Preface

The advancement of information and communication technologies (ICT) has enabled broad use of ICT and facilitated the use of ICT in the private and personal domain. ICT-related industries are directing their business targets to home applications. Among these applications, entertainment will differentiate ICT applications in the private and personal market from the office. Comprehensive research and development on ICT applications for entertainment will be different for the promotion of ICT use in the home and other places for leisure. So far engineering research and development on entertainment has never been really established in the academic communities. On the other hand entertainment-related industries such as the video and computer game industries have been growing rapidly in the last 10 years, and today the entertainment computing business outperforms the turnover of the movie industry. Entertainment robots are drawing the attention of young people. The event called RoboCup has been increasing the number of participants year by year. Entertainment technologies cover a broad range of products and services: movies, music, TV (including upcoming interactive TV), VCR, VoD (including music on demand), computer games, game consoles, video arcades, gambling machines, the Internet (e.g., chat rooms, board and card games, MUD), intelligent toys, edutainment, simulations, sport, theme parks, virtual reality, and upcoming service robots.

The field of entertainment computing focuses on users’ growing use of entertainment technologies at work, in school and at home, and the impact of this technology on their behavior. Nearly every working and living place has computers, and over two-thirds of children in industrialized countries have computers in their homes as well. All of us would probably agree that adults and children need to become competent users to be prepared for life and work in the future. Especially children’s increasing use of entertainment technologies brings with it both the risk of possible harm and the promise of enriched learning, well-being and positive development.

Between now and the near future, digital technologies will become more powerful and affordable for all users and at every level, in digital networks and in product offerings. An increasing number of people will be able to compile, program, edit, create and share content; as a result, they will gain more control and become more immersed in media experiences. But more than technical challenges, the social implications on human behavior will be of most importance. We need a media ecology movement to heighten consciousness to fight the waste and pollution that the media produces. It is indeed a question of the mental environment for our children and future generations. The questions we must ask ourselves are: Do we give them a world that is challenging, stimulating, inspiring, and really entertaining? Do we encourage their intelligence, creativity and curiosity?

To address and hopefully answer these questions and to advance this newly born area of entertainment technologies it is important to build a good relationship between academia and industry, and to set up a task force group. This was the main motivation that in August 2000 prompted the International Federation for Information Processing (IFIP) General Assembly to approve the setting up of the Entertainment Computing
Specialist Group (SG16) under the auspices of IFIP and the Committee for Cooperation with Industry (CCI).

First of all, the major efforts of SG16 activities were directed toward demonstrating that the subject could be mature enough to attract the broad interest of the ICT community. For this purpose a technical event, the 1st International Workshop on Entertainment Computing (IWEC), was planned, and IWEC Steering Committee members were appointed (Bruce Blumberg from MIT Media Lab, USA; Marc Cavazza from the University of Teesside, UK; Jaap van den Herik from the Universiteit Maastricht, Netherlands; Tak Kamae from Laboratories of Image Science and Technology, Japan; Donald Marinelli from Carnegie Mellon University, USA; Ryohei Nakatsu from ATR, Japan; Matthias Rauterberg from the Technische Universiteit Eindhoven, Netherlands; and Demetri Terzopoulos from the University of Toronto, Canada).

The first important opportunity came when IFIP TC13 on “Human-Computer Interaction” kindly offered a time slot for a first international panel on entertainment computing at the prestigious INTERACT 2001 conference in Tokyo (Japan) in July 2001. The IWEC Steering Committee decided to accept this kind offer to increase the presence of SG16 and IWEC. At the panel many participants showed interests in entertainment computing.

In the next year, 2002, the first international workshop on entertainment computing (IWEC) was launched. IWEC 2002 was successfully held at Makuhari (Japan) on May 14–17, 2002. IWEC 2002 attracted over 100 participants and over 60 papers were published in the proceedings by Kluwer (edited by Ryohei Nakatsu and Junichi Hoshino). At IWEC 2002 were many high-quality papers and several interesting technical demonstrations. In other words, evidence that entertainment computing was already an important technical area. At IWEC 2002 we had an extended SG16 meeting, and it was agreed unanimously that the formation of a new technical committee (TC) on entertainment computing should be proposed formally to IFIP at the General Assembly at Montreal in 2002.

Based on the success of IWEC 2002, SG16 organized the next International Conference on Entertainment Computing (ICEC 2003), that was held during May 8–10, 2003 at the Entertainment Technology Center at Carnegie Mellon University, Pittsburgh (USA). ICEC 2003 was also successful with more than 100 attendees, 20 highly select papers, several prestigious keynote talks, and invited panels. All the papers for ICEC 2003 were accepted by ACM for inclusion in their ACM online digital library.

