The Proceedings of

Third IEEE International Games Innovation Conference

(IGIC 2011)

November 2-3, 2011 in Orange, California, USA

PART A

Editor

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Rambus Inc.

IEEE catalog number: CFP11GIC-CDR

ISBN: 978-1-4577-0257-0

IEEE International Games Innovation Conference November 2-3, 2011

Chapman University City of Orange California USA (Near Disneyland and Newport Beach)

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IEEE Consumer Electronics Society President's Welcome Message

On behalf of the IEEE Consumer Electronics (CE) Society, I welcome each participant to the Third International Games Innovation Conference (IGIC) 2011 in Orange, California, USA.

The CE Society is delighted with a group of world class keynote speakers, including Trip Hawkins, Robert Mical, Craig Hampel, Raj Talluri, Susan Bonds, Brian Winn and Ohad Shvueli. We are pleased with the sessions and papers that have been assembled for the conference.

Games innovation represents an important and growing segment in consumer electronics. The conference focuses on design, research and development of hardware, software, middleware and applications used in game platforms, development and production and interfaces, along with next generation platforms. While game technology has traditionally focused on entertainment, in recent years the lessons applied to game platforms are being applied to other segments, as well, such as, business, education, medical, government and military. During this conference we will address and explore innovations being developed in game industry and beyond as result of earlier developments.

I want to express my sincere gratitude to Harold Hughes, General Chair of IGIC 2011, Narisa N.Y. Chu, Executive Chair, Sharon Peng, Executive Vice-Chair/Secretary, Gary Yip, Technical Program Committee, Chair, and James Parker, Vice-Chair, Executive Committee, the Technical Program Committee members, all the paper reviewers, keynote speakers, authors, and the participants for making this conference happen.

I, also, want to give a special thanks to Harold Hughes and Rambus for sponsoring the IGIC 2011 Conference. This support is greatly appreciated and helps the conference organizers to offer events surrounding the event.

I welcome each you to the International Games Innovation Conference 2011. Enjoy your participation, the conference sessions, and the many other activities at the IGIC 2011 in Orange, California, USA.

Stephen D. Dukes
President
IEEE Consumer Electronics Society

IEEE Computer Society President's Greetings

On behalf of the IEEE Computer Society, I'd like to thank you for inviting me to participate in the Third International Games Innovation Conference. This is an event that most people who don't know better, might equate to something like Comic-Con, or even a Trekkie fan get-together. But you who are here certainly understand better than most, the nature of the work done by the participants in this conference.

Your discipline incorporates most of the topics covered in many of our more serious-sounding conferences and publications, and takes those topics even further than our traditional Computer Science or Information Technology activities. In no particular order, serious games can include Cloud Computing technologies, software engineering, networking, AI, multimedia, security, privacy, database, programming languages, simulations, and every other conceivable technology in which Computer Society members participate. And of course, the environments in which this conference's participants "play," are used in the broadest range of research, development, and application areas. These range from military simulations and actual warfare, through to social network-based consumer games. It is no surprise then, that the cosponsors of this conference are the Consumer Electronic Society and Computer Society. Together we cover almost every dimension of the theme of this conference.

My own participation in games took place when I was a graduate student many years ago, and I'm proud to say that my early work was published in something called the Journal of Simulation and Games. The paper described an interactive gaming simulation that I wrote, where the computer played dominoes against a human player. There were parameters that I could adjust to vary the computer's play strategies, and to collect data to assess the merit of one strategy over another. To build the algorithms, I analyzed and simulated the play behavior of my wife.

I was very excited when I received the galleys of the article that described the project that was to be published in the journal. That is, I was happy until I saw the typeset article that described my approach, not as simulating but as stimulating the play behavior of my wife! In any case, and aside from that typo that I have not lived down in my 44 of years of marriage, that application was a lot of fun for me to build, and even more fun for the players who played the game.

And here is where much of the software development work that you people do, differs from the work of traditional software developers. It is rare for software application users to experience a challenge, excitement, or fun when they use traditional computer applications. Can you imagine someone saying, 'I just had the greatest time doing a database query to analyze our sales revenue in the third quarter?' A challenge? It depends on how poorly the application has been designed. In fact, we try to deliberately excise the notion of 'challenge' from traditional software applications. Excitement? I suppose it depends on the personality of the user. But fun? In a database query? I doubt it.

The notion of 'fun' isn't usually a consideration when traditional software is built. But that's not true about games - serious or otherwise. In fact, I would venture that most traditional software developers don't even know what 'fun' is, in terms of building it into a software application. Of course we care more and more about matters related to usability and HCI, but fun?

