

# Proceedings

## 2006 International Conference on Cyberworlds

---

**CW 2006**

28-29 November 2006 • Lausanne, Switzerland

*Edited by*

Daniel Thalmann and Alexei Sourin

*Organized by*

EPFL, VRlab, Lausanne, Switzerland



Los Alamitos, California

Washington • Tokyo

---

Copyright © 2006 by The Institute of Electrical and Electronics Engineers, Inc.  
All rights reserved.

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries may photocopy beyond the limits of US copyright law, for private use of patrons, those articles in this volume that carry a code at the bottom of the first page, provided that the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

Other copying, reprint, or republication requests should be addressed to: IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 133, Piscataway, NJ 08855-1331.

*The papers in this book comprise the proceedings of the meeting mentioned on the cover and title page. They reflect the authors' opinions and, in the interests of timely dissemination, are published as presented and without change. Their inclusion in this publication does not necessarily constitute endorsement by the editors, the IEEE Computer Society, or the Institute of Electrical and Electronics Engineers, Inc.*

IEEE Computer Society Order Number P2671  
ISBN-13: 978-0-7695-2671-3  
ISBN-10: 0-7695-2671-3  
Library of Congress Number 2006928885

*Additional copies may be ordered from:*

IEEE Computer Society  
Customer Service Center  
10662 Los Vaqueros Circle  
P.O. Box 3014  
Los Alamitos, CA 90720-1314  
Tel: + 1 800 272 6657  
Fax: + 1 714 821 4641  
<http://computer.org/cspress>  
[csbooks@computer.org](mailto:csbooks@computer.org)

IEEE Service Center  
445 Hoes Lane  
P.O. Box 1331  
Piscataway, NJ 08855-1331  
Tel: + 1 732 981 0060  
Fax: + 1 732 981 9667  
[http://shop.ieee.org/store/  
customer-service@ieee.org](http://shop.ieee.org/store/customer-service@ieee.org)

IEEE Computer Society  
Asia/Pacific Office  
Watanabe Bldg., 1-4-2  
Minami-Aoyama  
Minato-ku, Tokyo 107-0062  
JAPAN  
Tel: + 81 3 3408 3118  
Fax: + 81 3 3408 3553  
[tokyo.ofc@computer.org](mailto:tokyo.ofc@computer.org)

*Individual paper REPRINTS may be ordered at:* [reprints@computer.org](mailto:reprints@computer.org)

Editorial production by Lisa O'Conner  
Cover art production by Joe Daigle/Studio Productions  
Cover Image: Crowd Simulation, EPFL VRLab 2006  
Printed in the United States of America by Odyssey Press Inc.



IEEE Computer Society  
**Conference Publishing Services**  
<http://www.computer.org/proceedings/>

# Table of Contents

2006 International Conference on Cyberworlds

CW 2006

<b>Message from the Chairs</b> .....	
<b>Conference Organization</b> .....	
<b>Program Committee</b> .....	
<b>Local Organization Committee</b> .....	

---

## Invited Talks

Simulation of Fluid Dynamics and Interactions .....	3
<i>Enhua Wu, Hongbin Zhu, Xuehui Liu, and Youquan Liu</i>	
Hybrid Function-Based Shape Modeling and Web Visualization .....	12
<i>Alexei Sourin</i>	

## Session I: Mixed and Augmented Reality I

Integrating a Real-Time Captured Object into Mixed Reality .....	17
<i>Hua Chen, Peter F. Elzer, and Odej Kao</i>	
Collaborative Mixed Reality Exposure Therapy .....	25
<i>Holger Regenbrecht, Daniel Wickerroth, Brian Dixon, and Stefan Mueller</i>	
A Volumetric Model-Based CNC Simulation and Monitoring System in Augmented Environments .....	33
<i>J. Zhang, S.K. Ong, and A.Y.C. Nee</i>	

## Session II: 3D Environments and Motion

Automatic Composition and Simulation System for Ballet Sequences Using 3D Motion Archive .....	43
<i>Asako Soga, Bin Umino, Takami Yasuda, and Shigeki Yokoi</i>	
A Method for 3D-Scene Generation Using a Human-Like Language .....	50
<i>Iván Piza, Félix Ramos, and Fabiel Zuñiga</i>	