To complete the first around-the-world cycle “Japan–USA–Europe”, the 3rd International Conference on Entertainment (ICEC 2004) was held in Europe at the Technische Universiteit Eindhoven during September 1–3, 2004. This conference attracted 27 full papers. Around 150 attendees from academia and industry participated in this successful conference. In several parallel sessions full papers, short papers, posters, system demonstrations and exhibitions from industry were presented. The program included three well-received keynote talks, three specially invited topic talks, and an outstanding super-chess contest organized by Jaap van den Herik.

For more information about ICEC 2004 have a look at the homepage on the Internet: http://www.icec.id.tue.nl/
For making ICEC 2004 such an outstanding event, we have to thank the following people who volunteered in the organization: Jaap van den Herik and Anton Nijholt as co-chairs, Jacques Terken as review chair, Ben Salem as treasurer and chair of the organizing committee, as well as all members of the different committees, in particular the long list of distinguished experts from all over the world in the scientific and industrial program committee, the several sponsors, all cooperating societies, and last but not least all researchers who submitted and presented their outstanding research results at ICEC 2004, documented in this book. We gratefully acknowledge their contributions, effort and valuable input.

Eindhoven, June 28, 2004

Matthias Rauterberg
Committees

Chair
Matthias Rauterberg (Technische Universiteit Eindhoven, The Netherlands)

Co-chairs
Jaap van den Herik (Universiteit Maastricht, The Netherlands)
Anton Nijholt (University of Twente, The Netherlands)

Review Chair
Jacques Terken (Technische Universiteit Eindhoven, The Netherlands)

Program Committee
Espen Aarseth (University of Copenhagen, Denmark)
Matt Adcock (CSIRO ICT Centre, Australia)
Samir Akkouche (Universite Claude Bernard Lyon 1, France)
Elisabeth André (University of Augsburg, Germany)
Sebastiano Bagnara (Politecnico di Milano, Italy)
Christoph Bartneck (Technische Universiteit Eindhoven, The Netherlands)
Trevor Batten (Media Art, The Netherlands)
Franck Bauchard (Ministère de la Culture, France)
Maurice Benayoun (Université Paris 1, France)
Aude Billard (Swiss Federal Institute of Technology, Switzerland)
Mark Billinghurst (University of Canterbury, New Zealand)
Mats Björkin (Göteborg University, Sweden)
Edwin Blake (University of Cape Town, South Africa)
Don Bouwhuis (Technische Universiteit Eindhoven, The Netherlands)
Jonah Brucker-Cohen (Trinity College Dublin, Ireland)
Brad Bushman (University of Michigan, USA)
Marc Cavazza (University of Teesside, United Kingdom)
Liming Chen (Ecole Centrale de Lyon, France)
Adrian Cheok (National University of Singapore, Singapore)
Jeffrey Cohn (University of Pittsburgh, USA)
Roger Dannenberg (Carnegie Mellon University, USA)
John Debenham (University of Technology, Australia)
Jürgen Enge (Zentrum für Kunst und Medientechnologie, Germany)
Loe Feijs (Technische Universiteit Eindhoven, The Netherlands)
Sidney Fels (University of British Columbia, Canada)
Franz Fischnaller (University of Illinois at Chicago, USA)
Christian Freksa (University of Bremen, Germany)
Masahiro Fujita (SONY, Japan)
Catherine Garbay (CNRS, France)
Bill Gaver (Royal College of Art, United Kingdom)
Ian Gibson (Academy of Interactive Entertainment, Australia)
Andrew Glassner (Coyote Wind Studios, USA)
Martin Goebel (flexilution, Germany)
Tom Gross (Bauhaus-University Weimar, Germany)
Reinder Haakma (Philips Research, The Netherlands)
Sture Hägglund (Linkoping University, Sweden)
Michael Haller (Upper Austria University of Applied Sciences, Austria)
Dong-Han Ham (ETRI, Korea)
Goffredo Haus (State University of Milan, Italy)
Ernst A. Heinz (International University, Germany)
Michael Herczeg (University of Luebeck, Germany)
Jaap van den Herik (University of Maastricht, The Netherlands)
Yibin Hou (Beijing University of Technology, China)
Hiroyuki Iida (University of Shizuoka, Japan)
Wijnand IJsselsteijn (Technische Universiteit Eindhoven, The Netherlands)
Ebroul Izquierdo (University of London, United Kingdom)
Anker Helms Jørgensen (University of Copenhagen, Denmark)
Oussama Khatib (Stanford University, USA)
Gudrun Klinker (Technical University Munich, Germany)
Karl-Friedrich Kraiss (RWTH Aachen, Germany)
Thomas Landsburg (In-Fusio, France)
Fatima Lasay (University of the Philippines, Philippines)
James Lester (North Carolina State University, USA)
Peri Loucopoulos (UMIST, United Kingdom)
Henry Lowood (Stanford University, USA)
Michael Macedonia (Georgia Tech, USA)
Don Marinelli (Carnegie Mellon University, USA)
Jeroen van Mastrigt (Hooghe School voor Kunst, The Netherlands)
Hitoshi Matsubara (Future University-Hakodate, Japan)
Frans Mayra (University of Tampere, Finland)
Gary McDarby (MediaLab Europe, Ireland)
Ivica Mitrovic (University of Split, Croatia)
Frank Nack (CWI, The Netherlands)
Ryohei Nakatsu (Kwansei Gakuin University, Japan)
Anton Nijholt (University of Twente, The Netherlands)
Dietmar Offenhuber (Ars Electronica Futurelab, Austria)
Michio Okada (ATR Network Informatics Laboratories, Japan)
Kees Overbeeke (Technische Universiteit Eindhoven, The Netherlands)
Mark Overmars (Utrecht University, The Netherlands)
René Paré (Grafico de Poost, The Netherlands)
X Organization