So many of you have a unique set of skills that go beyond those of traditional software developers -- creating software that is challenging, exciting, and often times, fun. And with this notion in mind, I challenge you all to continue to have fun, while making fun, especially as you spend the next few days at this conference.

Dr. Sorel Reisman
President, IEEE Computer Society
Managing Director, MERLOT.ORG
California State University, Office of the Chancellor
Professor, Information Systems, CSU Fullerton

Message from the Executive Chair

As digital games are touching many in daily lives: inside or outside the car, during lunch, after dinner, following the phone and PC to campus or as far reaching as to the beaches, it is my privilege, today, as the Executive Chair, to welcome you to the IEEE 3rd International Games Innovation Conference 2011, here on the campus of Chapman University. This is the time we share our professional devotion to a technology driving force that has established itself as the corner stone for many innovations and challenges in consumer electronics and computers, research and development.

Over the last year, a group of veteran and dedicated Organizing Committee members has worked diligently, with the intention to make the next 2 days a compact, fruitful and enjoyable experience for all who participate. I am proud to say that a stage is set reflecting what we have carefully cultivated to assure novel delivery of thoughts and practices from pioneers, innovators, entrepreneurs, and serious thinkers and doers from the Games Community in a global scale. I also humbly realize that other Games Forums and Shows around the world have stimulated major momentum and foresights for us to explore new minds in the horizon. In that context, joint efforts across professional societies and countries are key ingredients to success, such has been nourished under the leadership of the IEEE Consumer Electronics Society's President, Stephen Dukes. Along the same vein, I would also like to sincerely acknowledge the President of Computer Society, Dr. Sorel Reisman, representing the co-sponsors, who is also with us today.

Speaking from my background, the chance of playing while working is always in the back of my mind, ever since my involvement in Artificial Intelligence in the 1980's with Bell Labs and Networking Games in the 2000's with Verizon FiOS. However, I would never admit it in the public until today. As I am in the midst of healthcare rehab development using games, the boundary of serious and casual games is becoming increasingly blurry. It behooves us to marching Games into this digital world with an absolutely open mind and to increase our engineering and scientific competency with continuous, multi-disciplinary training. On this front, I would like to thank Gary Yip of Rambus Incorporated, to have taken on such a daunting task, in an extremely cramped schedule, to present us with a world class compact program. It is without saying that financial backing from Rambus has been the primary impetus for us to raise the bar involving both industry and academia.

Indeed, time has changed that working without playing is no fun, and playing without working is not meeting today's economic challenge. Let's work hard, talk loud, and play intelligently in the next 2 days. Please also don't forget, Mickey Mouse is our neighbor and you are within a short driving distance to the Pacific Ocean. On behalf of the IGIC 2011 Organizing Committee, I would like to extend our biggest welcome.

Narisa Chu, Ph.D.
Executive Chair
IGIC 2011

Message from the Technical Program Chair

When I took on the responsibility to organize the IGIC program this year, an obvious evolution seemed to be to transform the conference into a joint industry-academia event. In order to achieve this goal, I continued the effort of the previous conferences in 2009 and 2010 to grow the event into an international platform for disseminating research and development of games and related technologies. I hope that these two areas of growth continue to be a tradition for IGIC in following years.

The conference has successfully attracted papers from authors worldwide to share their work to a mixed audience from industry and academia. The program is filled with a wide range of topics divided into seven distinct sessions: (1) Innovative Ideas for Games, (2) Lessons Learned, Social Impact and Cultural Impact, (3) Games for Business and Multiple Players, (4) Learning, Training and Exercise, (5) Design of Game, (6) Interface Device, Location Awareness and Security, and (7) Education, Health and Training. Most of the contributors are from universities in different parts of the world, including Asia, Europe, and the Americas.

Industry participants have also recognized the unique opportunity provided by IGIC 2011 to share the results of their research and development that impact game play through new applications in hardware and software. We are very fortunate to hear their vision on the future of games, including how games will be played, innovative technology for game play, as well as the business and security aspects of games over networks and on the cloud.

One can realize from the collection of reviewed papers presented in this conference that serious games have contributed to non-entertainment applications that benefit the medical and health industry, business, education, professional training as well as social interactions. A special session focusing on the social and behavioral impacts of games provides views from experts of humanity disciplines.

To achieve my original goal of providing a platform for interactions between industry and academia, the second new tradition of hosting an Innovation Summit was formed back in February this year. I was encouraged by the positive response of IGIC 2011 organizing committee and started the search for Summit speakers from both industry and academia. This endeavor has brought to the audience five outstanding speakers who are practitioners of different aspects of games. The early commitments by Trip Hawkins, Robert Mical, Craig Hampel, Ohad Shvueli and Brian Winn became the foundation of this conference, which has enabled us to build up a rich and diverse technical program over the past six months.

