

# List of Publications, Ismo Rakkolainen, November 7, 2011

## Articles in refereed international journals and books

1. Rakkolainen, I., Vainio, T., A 3D City Info for Mobile Users. *Computers & Graphics, Special Issue on Multimedia Appliances*, Vol. 25, No. 4. Elsevier 2001. 619-625. (Cited: 116. Source: Google Scholar).
2. DiVerdi, S., Olwal, A., Rakkolainen, I., Höllerer, T., An Immaterial Pseudo-3D Display with 3D Interaction. A book Chapter on "Three-Dimensional Television: Capture, Transmission, and Display". Ozaktas, H., Onural L., (Eds). Springer, Heidelberg, Dec. 2007. 505-528.
3. Benzie, P., Watson, J., Surman, J., Rakkolainen, I., Hopf, K., Urey, H., Sainov, V., von Kopylow, C., 3DTV Displays: Techniques and Technologies. *IEEE Transactions on Circuits and Systems for Video Technology*, special issue on Multi-view Coding and 3DTV. Vol. 17, No. 11, 1647-1658. IEEE November 2007. (Cited: 67).
4. Rakkolainen, I., Höllerer, T., DiVerdi, S., Olwal, A., Mid-air Display Experiments to Create Novel User Interfaces. *Multimedia Tools and Applications*, Special issue on Semantic Ambient Media Experience, Vol. 44, Issue 3. Springer Netherlands, 2009. 389-405.
5. Rakkolainen, I., Jumisko-Pyykkö, S., The Mid-air FogScreen and User Experiences. A book Chapter on "Handbook of Research on Practices and Outcomes in Virtual Worlds and Environments". Yang, H., Yuen, S. (Eds.), IGI Global, Hershey, PA, USA, July 2011. 650-664.
6. Rakkolainen, I., Pseudo-Volumetric 3D Display Solutions. A book Chapter on "Handbook of Visual Display Technology". Chen, J., Cranton, W., Fihn, M., (Eds.), Springer-Verlag, Heidelberg, Germany, due December 2011.

## Articles in refereed international conference proceedings and compilation works

7. Koskelainen, P., Rakkolainen, I., Soinen, R., Suvanto, J., SISU - Schools to Information Superhighway. In *Global Information Infrastructure (GII) Evolution*, S. Rao et al. (Eds.), Interworking Issues. IOS Press 1996. 651-654.
8. Koskelainen, P., Rakkolainen, I., Soinen, R., Suvanto, J., ATM-based Multimedia Trial in Comprehensive Schools. *Telematics for Future Education and Training: Proceedings of the EAEEIE'96 7<sup>th</sup> annual Conference*, June 12-14, 1996, Oulu, Finland. 23-25.
9. Husberg, F., Blomqvist, M., Visala, K., Niskanen, M., Rakkolainen, I., Shared Platform Independent VRML Worlds. *Proceedings of the ISMCR 97 Conference*, June 3-4, 1997, Tampere, Finland. 146-151.