Paolo Petta (Medical University of Vienna, Austria)
Paul Plöger (FH Bonn Rhein Sieg, Germany)
Andriana Prentza (National Technical University of Athens, Greece)
Matthias Rauterberg (Technische Universiteit Eindhoven, The Netherlands)
Theresa-Marie Rhyne (North Carolina State University, USA)
Ben Salem (Technische Universiteit Eindhoven, The Netherlands)
Jonathan Schaeffer (University of Alberta, Canada)
Nikitas Sgouros (University of Piraeus, Greece)
Takanori Shibata (AIST, Japan)
Andy Sloane (University of Wolverhampton, United Kingdom)
Otto Spaniol (RWTH Aachen, Germany)
Pieter Spronck (Universiteit Maastricht, The Netherlands)
Scott Stevens (Carnegie Mellon University, USA)
Norbert Streitz (Fraunhofer IPSI, Germany)
Kazuo Tanie (AIST, Japan)
Naoko Tosa (Entertainment Computing Labs., Japan)
Bodo Urban (Fraunhofer Institute for Computer Graphics, Germany)
Frans Vogelaar (Kunsthochschule für Medien Köln, Germany)
Magdalena Wesolkowska (Concordia University, Canada)
Lars Wolf (Technical University Braunschweig, Germany)
Jeremy Wyatt (University of Birmingham, United Kingdom)
Ken Young (University of Warwick, United Kingdom)

Organizing Committee

Chair
Ben Salem (Technische Universiteit Eindhoven, The Netherlands)

Secretary
Helen Maas-Zaan (Technische Universiteit Eindhoven, The Netherlands)
Martine Tiessen (Universiteit Maastricht, The Netherlands)
Nora Tonnaer (Technische Universiteit Eindhoven, The Netherlands)

Treasurer
Ben Salem (Technische Universiteit Eindhoven, The Netherlands)

Web Design
Christoph Bartneck (Technische Universiteit Eindhoven, The Netherlands)

Student Volunteers
Erik van Alphen, Willeke van de Linden, Serge Offermans, Joep van Poppel, Rik Runge, Dick Rutten, Linda Valk, Harry Vermeulen, Thomas Visser (Technische Universiteit Eindhoven, The Netherlands)
Sponsors

TU/e: Technical University of Eindhoven
TU/e-ID: Department of Industrial Design
TU/e-JFS: J.F. Schouten School for User-System Interaction Research
KNAW: Royal Netherlands Academy of Arts and Sciences
NWO: Netherlands Organisation for Scientific Research
ERCIM: European Research Consortium for Informatics and Mathematics
IOP-MMI: Innovation-Oriented Research Program Human-Machine Interaction

Cooperating Societies

Association for Computing Machinery: SIGCHI and SIGGRAPH
Association for Robotics & Automation
Associazione Italiana per l’Intelligenza Artificiale
Australian Computer Society
British Computer Society
Computer Professionals for Social Responsibility
Computer Society of India
Digital Games Research Association
Dutch Chapter of SIGCHI
Dutch Computer Society
Francophone Human-Computer Interaction Association
German Informatics Society: SIG Communication & Distributed Systems
Icelandic Society for Information Processing
Norwegian Computer Society
Philippine Computer Society
Royal Institution of Engineers in the Netherlands
Swiss Informatics Society
Usability Professionals’ Association
A new Technical Committee (TC) on Entertainment Computing was proposed to IFIP (approval pending) in the following way:

**TC Title**

Entertainment Computing

**Aims**

To encourage computer applications for entertainment and to enhance computer utilization in the home, the technical committee will pursue the following aims:

- to enhance algorithmic research on board and card games
- to promote new types of entertainment using information technologies
- to encourage hardware technology research and development to facilitate implementing entertainment systems, and
- to encourage non-traditional human interface technologies for entertainment.