It was obvious by mid-summer that we had the momentum to expand the Summit to both days of the program. We are glad to have veterans in game research from IBM, innovators from technology companies like Rambus and Qualcomm, an accomplished expert in ARGs for the entertainment business, and an outstanding Southern California educator who has successfully graduated many

outstanding students to enter the game development industry. I would like to invite you to check out the complete line-up of speakers for IGIC 2011 in a later section of the conference proceedings.

The dedication of many individuals and sacrifice of their time are responsible for this year's rich and diverse technical program. I would like to thank the paper reviewers, William Fisher, Daniel Frost, Patricia Gouveia, Robert J. Hall, Wen-Chung Kao, William Lumpkins, Genaro Rebolledo-Mendez, Andrew Phelps, Teresa Romao, Alf Inge Wang and William Ng.

It is also important to point out that the three Technical Program Vice-chairs have contributed in different ways according to their background. James Parker solicited papers from researchers across Canada and encouraged them to participate in the conference. William Fisher always responded quickly and professionally to all my requests for help during and after the paper review process, while taking care of his other responsibilities in the organizing committee. Deborah Dressler was always there to discuss and offer opinions during the search for speakers from industry. Lastly, I want to thank Rambus management for allowing me to spend time in organizing the technical program.

T. Gary Yip

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IEEE 2011 IGIC

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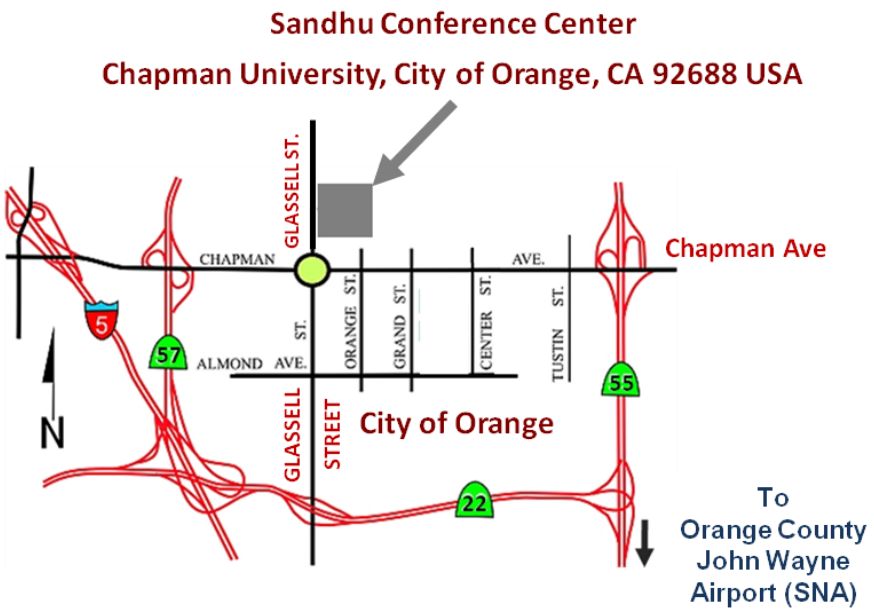
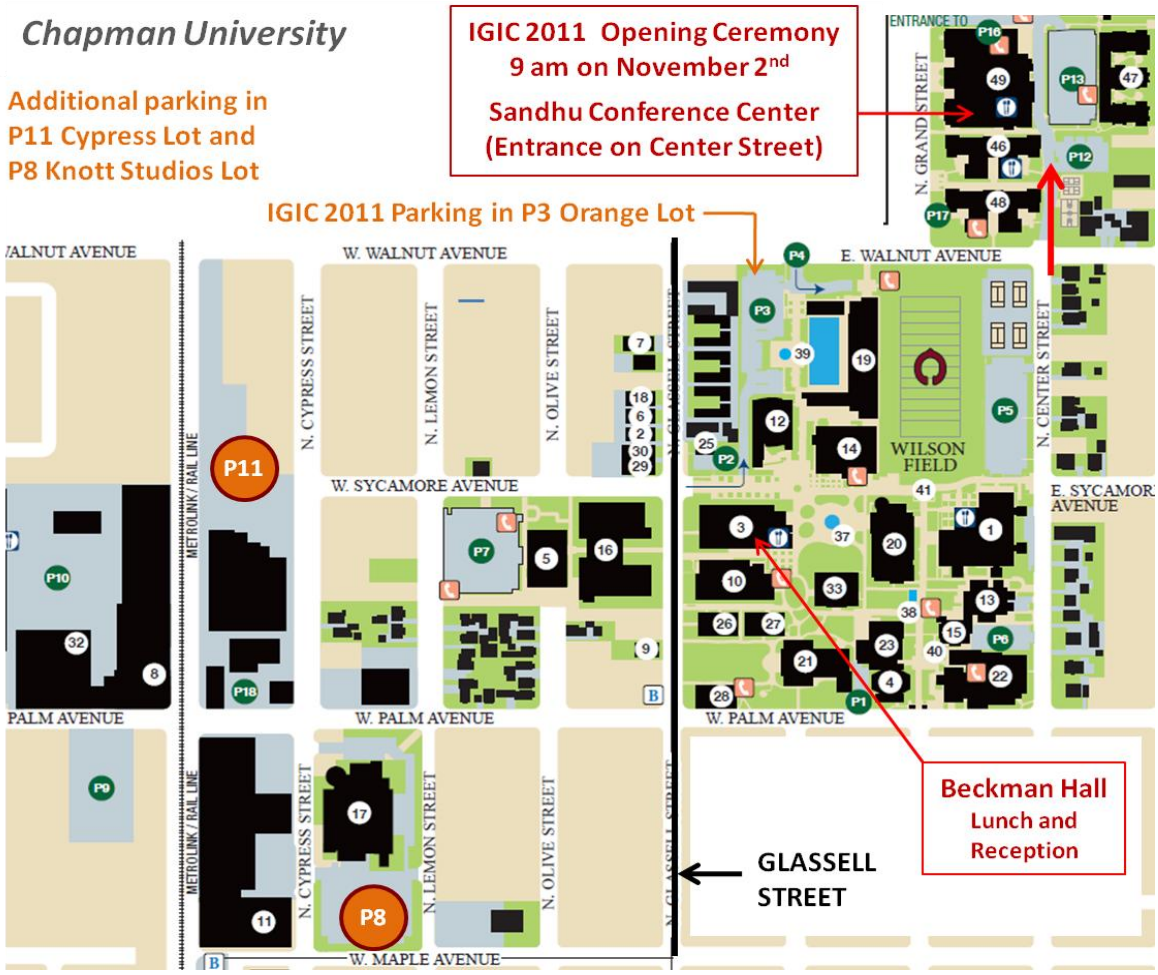
Conference Venue and Driving Directions