10. Hoppenot, Y., Rakkolainen, I., Real Virtuality - Bringing Position Data into VRML Worlds. *Proceedings of the Second Tampere International Conference on Machine Automation (ICMA'98)*, September 15-18, 1998, Tampere, Finland. 579-586.
11. Rakkolainen, I., Pulkkinen, S., Heinonen, A., Visualizing Realtime GPS Data with VRML Worlds. *Proceedings of the ACM-GIS'98 workshop*, November 6-7, 1998, Washington D.C., USA. 52-56. (cited: 9).
12. Jomppanen, J., Rintanen, M., Rakkolainen, I., Teleoperated Teamwork over Internet Using VRML. *Proceedings of the International Conference on Visual Computing'99*, February 23-26, 1999, Goa, India. 304-310.
13. Heinonen, A., Pulkkinen, S., Rakkolainen, I., An Information Database for VRML Cities. *Proceedings of the IEEE Information Visualization 2000 Conference*, July 19-21, 2000, London, England. 469-473. (Cited: 19).
14. Rakkolainen, I., Timmerheid, J., Vainio, T., A 3D City Info for Mobile Users. *Proceedings of the 3rd International Workshop on Intelligent Interactive Assistance and Mobile Multimedia Computing (IMC'2000)*, November 9-10, 2000, Rostock, Germany. 115-121.
15. Kupila, H., Majahalme, T., Salmenperä, H., Rakkolainen, I., Improving GPS Accuracy for a Mobile 3D City Guide. *Proceedings of the 4th International Symposium on Multi-Dimensional Mobile Communications (MDMC'01)*. June 11-12, 2001, Pori, Finland.
16. Rakkolainen, I., Vainio, T., Kupila, H., Majahalme, T., Salmenperä, H., A GPS-based Mobile 3D City Guide. *Proceedings of the 5th World Multi-Conference on Systemics, Cybernetics and Informatics (SCI'2001)*, session on wearable computing, Orlando, FL, USA, July 22-25, 2001. 485-489.
17. Rakkolainen, I., Palovuori, K., A Walk-thru Screen. *IS&T/Spie Electronic Imaging 2002*, *Proceedings of Conference on Projection Displays VIII*, San Jose, CA, USA, January 23-24, 2002. 17-22. (Cited: 8).
18. Rakkolainen, I., Palovuori, K., WAVE – A Walk-thru Virtual Environment. *CD Proceedings of the 6th Immersive Projection Technology Symposium in association with IEEE VR 2002 Conference*, Orlando, FL, USA, March 24-25, 2002. (Cited: 8).
19. Vainio, T., Kotala, O., Rakkolainen, I., Kupila, H., Connecting a Three-dimensional City Model, a Map and a Database to an Information System for Mobile Users. *Proceedings of the 2nd IASTED International Conference on Visualization, Imaging and Image Processing (VIIP 2002)*, Malaga, Spain, September 9-12, 2002. 151-155.
20. Vainio, T., Kotala, O., Rakkolainen, I., Kupila, H., Towards Scalable User Interfaces in 3D City Information Systems. *Proceedings of the Fourth International Symposium on Human Computer Interaction with Mobile Devices*