**Scope**

1. Algorithms and strategies for board and card games (algorithms of board and card games; strategy controls for board and card games; level setups for game and card games).
3. Audio (music informatics for entertainment; 3D audio for entertainment; sound effects for entertainment).
5. Entertainment robots (ICT-based toys; pet robots; mental commit robots; emotion models and rendering technologies for robots).
6. Entertainment systems (design of entertainment systems; entertainment design toolkits; authoring systems).
7. Theoretical aspects of entertainment (sociology, psychology and physiology for entertainment; legal aspects of entertainment).
8. Video game and animation technologies (video game hardware and software technologies; video game design toolkits; motion capture and motion design; interactive story telling; digital actors and emotion models).
9. Interactive TV and movies (multiple-view synthesis; free viewpoint TV; authoring technologies).
10. Edutainment (entertainment technologies for children’s education; open environment entertainment robots for education).
Members: As first members of this TC, Ryohei Nakatsu is named as chair (contact: nakatsu@ksc.kwansei.ac.jp), Matthias Rauterberg as vice-chair, and Claudio Pinhanez as secretary.

TC Activities: The 3rd International Conference on Entertainment Computing (ICEC) was organized. The next ICEC will be held in 2005 in Japan. SG16 became a sponsor of the international 10th Advances in Computer Games Conference (ACG-10), that was held in November 2003 at Graz, Austria. Two panel sessions were organized: (1) at the IFIP TC13 INTERACT conference in 2001 (Japan), and (2) at the IFIP World Computer Congress in 2002 (Canada). An additional Topical Day “Virtual Realities and New Entertainment” was held at the IFIP World Computer Congress in August 2004 (France).


Working Groups (WG) Under TC ‘Entertainment Computing’

WG16.1 Digital Storytelling

Scope: Storytelling is one of the core technologies of entertainment. Especially with the advancement of information and communication technologies (ICT), new types of entertainment called video games have been developed where interactive story development is the key that makes those games really entertaining. At the same time, however, the difference between interactive storytelling and conventional storytelling has not been well studied. Also, as the development of interactive storytelling needs a lot of time and human power, it is crucial to develop technologies for automatic or semiautomatic story development. The objective of this working group is to study and discuss these issues.

Members: As a first member of this WG16.1, Marc Cavazza is named as chair (contact: m.o.cavazza@tees.ac.uk).

WG16.1 Activities: Already there are several conferences/workshops on digital storytelling. To establish a link between IFIP and these conferences/workshops is the first activity of WG16.1.

WG16.2 Entertainment Robots

Scope: Robots are becoming one of the most appealing forms of entertainment. New entertainment robots and/or pet robots are becoming popular. Also, from the theoretical point of view, compared with computer graphics based characters/animations, the robot is an interesting research object as it has a physical entity. Taking these issues into consideration, it was decided at the SG16 annual meeting that a new working group on entertainment robots is to be established.

Members: As a first member of WG16.2, Hitoshi Matsubara is named as chair (contact: matsubar@fun.ac.jp).
**WG16.2 Activities:** As a first activity of this working group, WG16.2 organized a national workshop on entertainment computing, Entertainment Computing 2003, held during Jan. 13–15 at Osaka (Japan). It attracted more than 120 attendees and 30 papers.

**WG16.2 publications:** The proceedings were published by IPSJ (Information Processing Society of Japan) as a special issue on “Entertainment Computing,” IPSJ Symposium Series, No.1, 2003.

**WG16.3 Theoretical Basis of Entertainment**

*Scope:* Although there are huge entertainment industries already, such as video games, toys, robots, etc., little academic interest has been paid to such questions as what is the core of the entertainment, what are the technologies that could create new entertainment, and how can the core technologies of entertainment be applied to other areas such as education, learning and so on. The main objective of this WG is to study these issues.

*Members:* As a first member of WG16.3, Matthias Rauterberg is named as chair (contact: g.w.m.rauterberg@tue.nl).

Anyone who is qualified and interested in active participation in one of the working groups is kindly invited to contact one of the WG chairs.
Editor’s Note

ICEC 2004 attracted 62 full-paper submissions, 40 short-paper submissions, 8 poster submissions and 4 demo submissions, in total 114 submissions.