Speakers

Opening Keynote
Trip Hawkins
Founder, EA
Digital Chocolate

Award Keynote
Craig Hampel
Rambus Fellow

Innovation Summit Keynote
Ohad Shvueli
PrimeSense

Reception Keynote
Robert Mical
Pioneer in Video Game Industry from Sony

Innovation Summit Keynote
Dave Durnil
Qualcomm

Innovation Summit Speaker
Brian Winn
Michigan State University

Conference Keynote
Susan Bonds
CEO
42 Entertainment

Conference Keynote
Li-Te Cheng
IBM Research
Cambridge
Massachusetts

Innovation Summit Speaker
Steven Woo
Rambus Inc.

Conference Keynote
Phaedra Biondiris
IBM

Innovation Summit Speaker
Ben Jun
Cryptography Research Inc.

Conference Closing Keynote
Glennon Neubauer
Westwood College

Abstracts of Conference Keynote and Innovation Summit Presentations

The Next Big Thing for Games

Trip Hawkins, CEO, Digital Chocolate, San Mateo, USA

To paraphrase Carl Sagan, we now have billions and billions of devices that can be used to play video games. This is creating great disruption in the game industry and leading us into a new era that will be driven by user convenience. New game architectures will be cross-platform, interoperable and cloud-based with the ubiquitous browser emerging as the ultimate game platform.

Free Transistors: How Can Gaming Benefit From The Plenty?

Craig Hampel, Rambus Inc., Sunnyvale, USA

The economics of semiconductor content has been an instrumental force in driving gaming features and gaming experience for 30 years. Hardware cost reduction has helped finance the growth of gaming hardware. Today additional hardware features are virtually free from a semiconductor capital standpoint. However, a slowdown in power scaling has ended our ability to cool and power all of these inexpensive transistors all at once. This results in a change in how we view transistors as a

resource to provide value conditionally. This talk will take a look at new ways to get value from the inexpensive transistors.