(Mobile HCI 2002), Pisa, Italy, September 18-20, 2002. 354-358. Published also as a book Chapter in Lecture Notes in Computer Science, Springer Berlin / Heidelberg, Volume 2411/2002. (Cited: 10).

21. Rakkolainen, I., MobiVR - A Novel User Interface Concept for Mobile Computing. Proceedings of the 4th International Workshop on Mobile Computing (IMC'2003), Rostock, Germany, June 17-18, 2003. 107-112. (Cited: 10).
22. Rakkolainen, I., Palovuori, K., FogScreen – An Immaterial, Interactive Screen. Society for Information Displays (SID 2005). Invited paper. Boston, USA, May 22-27, 2005. 102-105.
23. Rakkolainen, I., Palovuori, K., Laser Scanning for the Interactive Walk-Through FogScreen. ACM Symposium on Virtual Reality Software and Technology (VRST 2005), Monterey, CA, USA, Nov. 7-9, 2005. 224-226. (Cited: 9).
24. DiVerdi, S., Rakkolainen, I., Höllerer, T., Olwal, A., A Novel Walk-through 3D Display. SPIE Electronic Imaging, Stereoscopic Displays and Virtual Reality Systems XIII, Vol. 6055, San Jose, CA, USA, January 16-19, 2006. 1-10.
25. Fleck, S., Busch, F., Biber, P., Straßer, W., Rakkolainen, I., DiVerdi, S., Höllerer, T., 3DTV – Panoramic 3D Model Acquisition and its 3D Visualization on the Interactive FogScreen. The International Conference on Image Processing (ICIP) 2006. Atlanta, GA, USA, October 8-11, 2006.
26. Rakkolainen, I., Erdem, T., Erdem, Ç., Özkan, M., Laitinen, M., Interactive “Immaterial” Screen for Performing Arts. ACM Multimedia 2006, Interactive Arts Program (short paper), Santa Barbara, CA, USA, October 23-27, 2006. 185-188.
27. Rakkolainen, I., Tracking Users through a Projection Screen. ACM Multimedia 2006 (short paper), Santa Barbara, CA, USA, October 23-27, 2006. 101-104.
28. Rakkolainen, I., Erdem, T., Utku, B., Erdem, Ç., Özkan, M., Mid-air Display for Physical Exercise and Gaming. IEEE 3DTV Conference, Kos, Greece, May 7-9, 2007.
29. Rakkolainen, I., Lugmayr, A., Immaterial Display for Interactive Advertisements. ACM Conference on Advances in Computer Entertainment Technology, Salzburg, Austria, June 13-15, 2007. 95-98.
30. Rakkolainen, I., How Feasible Are Star Wars Mid-air Displays? 11<sup>th</sup> International Conference on Information Visualization. Zurich, Switzerland, July 4-6, 2007. 935-942. (Cited: 8).
31. Olwal, A., DiVerdi, S., Rakkolainen, I., Höllerer, T., Consigalo: Multi-user, Face-to-face Interaction on an Immaterial Display with Adaptive Audio. Second International Conference on INtelligent TEchnologies for interactive ENTAINment (INTETAIN) 2008. Playa del Carmen, Cancun, Mexico, January 8-10, 2008.
32. Rakkolainen, I., Measurements and Experiments of Immaterial Virtual Reality Display. The 2<sup>nd</sup> IEEE 3DTV Conference, Istanbul, Turkey, May 28-30, 2008. 37-40.
33. Jumisko-Pyykkö, S., Hellsten, S., Weitzel, M., Rakkolainen, I., Children’s Game Experiences in Different Settings. The 2<sup>nd</sup> IEEE 3DTV Conference, Istanbul, Turkey, May 28-30, 2008. 377-380.
34. Weitzel, M., Jumisko-Pyykkö, S., Rakkolainen, I., Biting, Whirling, Crawling – Children’s Embodied Interaction with Walk-through Displays. The 12<sup>th</sup> IFIP conference on Human-Computer Interaction: INTERACT 2009, Uppsala, Sweden, August 24-28, 2009.
35. Rakkolainen, I., Feasible Mid-air Virtual Reality with the Immaterial Projection Screen Technology. The 4<sup>th</sup> IEEE 3DTV Conference, Tampere, Finland, June 7-9, 2010. 1-4.

#### **Articles in refereed international workshops**

36. Rakkolainen, I., Mobile 3D City Info. Proceedings of the Workshop on the Future of VR and AR Interfaces, IEEE VR'2001 Conference, March 14, 2001, Yokohama, Japan. 31-32.
37. Rakkolainen, I., 3D City Info – a Near-future Application of 4G Services. Proceedings of the second Wireless World Research Forum (WWRF), May 10-11, 2001, Helsinki, Finland.
38. Rakkolainen, I., Novel Applications for Mobile 3D Graphics. YoungVR'2001 Workshop, Taejon, South Korea, December 18-20, 2001.
39. Koskela, T., Vilpola, I., Rakkolainen, I., User Requirements for Large Virtual Display and Finger Pointing Input for Mobile Devices. 2<sup>nd</sup> International Conference on Mobile and Ubiquitous Multimedia 2003, Workshop on Designing for Ubicomp in the Wild. Norrköping, Sweden, December 10, 2003.
40. Rakkolainen, I., Mid-air Displays Enabling Novel User Interfaces. Invited paper. Semantic Ambient Media Experience workshop, ACM Multimedia 2008 Conference, Vancouver, Canada. October 31, 2008.
41. Neri, M., Campi, A., Suffritti, R., Grimaccia, F., Sinogas, P., Guye, O., Papin, C., Michalareas, T., Gazdag, L., Rakkolainen, I. SkyMedia – UAV-based Capturing of HD / 3D Content with WSN Augmentation for Immersive Media Experiences. HotMD 2011, held in conjunction with IEEE ICME 2011. Barcelona, Spain. July 11, 2011.

