest). Note that the size of each thorn is relative to the local feature size on the dataset. Smaller thorns appear around the mouth and nose.
Cindy Ball helped with modeling this object, and Erik Winfree wrote some important sections of the code. The image was rendered using John Snyder's ray-tracer, with parallel extensions written by Mark Montague. Many thanks to Barbara Meier for textures, and to members of the Caltech Graphics Group for software and support.
Reference: "Cellular Texture Generation," Kurt W. Fleischer, David H. Laidlaw, Bena L. Currin, and Alan H. Barr, p. XXX.

Title Page

"Artistic Screening"
Copyright (c) 1995 Victor Ostromoukhov and Roger D. Hersch, Ecole Polytechnique Féde´rale de Lausanne
This picture shows the image of 10-year old Bella, daughter of Victor Ostromoukhov, and her favorite parakeet Gosha, halftoned with artistic screen elements created with the lettershapes "SIGGRAPH95." It illustrates how one can incorporate a logo or a message such as "SIGGRAPH95" into the screening layer of a halftone image. A rectangular screen tile made up of a large number of replications of the "SIGGRAPH95" character outline descriptions was created. A smooth transform was found, which maps the rectangular screen tile into a deformed screen tile incorporating many different screen element orientations and periods. The smoothly deformed screen tile offers a highly esthetic appearance and gives protection against forgery due to the fact that at high resolution, the artistically halftoned picture can hardly be rescanned without producing significant Moiré effects. Please note that while the screen tile underwent a strong non-linear transformation, the image was left untouched.
Reference: "Artistic Screening," Victor Ostromoukhov and R.D. Hersch, p. XXX.

Back Cover, top left

"Glossy Reflection and Transmission"
Copyright © 1995, James Arvo, Cornell University
These Phong-like glossy reflections and transmissions were computed analytically at each pixel. The new closed-form expressions were derived using a general recurrence relation for irradiance tensors. Albert Dicruttalo and Ben Trumbore assisted in modeling the stained glass window design by Elsa Schmid.
Reference: "Applications of Irradiance Tensors to the Simulation of Non-Lambertian Phenomena," James Arvo, p. XXX.

Back Cover, top right

"3 1/2 Months Before Birth"
Copyright © 1995 Georgios Sakas, Fraunhofer Institute of Computer Graphics
The image on the left shows a reconstruction of the face of a fetus. The data used for the reconstruction have been acquired 3 1/2 months before birth by means of 3D ultrasound. To the right, one can see a photograph of the baby 24 hours after birth. The comparison shows a significant similarity in appearance and facial expression. Several new techniques have been used for filtering and extracting a valid surface from the noisy, "fuzzy" ultrasonic data. The developed algorithms are implemented entirely in software (no special boards, graphics engine etc.) and allow a complete processing, filtering, reconstruction, smoothing and volume rendering of similar images within less than a minute on a Pentium PC or other similar platform.
Reference: "Extracting Surfaces From Fuzzy 3D-Ultrasound Data," Georgios Sakas and Stefan Walter, p. XXX.

Back Cover, middle left

"Human to Orangutan Volume Morph"
Copyright © 1994, Apostolos Lerios, Stanford University.
Three frames from a 3D volume morph, depicting the transformation of a human head on the left into an orangutan head on the right; the middle stage of the transformation is shown in the center. All three images are volume renderings of opacity volumes. The human and orangutan opacity volumes originated from CT scans. Using an interactive program, we manually specified corresponding features of these two volumes. Given this input, our software generated a sequence of opacity volumes which, when volume rendered, depict a smooth and realistic transformation of the human into the orangutan.
Acknowledgments: We used Philippe Lacroute's VolPack package for volume classification and rendering. The plastic cast of the orangutan head was lent to us by John W. Rick and was CT scanned with the help of Paul F. Hemler.
Reference: "Feature-Based Volume Metamorphosis," Apostolos Lerios, Chase D. Garfinkle, and Marc Levoy, p. XXX.

Back Cover, middle right

"Weeping Willow"
Jason Weber and Joseph Penn, Teletronics Intl. Inc. and Army Research Lab.
The tree is created using a set of parameters such as lengths, angles, curvatures, and variations at different recursive levels of growth. The model relies on basic geometric principles that the general user can easily measure and visualize. The willow pictured uses downward attraction and pruning to conform to the characteristic shape.
The original 3300x4500 image was created with the CREATION software (in-house) using IrisGL on a SGI workstation. At common resolutions, most trees can be rendered in real-time.
Reference: "Creation and Rendering of Realistic Trees," Jason Weber and Joseph Penn, p. XXX.

Back Cover, bottom left

"Bonfire with Smoke"
Copyright © 1995, Jos Stam, University of Toronto.
This image shows four frames from an animation of a fire with smoke. The creation of the flame and the smoke are governed by simple Arrhenius type reactions. The smoke and the flame are modelled as a superposition of 'warped blobs.' These blobs are moved using a superposition of smooth and turbulent wind fields. The interchange of light of the flame and the smoke with the rest of the environment is computed using a global illumination algorithm that includes gaseous blobs. Motion created using an interactive gas/fire modeller written by the author. The images were rendered using a modified ray-tracer with a blob tracer and global illumination preprocess. Hardware: Iris Indigo with RS4000 processor.
Reference: "Depicting Fire and other Gaseous Phenomena Using Diffusion Processes," Jos Stam and Eugene Fiume, p. XXX.

Back Cover, bottom right

"Interior With Intraocular Glare Simulation"
Copyright © 1995, Cornell University
Optical effects are added which mimic the glare perceived by viewers in interior lighting. The model is of the Center for Cultural Arts, San Francisco, Polshek & Partners Associates. It was created by Jason Ardizzone, and the radiosity solution was created by Brian Smits.
Reference: "Physically-Based Glare Effects for Digital Images," Greg Spencer, Peter Shirley, Kurt Zimmerman, and Donald P. Greenberg, p. XXX.