Introducing a 3rd dimension to Natural Interaction

Ohad Shvueli, VP, PrimeSense

In the Industrial Revolution era, as machines were invented and developed and introduced into every aspect of commercial and social life, man needed to adapt to these machines and learn to interface with them on the machines' terms. Pulling levers, turning knobs, cranking pulleys were all assumed necessary and inevitable in order to get the machine to function and perform such that man could utilize and gain the benefits of a specific machine. In the Digital age, much of that legacy mentality remained intact; we continue to punch holes in cards, click away at noisy, pain-inducing keyboards, search for the ever-remote remote control, and hope the TV responds to the button clicks. While these may appear to us as 2nd nature by now, they are NOT truly natural at all. In the Natural Interaction era, it is time for man to reclaim our position and demand that machines interface with us on our terms. Natural Interaction is the ability to use our naturally given abilities and senses to interact, just as we do in real life when interacting with other humans. This is the promise of Touch technologies, the foresight of Audio applications, and the Vision that PrimeSense brings with 3D sensing capabilities, making machines sentient, interactive and more natural to use than ever before.

Reception Keynote

Robert Mical, Pioneer in Video Game Industry from Sony

Innovation and Gaming – The Anytime, Anywhere Player

Dave Durnil, Qualcomm, USA

A brief chronology of 30+ years of video game systems to date and the innovations that empowered major inflection points; leading to a glimpse into what the future holds in our increasingly mobile, social and connected world.

The Process of Innovation in Game Design

Brian Winn, Michigan State University, USA

Innovation is what drives our industry forward. This innovation not only comes in the form of advances in technology, but also in advances in the design of games. This talk will discuss technological advances over time and how these advances have influenced innovation in games to date. A process for innovating and a framework for designing innovative games will be discussed.

Conference Keynote

Susan Bonds, President, 42 Entertainment, Pasadena, USA

Finding Moments of Play in the Enterprise

Li-Te Cheng, IBM Research, Cambridge, Massachusetts, USA

Games are changing how large corporations do business. This talk will review how enterprises are using games to help employees, examine challenges they face with integration, and opportunities for future innovation by the game community.

Challenges for Memory Systems in Future Gaming Platforms

Steven Woo, Rambus Inc., Sunnyvale, USA

Over the past 30+ years electronic gaming has become ubiquitous, venturing out of arcades and into our living rooms and personal devices. Throughout this evolution, gaming has been a key performance and technology driver across a wide range of platforms. Over this time memory system performance has steadily risen to meet the needs of gaming, primarily through increases in bandwidth and reductions in latency. As gaming continues to evolve, new platforms and new paradigms have emerged that present a growing set of challenges for future memory systems. This talk will address how technology trends and changes in gaming are impacting memory systems of the future.

Serious Games Untie the Gordion Knot - The Art of the Possible

Phaedra Boinodiris, Serious Games Program Manager, IBM, USA

Today, players from all over the globe log into realistic and real-time virtual worlds via the Internet; they learn different roles and skill sets, and come together in self-selecting teams to collaborate and carry out missions in pursuit of common goals. How is this any different than the challenges that await us in the global real-time economy we now inhabit? Serious games are a way for companies to create life-like simulations of real markets, customers & business situations that companies deal with every day. Come join Phaedra Boinodiris (IBM) as she redefines training by embracing new concepts like time travel in collaborative, contextual environments augmented by real-time data. This session will demonstrate how we can finally blur the lines between training and on-the-job visualization.

Security, Complexity, and the Future of Gaming

Benjamin Jun, VP and CTO, Cryptography Research, Inc., San Francisco, USA

Game hacks have long served as a barometer for software security. Today, we tantalize gamers with non-virtual rewards, offer cutting-edge consoles at subsidized prices, and shift entertainment to thinly protected mobile devices. Security approaches must coexist with – and address – growing system complexity.

Motivating Students to Become Possibility Strategists

Glennon Neubauer, Program Director, Westwood College, USA

Teaching students to be problem solvers merely prepares them to achieve immediate, although temporary results. Educational institutions must prime the students' passion to engage their imagination to become possibility strategists capable of devising new algorithms for continually advancing interactive, game-relevant technologies.

Special Sessions

Advance Graphics Programming on Next-Gen Mobile Platforms
Wolfgang Engel, Confetti Special Effects, San Diego USA

High Quality Mobile Experience (IEEE P2200)
"Impact of Data Caching over Network on Games"
Bill Fisher, Quicksilver, Irvine CA USA
Yehuda Hahn, SanDisk Corporation, Milpitas, USA

No Storage - No Games: The Role of Memory and Storage Architecture in Game Design and Performance
Tom Coughlin, Coughlin Associates, San Jose, USA
Michael Wang, Macronix, Milpitas, USA

Playing with Reality, Alternate Reality Games, Urban and Serious Play

Patricia Gouveia

Universida de Lusofona de Humanidades e Tecnologias, Portugal

Jeff Watson

University of Southern California, Los Angeles, USA

Tutorial

Culture, Learning, Play in Radically Connected Era
Adrian David Cheok, National University of Singapore and Keio University

