

# **2006 IEEE Symposium on 3D User Interfaces**

**Alexandria, Virginia, USA  
25-26 March 2006**



**IEEE Catalog Number:**  
**ISBN:**

**06EX1321**  
**1-4244-0225-5**

**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 are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republications permission, write to IEEE Copyrights Manager, IEEE Operations Center, 445 Hoes Lane, Piscataway, New Jersey USA 08854. All rights reserved.

IEEE Catalog Number:                   06EX1321  
ISBN:                                       1-4244-0225-5  
LOC:                                        2006921068

**Additional Copies of This Publication Are Available from:**

IEEE Service Center  
445 Hoes Lane  
Piscataway, NJ 08854  
IEEE Service Center  
445 Hoes Lane  
Piscataway, NJ 08854  
Phone:           (800) 678-IEEE  
                  (732) 981-1393  
Fax:             (732) 981-9667  
E-mail:         customer-service@ieee.org

# Table of Contents

|  |             |
|--|-------------|
| <b>Message from Chairs .....</b>   | <b>vi</b>   |
| <b>IEEE Computer Society Visualization and Graphics Technical Committee .....</b>                      | <b>vii</b>  |
| <b>Reviewers .....</b>   | <b>viii</b> |
| <b>Keynote Address: Why Aren't We Using 3D User Interfaces, and Will We Ever? .....</b>                | <b>ix</b>   |
| <i>Ravin Balakrishnan (University of Toronto)</i>  |             |
| <b>Session 1: Navigation</b>   |             |
| <b>Evaluating Distributed Cognitive Resources for Wayfinding in a Desktop Virtual Environment.....</b> | <b>1</b>    |
| <i>Shamus P. Smith, Jonathan Hart</i>  |             |
| <b>Overcoming World in Miniature Limitations by a Scaled and Scrolling WIM .....</b>                   | <b>9</b>    |
| <i>Chadwick A. Wingrave, Yonca Haciahmetoglu, Doug A. Bowman</i>                                       |             |
| <b>Coordination Strategies for Assisted Viewpoint Interaction .....</b>                                | <b>15</b>   |
| <i>Stephen B. Hughes</i>   |             |
| <b>Interactive Perspective Cut-away Views for General 3D Scenes .....</b>                              | <b>23</b>   |
| <i>Chris Coffin, Tobias Höllerer</i>   |             |
| <b>Session 2: Applications and Implementation</b>  |             |
| <b>A Hybrid User Interface for Manipulation of Volumetric Medical Data.....</b>                        | <b>27</b>   |
| <i>Alexander Bornik, Reinhard Beichel, Ernst Kruijff, Bernhard Reitinger, Dieter Schmalstieg</i>       |             |
| <b>Spatial Analysis Tools for Virtual Reality-based Surgical Planning .....</b>                        | <b>35</b>   |
| <i>Bernhard Reitinger, Dieter Schmalstieg, Alexander Bornik, Reinhard Beichel</i>                      |             |
| <b>A Cost-effective Approach for Developing Application-control GUIs for Virtual Environments.....</b> | <b>43</b>   |
| <i>Carlos Andujar, Marta Fairén, Ferran Argelaguet</i>   |             |
| <b>Session 3: Collaborative and Bimanual Interface</b>   |             |
| <b>Using the Non-Dominant Hand for Selection in 3D.....</b>  | <b>51</b>   |
| <i>Joan De Boeck, Tom De Weyer, Chris Raymaekers, Karin Coninx</i>                                     |             |
| <b>iSith – Intersection-based Spatial Interaction for Two Hands .....</b>                              | <b>57</b>   |
| <i>Hans Peter Wyss, Roland Blach, Matthias Bues</i>  |             |
| <b>The Bent Pick Ray: An Extended Pointing Technique for Multi-User Interaction .....</b>              | <b>61</b>   |
| <i>Kai Riege, Gerold Wesche, Thorsten Holtkämper, Bernd Fröhlich</i>                                   |             |

## Table of Contents

**A Collaborative Interface for IllusionHole using a Control-Ring and a Set of Mice .....65**  
*Martin Hachet, Ryoichi Watanabe, Yoshifumi Kitamura*

**SkeweR: a 3D Interaction Technique for 2-User Collaborative Manipulation of Objects in Virtual Environments.....69**  
*Thierry Duval, Anatole Lécuyer, Sébastien Thomas*

### **Session 4: 3D Interaction Techniques**

**Interactive Reconfiguration Techniques of Reference Frame Hierarchy in the Multi-viewport Interface .....73**  
*Kouichi Hirose, Takefumi Ogawa, Kiyoshi Kiyokawa, Haruo Takemura*

**Grab-and-Throw Metaphor: Adapting Desktop-based Interaction Paradigms to Virtual Reality .....81**  
*Frank Steinicke, Klaus Hinrichs*

**Toward Disambiguating Multiple Selections for Frustum-Based Pointing .....85**  
*Greg Schmidt, Dennis G. Brown, Erik B. Tomlin, J. Edward Swan II, Yohan Baillot*

**Group Selection Techniques for Efficient 3D Modeling .....93**  
*Ji-Young Oh, Wolfgang Stürzlinger, Darius Dadgari*

**Towards a General Model for Selection in Virtual Environments .....101**  
*Anthony Steed*

### **Session 5: Augmented Reality**

**Interaction Techniques for Exploring Historic Sites through Situated Media .....109**  
*Sinem Güven, Steven Feiner*

**Virtual Vouchers: Prototyping a Mobile Augmented Reality User Interface for Botanical Species Identification .....117**  
*Sean White, Steven Feiner, Jason Kopylec*

**A Survey of Challenges Related to the Design of 3D User Interfaces for Car Drivers .....125**  
*Marcus Tönnis, Verena Broy, Gudrun Klinker*

**SSIML/AR: A Visual Language for the Abstract Specification of Augmented Reality User Interfaces .....133**  
*Arnd Vitzthum*

### **Session 6: Devices**

**The VR Scooter: Wind and Tactile Feedback Improve User Performance.....141**  
*Leonidas Deligiannidis, Robert J.K. Jacob*

## Table of Contents

|  |            |
|--|------------|
| <b>Gesture-recognition with Non-referenced Tracking .....</b>  | <b>149</b> |
| <i>Paul Keir, Jocelyn Elgoyhen, Martin Naef, John Payne, Martyn Horner, Paul Anderson</i>                          |            |
| <b>Turning Pages of 3D Electronic Books .....</b>  | <b>157</b> |
| <i>Lichan Hong, Stuart K. Card, Jindong (JD) Chen</i>  |            |
| <b>“two - 4 - six” - A Handheld Device for 3D-Presentations .....</b>  | <b>165</b> |
| <i>Alexander Kulik, Roland Blach, Bernd Fröhlich</i>   |            |
| <b>SpaceActor – Interface Prototypes for Virtual Environments .....</b>  | <b>169</b> |
| <i>Mario Doulis, Victor Zwimpfer, Jan Pflüger, Andreas Simon, Christian Stern, Till Haldimann, Christoph Jenni</i> |            |