#### **Abstracts & posters in refereed international conferences**

42. Rakkolainen, I., Landkammer, J., Piirto, M., Palovuori, K., The Walk-thru Fog Screen Experience. A demonstration and associated abstract at ACM SIGGRAPH 2003 Program: Emerging Technologies, San Diego, CA, USA, July 27-31, 2003. 110.
43. Rakkolainen, I., Palovuori, K., Interactive, Immaterial FogScreen (poster), ACM UIST 2004, Santa Fe, NM, USA, October 24-27, 2004.
44. Fleck, S., Piirto, M., Rakkolainen, I., Laser-scanning for the Interactive walk-through FogScreen (poster). Proceedings of the 9th International Conference on Information Visualisation, Symposium on Human-Computer Interaction for Information Visualization. London, England, July 6-8, 2005.
45. Rakkolainen, I., DiVerdi, S., Olwal, A., Candussi, N., Höllerer, T., Laitinen, M., Piirto, M., Palovuori, K., The Interactive FogScreen. A demonstration and associated abstract at ACM SIGGRAPH 2005 Program: Emerging Technologies, Los Angeles, CA, USA, July 31-August 4, 2005. 127. (Cited: 16).
46. Olwal, A., DiVerdi, S., Candussi, N., Rakkolainen, I., Höllerer, T., An Immaterial, Dual-sided Display System with 3D Interaction (poster). IEEE VR 2006. Washington, D.C., USA, March 25-29, 2006. 279-280.
47. Rakkolainen, I., Recent Developments in the Immaterial Projection Screen technology (poster). Society for Information Displays (SID 2008). Los Angeles, USA, May 18-23, 2008. 1545-1548.

#### **Articles in refereed Finnish conference proceedings**

48. Jomppanen, J., Rintanen, M., Korhonen, S., Rakkolainen, I., A Teleoperation Application with VRML and HMD. Proceedings of the FINSIG'99 Conference, May 31, 1999, Oulu, Finland. 204-208.

#### **Scientific monographs**

49. Rakkolainen, I., Radiositeittemenetelmän toteutus (Implementation of Radiosity Method), Master's Thesis, University of Helsinki 1990.
50. Rakkolainen, I., Visualizing Reality with Web3D, Licentiate Thesis, Tampere University of Technology, June 2000.
51. Rakkolainen, I., Novel Applications and Methods for Virtual Reality, PhD Thesis, Tampere University of Technology, published on November 29<sup>th</sup>, 2002.

#### **Other publications**

1. Rakkolainen, I. Verkotetut virtuaaliympäristöt, Keynote lecture on KAMU-seminar Multimedian uudet ulottuvuudet, 26-27.11.1997, Finlandia-talo, Helsinki, Finland. 199-202.
2. Rakkolainen, I. Virtuaaliodellisuus - Hypeä vai hyötykäyttöä? Tietoyhteys 2/98. 5-6.
3. Virtuaaliodellisuuden hyötysovellukset. In Avaautuminen tietoyhteiskuntaan, Varis, T. (ed.), Tampereen yliopiston täydennyskoulutuskeskus, Julkaisusarja A 1/98. 84-86.
4. Rakkolainen, I., A Walk-Thru Fog Screen for Museums. Nordic Digital Excellence in Museums (NODEM'2003). Helsingborg, Sweden, March 17-19, 2003.
5. Rakkolainen, I., A Section in an internal State-of-the-Art Report on "3D Displays", EU's Network of Excellence "3D TV", September 2005.
6. Rakkolainen, I., A Section in an internal State-of-the-Art Report on "Applications of 3D TV Technology", EU's Network of Excellence "3D TV", September 2005.
7. Contribution to H. Ozaktas, Three-dimensional Television: Consumer, Social, and Gender Issues. A book Chapter on "Three-Dimensional Television: Capture, Transmission, and Display." Editors: H. Ozaktas and L. Onural. Springer, Heidelberg, 2007. 601-631.

#### **Patents**

1. Rakkolainen, I., Method and apparatus for acquiring a three-dimensional model of a physical object. Finnish patent FI 112823 B. January 15, 2004.
2. Palovuori, K., Rakkolainen, I., Method and apparatus for forming a projection screen. Finnish patent FI 114878. January 14, 2005.
3. Rakkolainen, I., Method and apparatus for collecting and connecting light into a fiber optic bundle. Finnish patent FI 116639. January 13, 2006.
4. Rakkolainen, I., Method and apparatus for tracking through a projection screen. Finnish patent FI 117307. August 31, 2006.
5. Rakkolainen, I., Display screen based on particles carried in a fluid stream. PCT/FI2007/ 050364. A PCT patent application filed in 15.6.2007. Positive preliminary research.