Abstracts of Special Sessions

Playing with Reality, Alternate Reality Games, Urban and Serious Play

Patricia Gouveia, Universida de Lusofona de Humanidades e Tecnologias, Portugal
Jeff Watson, University of Southern California, Los Angeles, USA

Starting by questioning how digital games and networks can help us to change reality and generate concrete changes in social environments we will research the application of playful techniques and spaces to address the challenges of our present world. Transmedia experiences such as Alternate Reality Games (ARGs) and Urban & Serious Play (USP) can be useful to engage players in solving real questions. Using social game examples from different cultures the aim of these presentations is to promote and expand the field of experimental Alternate Reality Games (ARGs) and urban play experiences in a broader context.

Advanced Graphics Programming on Next-Gen Mobile Platforms

Wolfgang Engel, Confetti Special Effects, San Diego, USA

The talk will cover techniques for next-gen mobile devices. It will deal with Gamma correction, High-Dynamic Range Data and Light adaptation effects commonly found in Post-Processing Pipelines in Games. It will also cover new ways to compress vertex data to improve performance on future devices.

High Quality Mobile Experience (IEEE P2200) - Impact of Data Caching over Network on Games

Bill Fisher, Quicksilver Software, Irvine, USA
Yehuda Hahn, SanDisk Corporation, Milpitas, USA

Wireless network congestion is getting worse due to video streaming and similar high-data-rate services. Find out how the IEEE P2200 caching standard will improve the end-user experience by optimizing use of available bandwidth.

No Storage - No Games: The Role of Memory and Storage Architecture in Game Design and Performance

Tom Coughlin, Coughlin Associates, San Jose, USA
Michael Wang, Macronix, Milpitas, USA

This talk will explore how digital storage is used in modern game architectures. The discussion will include both local and direct attached storage (including game cartridge storage for mobile game devices), hard disk and optical storage for game consoles and on-line cloud storage to support interactive games on thin clients. The talk will be followed by a panel including a major game cartridge memory supplier.

Culture, Learning, Play in Radically Connected Era

Adrian David Cheok, National University of Singapore and Keio University

IEEE International Games Innovation Conference November 2-3, 2011

Chapman University City of Orange California USA (Near Disneyland and Newport Beach)

Conference Program

Wednesday - November 2, 2011		
Morning Program		
8:00	Registration at Sandhu Conference Center, Chapman University	
09:00 - 09:20	Conference Opening at Sandhu Conference Center	
09:20 - 10:00	Opening Keynote - The Next Big Thing For Games	*Trip Hawkins, Digital Chocolate*
10:00 - 10:30	Security, Complexity, and the Future of Gaming	*Ben Jun, Cryptography Research Inc.*
10:40 - 11:15	Conference Keynote	*Susan Bonds, 42 Entertainment*
Lunch Program		
11:40 - 13:10	Lunch at Beckman Hall	
	Innovation Summit Keynote: Introducing a 3rd Dimension to Natural Interaction	*Ohad Shvueli, PrimeSense*
	Keynote - Finding Moments of Play in the Enterprise	*Li-Te Cheng, IBM*
Afternoon Program		
13:35 - 14:10	"No Storage, No Game: The Role of Memory and Storage Architectures in Game Design and Performance" *Tom Coughlin, Coughlin Associates* *Michael Wang, Macronix*	"Playing with Reality, Alternate Reality Games, Urban and Serious Play" *Patricia Gouveia, Universidade Lusofona de Humanidades e Tecnologias, Portugal* *Jeff Watson, University of Southern California*
14:20 - 16:15	Paper Session 1	Paper Session 2
16:20 - 17:30	Tutorial: Culture, Learning, Play in Radically Connected Era *Adrian Cheok, National University of Singapore*	Paper Session 3
Conference Reception		
17:40 - 19:00	Reception at Beckman Hall	
	Reception Keynote	*Robert Mical, Video Game Industry Pioneer*

IEEE International Games Innovation Conference November 2-3, 2011

Chapman University City of Orange California USA (Near Disneyland and Newport Beach)