Based on a thorough review and selection process done by 93 international experts from academia and industry as members of the program committee, a high-quality program was compiled. The international program committee consisted of experts from all over the world: 3 from Australia, 3 from Austria, 3 from Canada, 1 from China, 1 from Croatia, 2 from Denmark, 1 from Finland, 6 from France, 15 from Germany, 2 from Greece, 2 from Ireland, 2 from Italy, 8 from Japan, 1 from Korea, 16 from the Netherlands, 1 from New Zealand, 1 from the Philippines, 1 from Singapore, 1 from South Africa, 3 from Sweden, 1 from Switzerland, 7 from the United Kingdom, and 12 from the United States.

The final decision was made by review and conference chairs based on feedback from at least two reviewers available online via the conference management tool. As a result, 27 full papers were directly accepted as submitted, and for the acceptable remaining 21 submissions their status was changed: 9 were accepted as short papers, and 12 as posters; 14 full-paper submissions were definitively rejected; 19 short papers were directly accepted as submitted, and for 10 others their status was changed, to 8 posters and 2 demo papers, for final acceptance; 11 short-paper submissions were definitively rejected; 3 poster paper submissions were accepted and 5 rejected; 3 demo paper submissions were accepted and 1 rejected.

Finally 27 full papers, 27 short papers, 18 poster papers, 3 demo papers, and in addition 3 keynote papers plus 3 specially invited topic papers were compiled and are presented in this book. All these papers could be allocated to one of the following topics: (1) advanced interaction design; (2) art, design and media; (3) augmented, virtual and mixed reality; (4) computer games; (5) human factors of games; (6) intelligent games; (7) mobile entertainment; (8) sound and music; and (9) visual media engineering. Papers per topic are ordered as follows: full papers, short papers, demo papers, and poster papers.
# Table of Contents

## I Invited Presentations

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ludic Engagement and Immersion as a Generic Paradigm for Human-Computer Interaction Design</td>
<td>Craig A. Lindley</td>
<td>3</td>
</tr>
<tr>
<td>Realization of Tai-Chi Motion Using a Humanoid Robot</td>
<td>Takenori Wama, Masayuki Higuchi, Hajime Sakamoto, Ryohei Nakatsu</td>
<td>14</td>
</tr>
<tr>
<td>Building Better Systems for Learning and Training: Bringing the Entertainment Industry and Simulation Technology Together</td>
<td>William R. Swartout</td>
<td>20</td>
</tr>
<tr>
<td>Game Intelligence: From Animal Play Behavior to Entertainment Computing</td>
<td>Marion Bönsch-Kauke</td>
<td>21</td>
</tr>
<tr>
<td>Effects of Violent Video Games on Aggressive Behavior, Helping Behavior, Aggressive Thoughts, Angry Feelings, and Physiological Arousal</td>
<td>Brad Bushman</td>
<td>22</td>
</tr>
<tr>
<td>New Behavioural Approaches for Virtual Environments</td>
<td>Marc Cavazza, Simon Hartley, Jean-Luc Lugrin, Paolo Libardi, Mikael Le Bras</td>
<td>23</td>
</tr>
</tbody>
</table>

## II Advanced Interaction Design

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Kuru-kuru Pitcher”: A Game for the Scape Internet Chair</td>
<td>Kazuya Adachi, Michael Cohen, Uresh Duminduwardena, Kayoko Kanno</td>
<td>35</td>
</tr>
<tr>
<td>Fun and Sports: Enhancing the Home Fitness Experience</td>
<td>Wijnand IJsselsteijn, Yvonne de Kort, Joyce Westerink, Marko de Jager, Ronald Bonants</td>
<td>46</td>
</tr>
<tr>
<td>Manipulating Multimedia Contents with Tangible Media Control System</td>
<td>Sejin Oh, Woontack Woo</td>
<td>57</td>
</tr>
<tr>
<td>“Tangible Influence”: Towards a New Interaction Paradigm for Computer Games</td>
<td>Marco Vala, Ana Paiva, Rui Prada</td>
<td>68</td>
</tr>
</tbody>
</table>
Computer Supported Collaborative Sports: Creating Social Spaces
Filled with Sports Activities ............................................. 80
Volker Wulf, Eckehard F. Moritz, Christian Henneke, Kanan Al-Zubaidi, Gunnar Stevens

Optical-Flow-Driven Gadgets for Gaming User Interface ................. 90
Zoran Zivkovic

The Human-Information Workspace (HI-Space):
Ambient Table Top Entertainment ........................................ 101
Andrew J. Cowell, Richard May, Nick Cramer

Game-Driven Intelligent Tutoring Systems ................................ 108
Marco A. Gómez-Martín, Pedro P. Gómez-Martín, Pedro A. González-Calero

Practice! YUBIMOJI AIUEO for Japanese Hand Language Learning .... 114
Takao Terano, Fusako Kusunoki, Yasushi Harada, Miki Namatame