## International patents

Palovuori, K., Rakkolainen, I., Method and apparatus for forming a projection screen or a projection volume. U.S. patent 6,819,487, November 16, 2004. European patent 1362260, Russian patent RU2278405, Japanese, Indian and Australian patents for the same. Others pending.

## Invited talks

The Walk-thru FogScreen Experience. ACM SIGGRAPH 2003 Emerging Technologies, San Diego, CA, USA, July 27-31, 2003.

The Walk-thru Fog Screen. Information Society Models and the New Everyday Life Conference, Waseda University, Tokyo, Japan, October 6-7, 2003.

The Interactive 3D FogScreen. Displays for Immersive Education and Training Workshop. Institute for Creative Technologies, University of Southern California, Marina del Rey, CA, USA, October 24-25, 2005.

## Media publicity

- The 3D visualisation of GPS data, 3D multiuser worlds and 3D teleoperation of a model train received some Finnish and international press coverage in 1997-2000.
- The **3D City Info** system was covered in New Scientist (UK), July 2001 and in Finnish press.
- The **FogScreen** has been covered worldwide in numerous major newspapers and magazines. Some examples are CNN home page, Reuters, USA Today, New York Times, Wired, IEEE Computer, San Francisco Chronicle (USA), New Scientist, Daily Telegraph, The Engineer (UK), Focus, Der Spiegel (D), La Macchina del Tempo (I), Liberation, Le Monde, Science & Vie (F), Kijk, De Ingenieur (NL), Quo (E), AVM Magasine (N), Tiede, Aamulehti, Turun sanomat, Helsingin sanomat, IT-viikko, Tekniikka&Talous (FIN), etc. etc. It has also been covered e.g., in an international future documentary "World in 2057" (Discovery Channel, ZDF etc, see <http://ilab.cs.ucsb.edu/press/2057/>), all Finnish major TV news, local and national U.S. TV news (including Fox, CBS Evening News, Science Channel, Discovery Channel), Japanese TV (NHK) and others.
- The **novel user interface** for hand-held devices was covered in Aamulehti, Proessori, Tekniikka&Talous (FIN).

## Major research demonstrations

1. Finnish Multimedia Seminar, November 26-27, 1997, Finlandia Hall, Helsinki, Finland.
2. Homo Mobilis-exhibition, Sep 16 - Oct 18, 1998, Museum of Art and Design, Helsinki, Finland.
3. Finnish Multimedia Seminar, January 21-22, 1999, Tampere Hall, Tampere, Finland.
4. Demo Night, VRML'99 Conference, February 23-26, 1999, Paderborn, Germany.
5. IEEE VR'2001 research demonstration, March 15-16, 2001, Yokohama, Japan.
6. Finnish Science Fair, FogScreen demonstration, October 4-6, 2002, Turku, Finland.
7. ACM SIGGRAPH 2003 Emerging Tech., FogScreen demo, July 27-31 2003, San Diego, CA, USA.
8. Conference on Information Society, FogScreen demo, Oct. 6-7, 2003, Waseda Univ., Tokyo, Japan.
9. April Spring Friendship Art Festival, FogScreen demo, April 10-18, 2004, Pyongyang, North Korea.
10. Wired Magazine's NextFest, FogScreen demo, May 14-16, 2004, San Francisco, USA.
11. Wired Magazine's NextFest 2005, FogScreen demo, June 24-26, 2005, Chicago, IL, USA.
12. ACM SIGGRAPH 2005 Emerging Technologies, Interactive FogScreen demonstration, July 31-August 4, 2005, Los Angeles, CA, USA.
13. EU's IST 2006 event, November 2006. Helsinki, Finland.

Additionally the FogScreens are installed or rented for numerous world-class sites, exhibitions and events world-wide e.g., to museums, theme parks, night clubs, cruise ships, casinos etc.