Thursday - November 3, 2011		
Morning Program		
8:00	Registration at Sandhu Conference Center, Chapman University	
09:00 - 09:40	Innovation Summit Keynote: Innovation and Gaming – The Anytime, Anywhere Player	*Dave Durnil, Qualcomm*
09:40 - 10:15	High Speed Memory for Games	*Steven Woo, Rambus*
10:25 - 11:00	The Process of Innovation in Game Design	*Brian Winn, Michigan State University*
11:00 - 11:40	High Quality Mobile Experience - IEEE P2200: Impact of Data Caching over Network on Games	*William Fisher, Quicksilver Software* *Yehuda Hahn, SanDisk*
Award Lunch		
12:00 - 13:35	Award Lunch in Beckman Hall	
	Keynote - Free Transitors: How can gaming benefit from the plenty?	*Craig Hampel, Rambus*
	Keynote: Serious Games Untie the Gordion Knot - The Art of the Possible	*Phaedra Boindiris, IBM*
Afternoon Program		
14:00 - 14:45	"Advanced Graphics Programming on Next-Gen Mobile Platforms" *Wolfgang Engel, Confetti Special Effects*	Poster Session
15:00 - 16:15	Paper Session 4	Paper Session 5
16:15 - 17:30	Paper Session 6	Paper Session 7
17:40 - 18:15	Closing Ceremony Keynote: Motivating Students to Become Possibility Strategists *Glennon Neubauer, Westwood College* Announcement: IEEE 2012 International Games Innovation Conference	

Paper Sessions

Wednesday, November 2, 2011

14:16 - 16:05 Session 1: Innovative Ideas for Games (6 papers)
Session 2: Lessons Learned, Social Impact and Cultural Impact (6 papers)

16:10 - 17:40 Session 3: Games for Business and Multiple Players (5 papers)

Thursday, November 3, 2011

14:00 - 15:00 Poster Session (5 papers)

15:00 - 16:15 Session 4: Games for Learning, Training and Exercise (4 papers)
Session 5: Design of Game (4 papers)

16:16 - 17:30 Session 6: Interface Device, Location Awareness and Security (4 papers)
Session 7: Education, Health and Training (4 papers)

Paper titles and abstracts are on the following pages.

Wednesday, November 2. 14:20 – 16:15

Paper Session 1: Innovative Ideas for Games

Room: D

Chair: William C Fisher (Quicksilver Software, Inc., USA)

14:20 *The iTron Family of Geocast Games (Extended Abstract)*

Robert J Hall (AT&T Labs Research, USA)

The iTron Family of geocast games illustrates how athletic play can be combined with real-time-strategic, imaginative, and creative play from digital games to produce sports of the future appealing to a wider range of users.

14:38 *Musical Mood-Based Mobile Gaming*

Alexander Hodge (University of Waterloo, Canada); Karen Collins (University of Waterloo, Canada); Kelvin Lam (University of Waterloo, Canada); Peter Taillon (University of Waterloo, Canada)

We explore ways of using mood-based extraction methods on player-selected music to drive content in mobile video games. We describe the methods for a game engine adapting the CLAM C++ Library for the Apple iPod.

14:56 *Applying Monte-Carlo Tree Search to Collaboratively Controlling of a Ghost Team in Ms Pac-Man*

Kien Q. Nguyen (Ritsumeikan University, Japan); Ruck Thawonmas (Ritsumeikan University, Japan)

We present an application of Monte-Carlo Tree Search to controlling ghosts in the game of Ms Pac-Man. We approached the problem by performing MCTS on each ghost tree represents the game-state from the ghost perspective.

15:14 *Fractal Territory Board Game*

S. F. Siao (National Dong Hwa University, Taiwan); Hung-Wei Hsu (National Dong Hwa University, Taiwan); Wen-Kai Tai (National Dong Hwa University, Taiwan); Andrew Yip (Excel Computers of Silicon Valley, USA)

Novel fractal board games that can be infinitely subdivided for generating the subgames to balance the dominance of the leading player in the abstract board game is proposed, making connection board games truly fractal games.

15:32 *Immersive Mobile Gaming with Scanned Laser Pico Projection Systems*

P. Selvan Viswanathan (Microvision, Inc., USA); David Lashmet (Microvision, Inc., USA); Jari Honkanen (Microvision, Inc., USA)

A scanned laser pico-projector's unique advantages in the space of motion sensed and/or mobile gaming domain is presented and immersive gaming with such components is described. We also discuss user survey results from CeBIT, 2011.

15:50 *Achieving Connected Home Architectural Simplicity*

Sathia Narayanan Mahadevan (Infosys Technologies Limited, USA)

Next generation platforms built around mobility,"smart" systems needs applications that are cloud based and require seamless common communication among each other. This paper argues on the basic tenet of communication,IPC mechanism to be standardized to a considerable scale.