The Bush Telegraph: Networked Cooperative Music-Making ............. 120
Rodney Berry, Mao Makino, Naoto Hikawa, Masami Suzuki

III  Art, Design, and Media

Live Role-Playing Games: Implications for Pervasive Gaming .......... 127
Jennica Falk, Glorianna Davenport

Animating Conversation in Online Games ................................ 139
Hannes Högni Vilhjálmsson

From Artistry to Automation: A Structured Methodology
for Procedural Content Creation ............................................ 151
Timothy Roden, Ian Parberry

Commedia Virtuale: Theatre Inspiration for Expressive Avatars .......... 157
Ben Salem

Take the Money and Run? An Ethical Approach to the Relation
Between Game Research and Game Industry ............................ 163
Miguel Sicart

Moved by Movements: How Character Movements Cue Us to Form
Specific Genre and Affective Impressions ................................ 168
Valentijn Visch

Improvisation in Theatre Rehearsals for Synthetic Actors .............. 172
Tony Meyer, Chris Messom
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment and Entertainment in East and West</td>
<td>176</td>
</tr>
<tr>
<td><em>Matthias Rauterberg</em></td>
<td></td>
</tr>
<tr>
<td>IV Augmented, Virtual, and Mixed Reality</td>
<td></td>
</tr>
<tr>
<td>Interactive Props and Choreography Planning with the Mixed Reality Stage</td>
<td>185</td>
</tr>
<tr>
<td>Wolfgang Broll, Stefan Grünvogel, Iris Herbst, Irma Lindt, Martin Maercker, Jan Ohlenburg, Michael Wittkämper</td>
<td></td>
</tr>
<tr>
<td>The Interactive and Multi-protagonist Film: A Hypermovie on DVD</td>
<td>193</td>
</tr>
<tr>
<td>André Melzer, Sebastian Hasse, Oliver Jeskulke, Inga Schön, Michael Herczeg</td>
<td></td>
</tr>
<tr>
<td>Apply Social Network Analysis and Data Mining to Dynamic Task Synthesis for Persistent MMORPG Virtual World</td>
<td>204</td>
</tr>
<tr>
<td>Larry Shi, Weiyun Huang</td>
<td></td>
</tr>
<tr>
<td>How Realistic is Realism? Considerations on the Aesthetics of Computer Games</td>
<td>216</td>
</tr>
<tr>
<td>Richard Wages, Stefan M. Grünvogel, Benno Grützmacher</td>
<td></td>
</tr>
<tr>
<td>Read-It: A Multi-modal Tangible Interface for Children Who Learn to Read</td>
<td>226</td>
</tr>
<tr>
<td>Ivo Weevers, Wouter Sluis, Claudia van Schijndel, Siska Fitrianie, Lyuba Kolos-Mazuryk, Jean-Bernard Martens</td>
<td></td>
</tr>
<tr>
<td>Exploiting Films and Multiple Subtitles Interaction for Casual Foreign Language Learning in the Living Room</td>
<td>235</td>
</tr>
<tr>
<td>Victor Bayon</td>
<td></td>
</tr>
<tr>
<td>CLOVES: A Virtual World Builder for Constructing Virtual Environments for Science Inquiry Learning</td>
<td>241</td>
</tr>
<tr>
<td>Yongjoo Cho, Kyoung Shin Park, Thomas Moher, Andrew E. Johnson, Juno Chang, Min Cheol Whang, Joa Sang Lim, Dae-Woong Rhee, Kang Ryoung Park, Hung Kook Park</td>
<td></td>
</tr>
<tr>
<td>SEITV – Interactive Multimedia Leisure/Educational Services for Digital TV in MHP</td>
<td>248</td>
</tr>
<tr>
<td>Julián Flórez, Igor García, Iker Aizpurua, Céline Paloc, Alejandro Ugarte, Igor Jainaga, Jesús Colet, Xabier Zubiaur</td>
<td></td>
</tr>
<tr>
<td>Tangible Augmented Reality Modeling</td>
<td>254</td>
</tr>
<tr>
<td>Ja Yong Park, Jong Weon Lee</td>
<td></td>
</tr>
<tr>
<td>Human Body Tracking for Human Computer Intelligent Interaction</td>
<td>260</td>
</tr>
<tr>
<td>Jong-Seung Park, Sang-Rak Lee</td>
<td></td>
</tr>
</tbody>
</table>
A Graphical System for Interactive Rendering of Objects in an Augmented Reality Scenery ........................................ 266
    Uwe Berner, Norbert Braun, Sofia Kolebinova