Camera Motion Control from a Java 3D Environment: Virtual Studio Application in Decorative Arts Museum Collections .....	58
<i>Bernardo Uribe Mendoza, Germán Andres Ramos, Luis Miguel Méndez, Fransisco Javier Almonacid, Richard Boyacá, William Santamaría, and Alexander Pinzón</i>	

### **Session III: Business Applications**

A New Method for Developing Business Applications: The Cellular Data System.....	65
<i>Toshio Kodama, Toshiyasu L. Kunii, and Yoichi Seki</i>	
The Nature of the Cyber Firm-2006: Building an Affordance Architecture .....	75
<i>Ravindra Dastikop</i>	

### **Session IV: Geospatial, Terrain, and Hydrological Applications**

Error Minimizing Pipeline for Hi-Fidelity, Scalable Geospatial Simulation.....	81
<i>Chris Thorne</i>	
A Generic Model Framework for MOUT Simulations.....	89
<i>Suiping Zhou and Shang-Ping Ting</i>	
An Enhancement of Reeb Graph for Modeling Hydrogeological Information.....	93
<i>Rungwit Laichuthai and Pizzanu Kanongchaiyos</i>	

### **Session V: Collaborative and Distributed Virtual Environments**

Concepts for Cooperative Knowledge Spaces in Mathematics and Natural Sciences.....	98
<i>Sabine Cikic, Uwe Sinha, and Sabina Jeschke</i>	
A Proposal of Dead Reckoning Protocol in Distributed Virtual Environment Based on the Taylor Expansion .....	107
<i>Dai Hanawa and Tatsuhiro Yonekura</i>	
RTR-Trees for Space Robotics Behavior Simulation and Visualization .....	115
<i>Valery Afanasiev, Dmitry Baigozin, Ilya Kazanski, Sergey Fomin, and Stanislav Klimenko</i>	
Server Placement for Enhancing the Interactivity of Large-Scale Distributed Virtual Environments.....	123
<i>Duong N.B. Ta and Suiping Zhou</i>	

### **Session VI: Security and Watermarking**

Agent Teams in Cyberspace: Security Guards in the Global Internet.....	133
<i>Igor Kotenko and Alexander Ulanov</i>	
3D Multiple Digital Watermarking Framework for Joint-Creatorship Verification.....	141
<i>Misung Cho, Yuseung Sohn, and Soyoung Bu</i>	

## **Session VII: Search Engines and Visual Querying**

Visual 3D Querying of Spatio-Temporal Data.....	147
<i>Olga Sourina</i>	

## **Session VIII: Mixed and Augmented Reality II**

A Framework for Multiple-View Product Representation Using Augmented Reality .....	157
<i>Y. Shen, S.K. Ong, and A.Y.C. Nee</i>	
An Interactive Mixed Reality Framework for Virtual Humans .....	165
<i>Arjan Egges, George Papagiannakis, and Nadia Magnenat-Thalmann</i>	
Implementation of Outdoor Mixed Reality Gaming on Mobile Devices .....	173
<i>Yoshimichi Sasaki, Masaru Kamada, and Tatsuhiro Yonekura</i>	
Multi-User Networked Interactive Augmented Reality Card Game.....	177
<i>Marissa Diaz, Moisés Alencastre-Miranda, Lourdes Muñoz-Gómez, and Isaac Rudomin</i>	

## **Session IX: Virtual Reality**

The Red and Black Semantics: A Fuzzy Language .....	183
<i>Gianluca Mura</i>	
Standardized Virtual Reality, Are We There Yet?.....	191
<i>Mario A. Gutiérrez, Frédéric Vexo, and Daniel Thalmann</i>	
Motivate Them to Communicate .....	198
<i>Dorin Mircea Popovici, Cyril Septseault, and Ronan Querrec</i>	

## **Session X: Modeling and Complexity**

Research on Manufacturing Resource Discovery Based on Ontology and QoS in Manufacturing Grid.....	209
<i>He Yu'an, Yu Tao, Liu Lilan, and Sun Haiyang</i>	
An Incrementally Modular Abstraction Hierarchy for Linear Software Development Methodology .....	216
<i>Kenji Ohmori and Toshiyasu L. Kunii</i>	
Oil and Water <i>do</i> Mix: Social Science Meets Engineering Towards a Transdisciplinary Perspective on Cyberworlds .....	224
<i>Javier Salazar</i>	

<b>Author Index</b> .....	233
---------------------------	-----