

MARCH/APRIL 1999



## VRML

(P) PN 81 - E(22)

3-MAR-1999 BSDS

BOSTON SPA  
LS23 7BQ

IEEE COMPUTER GRAPHICS AND APPLICATIONS

\*ETOC



4362.814300

VOL 19 PART 2

1/1

- Public Speaking in VR
- Glassner on string Crossings

|||||.....|||.....|||.....|||.....|||.....|||

\*\*\*\*\* CAR-RT SORT \*\* R-042

031999 306

00279

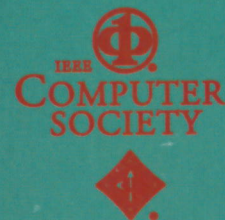
BRITISH LIBRARY (DSC-X9)

READMORE ACADEMIC SERVICES INC

SUITES 204-208

901 ROUTE 168

TURNERSVILLE NJ 08012-3210



## Articles

March/April 1999

Volume 19 Number 2

Published by the IEEE Computer Society

### VRML

- 17** **Guest Editor's Introduction: Virtual Reality Modeling Language**  
*Maureen Stone*
- 18** **Tutorial: Building Virtual Worlds with VRML**  
*David R. Nadeau*  
VRML makes it easy to create virtual worlds. This tutorial reviews VRML's syntax and features as well as its world construction and animation abilities.
- 30** **TerraVision II: Visualizing Massive Terrain Databases in VRML**  
*Martin Reddy, Yvan Leclerc, Lee Iverson, and Nat Bletter*  
To disseminate 3D maps and spatial data over the Web, the authors designed massive terrain data sets accessible through either a VRML browser or the customized TerraVision II browser.
- 39** **Large-Scale Mine Visualization Using VRML**  
*Keith Russ and Andrew Wetherelt*  
Traditionally, mine plans and sections in 2D stored 3D information. This article shows that using VRML to model this information leads to new, interactive methods of data visualization.
- 45** **"Bottom, Thou Art Translated": The Making of VRML Dream**  
*Stephen N. Matsuba and Bernie Roehl*  
Bringing virtual theater to the Web requires 3D graphics, efficient networking, and strong content. The authors discuss the VRML Dream Project, a real-time Internet performance.
- 52** **Developing the VRML 97 International Standard**  
*George S. Carson, Richard F. Puk, and Rikk Carey*  
VRML 97 arose from a cooperative effort between the standards and VRML communities. The methodology employed applies equally well to development of future standards.
- 59** **VRML Testing: Making VRML Worlds Look the Same Everywhere**  
*Mary Brady, Alden Dima, Len Gebase, Michael Kass, Carmelo Montanez-Rivera, and Lynne Rosenthal*  
NIST tools address problems posed by testing 3D graphics. This article explains the test development strategy and design issues in developing and delivering these testing tools.
- 68** **A Framework for Streaming Geometry in VRML**  
*André Guézic, Gabriel Taubin, Bill Horn, and Francis Lazarus*  
The authors introduce a framework for streaming geometry in VRML that eliminates the need to perform complete downloads of geometric models before starting to display them.
- 79** **Dynamics Modeling and Culling**  
*Stephen Cheney, Jeffrey Ichnowski, and David Forsyth*  
The tools described permit including large numbers of complex dynamic models in a VRML world easily and efficiently while maintaining high frame rates.

<http://computer.org/cga/>

ISSN 0272-1716

# TerraVision II: Visualizing Massive Terrain Databases in VRML

Martin Reddy, Yvan Leclerc, Lee Ivers  
and Nat Bletter  
*SRI International*

To disseminate 3D maps and spatial data over the Web, we designed massive terrain data sets accessible through either a VRML browser or the customized TerraVision II browser.

Researchers have increasingly turned to Virtual Reality Modeling Language (VRML) to represent geographic information. In VRML's early days, the result was a few toy examples that did not scale well, such as coarse, single-resolution elevation grids. Today, VRML is drawing more serious interest from researchers across the spectrum, including geographers, cartographers, geologists, and computer scientists, as the sidebar "Related Work" describes. As Theresa-Marie Rhyne noted, geographic information system (GIS) and scientific visualization tools have begun to expand into each other's

domains,<sup>1</sup> and VRML offers cartographers the potential to disseminate 3D map data over the World Wide Web. However, we have not seen useful large-scale VRML geographic data sets.

We aim to enable visualization of near-real-time 3D models of terrain that can be on the order of gigabytes. This might include digital terrain imagery for particular regions, elevation models and auxiliary information for geographic analysis.

The following scenario indicates the type of information required. Say a user wants to find a particular city in a particular city. Her journey begins with a view of the earth viewed from space. This view is mapped with satellite imagery of 100-meter resolution—that is, each pixel in the texture represents a region on the planet's surface covering one square kilometer. To find the city, the user first rotates the earth

## Related Work

Currently, interesting and significant work addresses the problem of representing geographic data in VRML. In the earth sciences, Kate Moore described the work of the Virtual Field Course (VFC) project,<sup>1</sup> which is developing software tools to familiarize students with fieldwork locations and aid data collection and analysis. The VFC project uses VRML and Java to provide interactive 2D and 3D views of geo-referenced data to enhance students' cognition of the real environment.

The US Naval Postgraduate School is currently working on a project to develop a 3D model of the Monterey Bay National Marine Sanctuary. They aim to create a VRML representation of the sanctuary based on raw bathymetry (below sea level) data for a 2.5 × 2.5 degree region of the bay. Their representation uses multiresolution techniques to deliver these large data amounts over a 28K modem connection.

Michael Abernathy and Sam Shaw described their work using VRML to visualize the 197-mile relay race through the San Francisco Bay Area.<sup>2</sup> They did this using standard USGS (USGS) 7.5 arc min digital elevation models (DEMs) for the terrain geometry and geo-referenced satellite imagery draped over the terrain. Their system also used Global Positioning System (GPS) input to create a line representing the race's course over the terrain.

## References

1. K. Moore, "Interactive Virtual Environment for Field Course Work," *British Cartographic Society*, 1998, available at <http://www.geog.le.ac.uk/~kmoore/>
2. M. Abernathy and S. Shaw, "Interactive Information in VRML Models," *Proceedings of the ACM SIGGRAPH '98 Conference on Computer Graphics and Interactive Techniques*, VRML, ACM New York, 1998, pp. 1-10.

Karen Anderson  
Perkins Coie LLP  
LIBRARIAN  
2901 North Central Avenue Suite 2000  
Phoenix, AZ 85012-2788  
USA

8<sup>th</sup> January 2016

Dear Ms Anderson,

TerraVision II: visualizing massive terrain databases in VRML (Volume:19, Issue: 2)  
March/April 1999

**Title:** IEEE computer graphics and applications.

**Contributor:** IEEE Computer Society. ;

National Computer Graphics Association (U.S.)

**Publication Details:** [Los Alamitos, CA] : IEEE Computer Society : National Computer  
Graphics Association

**Identifier:** ISSN 1558-1756; System

**Holdings Notes:** Document Supply 4362.814300 Volume 1, issue 1 (1981)-\*\*\*See ESTAR  
for full holdings.

**UIN:** BLL01012433228

**Shelfmark(s):** Document Supply 4362.814300

According to our records, this item was receipted by The British Library on the 3<sup>rd</sup> March 1999. It was then catalogued and would have been available for public use from that date.

A scan of the cover page showing the date stamp indicating the date of availability has been attached, together with the table of contents.

Please note that we can only provide the date that the British Library made this item available for public use; for the actual date of publication, please contact the publisher.

Yours sincerely

**Miss S Jennings**