V Computer Games

TEAM: The Team-Oriented Evolutionary Adaptability Mechanism .............. 273
    Sander Bakkes, Pieter Spronck, Eric Postma

Size Variation and Flow Experience of Physical Game Support Objects ........ 283
    Loe M.G. Feijs, Peter Peters, Berry Eggen

Enhancing the Performance of Dynamic Scripting in Computer Games .......... 296
    Pieter Spronck, Ida Sprinkhuizen-Kuyper, Eric Postma

Open-Source Game Development with the Multi-user Publishing Environment (MUPE) Application Platform ........................................ 308
    Riku Suomela, Eero Räsänen, Ari Koivisto, Jouka Mattila

Player-Centered Game Environments: Assessing Player Opinions, Experiences, and Issues ........................................ 321
    Penelope Sweetser, Daniel Johnson

An Application of Game-Refinement Theory to Mah Jong ...................... 333
    Hiroyuki Iida, Kazutoshi Takahara, Jun Nagashima,
    Yoichiro Kajihara, Tsuyoshi Hashimoto

The Design and Implementation of Multi-player Card Games on Multi-user Interactive Tabletop Surfaces ........................................... 339
    Shwetak N. Patel, John A. Bunch, Kyle D. Forkner, Logan W. Johnson,
    Tiffany M. Johnson, Michael N. Rosack, Gregory D. Abowd

Entertainment Feature of a Computer Game Using a Biological Signal to Realize a Battle with Oneself ............................ 345
    Shigeru Sakurazawa, Nagisa Munekata, Naofumi Yoshida,
    Yasuo Tsukahara, Hitoshi Matsubara

AI: the Missing Link in Digital Game Interface Design? ....................... 351
    Darryl Charles, Daniel Livingstone

Engaging Game Characters: Informing Design with Player Perspectives ...... 355
    Penelope Drennan, Stephen Viller, Peta Wyeth

Emergent Stories in Massively Multiplayer Online Games: Using Improvisational Techniques to Design for Emotional Impact ............ 359
    Brenda Harger, David Jimison, Eben Myers, Ben Smith,
    Shanna Tellerman
### VI Human Factors of Games

Towards a Framework for Design Guidelines for Young Children’s Computer Games .......................................................... 365  
*Wolmet Barendregt, Mathilde M. Bekker*

Social Translucence of the Xbox Live Voice Channel ........................................ 377  
*Martin R. Gibbs, Kevin Hew, Greg Wadley*

Artifact-Based Human-Computer Interface for the Handicapped .................... 386  
*Ki-Hong Kim, Hong-Kee Kim, Wook-Ho Son*

A Home Page Is Where the Heart Is: Using Games Based Design Techniques to Enhance Contact Centre Interfaces ........................................ 393  
*Nicola J. Millard, Paul K. Buckley, Faye Skinner, Rosita Venousiou*

Avoiding Average: Recording Interaction Data to Design for Specific User Groups ........................................ 398  
*Nick Fine, Willem-Paul Brinkman*

Physiological Response to Games and Non-games: A Contrastive Study ......... 402  
*Karina Oertel, Gösta Fischer, Holger Diener*

### VII Intelligent Games

Probabilistic Opponent-Model Search in Bao ........................................ 409  
*Jeroen Donkers, Jaap van den Herik, Jos Uiterwijk*

Agent Wars with Artificial Immune Systems ........................................ 420  
*Gayle Leen, Colin Fyfe*

MMOG Player Classification Using Hidden Markov Models .......................... 429  
*Yoshitaka Matsumoto, Ruck Thawonmas*

Expanding Spheres: A Collision Detection Algorithm for Interest Management in Networked Games ........................................ 435  
*Graham Morgan, Kier Storey, Fengyun Lu*

Electronic Augmentation of Traditional Board Games .................................. 441  
*Clim J. de Boer, Maarten H. Lamers*

Strategy Selection in Games Using Co-evolution Between Artificial Immune Systems ........................................ 445  
*Donald MacDonald, Colin Fyfe*

Level of Detail Modelling in a Computer Game Engine .................................. 451  
*Francisco Ramos, Miguel Chover*
## VIII Mobile Entertainment

<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networked Mobile Gaming for 3G-Networks</td>
<td>457</td>
</tr>
<tr>
<td><em>Amjad Akkawi, Sibylle Schaller, Oliver Wellnitz, Lars Wolf</em></td>
<td></td>
</tr>
<tr>
<td>Mobile Games for Training Tactile Perception</td>
<td>468</td>
</tr>
<tr>
<td><em>Grigori Evreinov, Tatiana Evreinova, Roope Raisamo</em></td>
<td></td>
</tr>
<tr>
<td>Emotionally Loaded Mobile Multimedia Messaging</td>
<td>476</td>
</tr>
<tr>
<td><em>Timo Saari, Marko Turpeinen, Jari Laarni, Niklas Ravaja, Kari Kallinen</em></td>
<td></td>
</tr>
<tr>
<td>“Why Is Everyone Inside Me?!” Using Shared Displays</td>
<td>487</td>
</tr>
<tr>
<td>in Mobile Computer Games</td>
<td></td>
</tr>
<tr>
<td><em>Johan Sanneblad, Lars Erik Holmquist</em></td>
<td></td>
</tr>
<tr>
<td>Associated Emotion and Its Expression in an Entertainment Robot QRIO</td>
<td>499</td>
</tr>
<tr>
<td><em>Fumihide Tanaka, Kuniaki Noda, Tsutomu Sawada, Masahiro Fujita</em></td>
<td></td>
</tr>
<tr>
<td>Position-Aware IEEE 802.11b Mobile Video Services</td>
<td>505</td>
</tr>
<tr>
<td><em>Rafael Asorey-Cacheda, Francisco J. González-Castaño, Enrique Costa-Montenegro, Ignacio López-Cabido, Andrés Gómez-Tato, José Carlos Pérez-Gómez</em></td>
<td></td>
</tr>
<tr>
<td>A Human-Pet Interactive Entertainment System over the Internet</td>
<td>509</td>
</tr>
<tr>
<td><em>Lee Shang Ping, Farzam Farbiz, Adrian David Cheok</em></td>
<td></td>
</tr>
<tr>
<td>Developing and Evaluating Mobile Entertainment Applications:</td>
<td>513</td>
</tr>
<tr>
<td>The Case of the Music Industry</td>
<td></td>
</tr>
<tr>
<td><em>Vasilios Koutsouris, Pavlos Vlachos, Adam Vrechopoulos</em></td>
<td></td>
</tr>
<tr>
<td>An Entertaining Way to Access Web Content</td>
<td>518</td>
</tr>
<tr>
<td><em>Giacomo Poretti, Alberto Sollberger</em></td>
<td></td>
</tr>
<tr>
<td>Design of an Interface for Technology Supported Collaborative</td>
<td>522</td>
</tr>
<tr>
<td>Learning – The RAFT Approach</td>
<td></td>
</tr>
<tr>
<td><em>Lucia Terrenghi, Marcus Specht, Moritz Stefaner</em></td>
<td></td>
</tr>
</tbody>
</table>

## IX Sound and Music

<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>iFP: A Music Interface Using an Expressive Performance Template</td>
<td>529</td>
</tr>
<tr>
<td><em>Haruhiro Katayose, Keita Okudaira</em></td>
<td></td>
</tr>
<tr>
<td>Sound Pryer: Adding Value to Traffic Encounters with Streaming Audio</td>
<td>541</td>
</tr>
<tr>
<td><em>Mattias Östergren</em></td>
<td></td>
</tr>
</tbody>
</table>
Harmonics Table: Audiovisual Expression of Group Interaction on a Sensing Table .................................................... 553
  Sangwoong Hwang, Hyunchul Park, Chansuk Yang, Manjai Lee

Hello-Fish: Interacting with Pet Fishes Through Animated Digital Wallpaper on a Screen ............................................. 559
  Sunyean Jang, Manjai Lee

Background Music Generation Using Music Texture Synthesis .......... 565
  Min-Joon Yoo, In-Kwon Lee, Jung-Ju Choi

A Progressive Sounding Object Model in Virtual Environment ........ 571
  Qiong Zhang, Taiyi Chen

X  Visual Media Engineering

Automatic Visual Data Management System ........................................ 579
  Jae-Ho Lee, Sang-Hoon Park, Young-Jin Choi, Whoi-Yul Kim

Development of Extemporaneous Performance by Synthetic Actors in the Rehearsal Process .................................................... 586
  Tony Meyer, Chris Messom

An Efficient CLOD Method for Large-Scale Terrain Visualization ........ 592
  Byeong-Seok Shin, Ei-Kyu Choi

Integrating Ideas About Invisible Playgrounds from Play Theory into Online Educational Digital Games ......................... 598
  Darryl Charles, Moira McAlister

EffecTV: A Real-Time Software Video Effect Processor for Entertainment .................................................. 602
  Kentaro Fukuchi, Sam Mertens, Ed Tannenbaum

Web-Based Tool for Analyzing Emotions Through Images and Generating a Music Therapy System ......................... 606
  Taesik Kim, Hyeyoung Kim

Turning Photo Annotating Tasks into Instant Messaging Fun:
Prototyping, User Trials, and Roadmapping ................................ 610
  Yuechen Qian, Loe M.G. Feijs

Author Index ................................................... 615