Wednesday, November 2. 14:20 – 16:15

Paper Session 2: Lessons Learned, Social Impact and Cultural Impact

Room: D1

Chair: Daniel Frost (University of California, Irvine, USA)

14:20 *IgnitePlay: Encouraging and Sustaining Healthy living through Social Games*

Magy Seif El-Nasr (Northeastern University & Simon Fraser University, USA); Lisa Andres (Ignite Play, Canada); Terry Lavender (Simon Fraser University, Canada); Natalie Funk (Simon Fraser University, Canada); Nasim Jahangiri (Simon Fraser University, Canada); Mengting Sun (Simon Fraser University, USA)

Many successful social and casual games use motivational techniques in their design that sustain players' interest over time. In this paper, we discuss a novel technique to guide motivation towards a healthy life style using concepts from social online games.

14:38 *Survey on How Norwegian Teenagers Play Video Games*

Alf Inge Wang (Norwegian University of Science and Technology, Norway)

A survey among 103 Norwegian teenager about how they play video games, how much they play, the game platform they prefer, how much time they spend playing mobile games, and the game genres they prefer.

14:56 ***Applying the Technology Acceptance Model to Investigate the Factors Comparing the Intention between EIVG and MCG Systems***
Jon-Chao Hong (National Taiwan Normal University, Taipei, Taiwan); Kai-Hsin Tai (National Taiwan Normal University, Taipei, Taiwan)
This study investigated technology acceptance model of students by using Embodied Interactive Video Games and Mouse Click Games to learn tenses in English. Participants were junior high students, and they were divided into two groups.

15:14 ***Classification of cognitive states of attention and relaxation using supervised learning algorithms***
Candy Obdulia Sosa Jimenez (University of Veracruz, Mexico); Héctor Gabriel Acosta Mesa (University of Veracruz, Mexico); Genaro Rebolledo-Mendez (University of Veracruz, Mexico); Sara de Freitas (Coventry University, United Kingdom)
This paper shows results related to accuracy of Artificial Intelligence techniques to classify physiological data during video game use. Future studies will be geared towards automatic recognition of cognitive states and self-adaptation in video games.

15:32 ***Experiment on Social Multiplayer Multimodal Games***
Alf Inge Wang (Norwegian University of Science and Technology, Norway)
This paper presents results from an experiment where 35 teenagers tested a social multiplayer multimodal games discovering attitude towards such games to test differences related to gender and how much the subjects play every week.

15:50 ***The Relation between Students' Anxiety and Interest in Playing an Online Game***
Ming-Yueh Hwang (National Taiwan Normal University, Taiwan); Jon-Chao Hong (National Taiwan Normal University, Taipei, Taiwan); Tsui-Fang Hsu (National Taiwan Normal University, Taiwan); Yu-Ju Chen (National Taiwan Normal University, Taiwan)
A survey was conducted to examine participants' anxiety, interest and cognitive load by using this computer-assisted game. Results indicated that students were interested in this game and would like to play again in the future.

Wednesday, November 2. 16:20 – 17:30

Paper Session 3: Games for Business and Multiple Players

Room: D1
Chair: Will Lumpkins (O & S Services, USA)

16:20 ***Real-time imaging and recognition techniques for game applications***
Wen-Chung Kao (National Taiwan Normal University, Taiwan)
This talk focuses on the key technologies used for the human machine interface of interactive game applications. The topics cover the real-time color/tone reproduction as well as the image feature extraction under various illumination conditions.

16:38 ***The Future of Work is Play***
Ross Smith (Microsoft Corporation, USA)
Shifts in global, societal, technological, economic, and socio-political trends will shape the future of work. The culmination of distinct trends will lead to an increased use of game mechanics in the workplace of the future.

16:56 ***Mimicking Player Strategies in Fighting Games***
Simardeep Saini (Loughborough University, United Kingdom); Christian Dawson (Loughborough University, United Kingdom); Paul Chung (Loughborough University, United Kingdom)
Extended abstract providing a high level summary of research regarding the mimicking of human playing strategies in one-on-one fighting games. A novel approach utilizing clustering, supervised learning and data driven finite state machines is used.

17:14 ***Cost-effective Virtual World Development for Serious Games***
Hao Liu (University of East London, United Kingdom); Yasmine Arafa (University of East London, United Kingdom); Cornelia Boldyreff (University of East London, United Kingdom); Mohammad Dastbaz (University of East London, United Kingdom)
Developing a virtual environment normally involves model creations, animations and event simulations. This paper introduces an open-source software bundle that will enable developers to easily and quickly create collaborative and scenario-driven environments for serious games.

Thursday, November 3. 14:00 – 15:00

Poster Session
Room: D1

A Simplified Level Editor
Brent Cowan (University of Ontario Institute of Technology, Canada); Bill Kapralos (University of Ontario Institute of Technology, Canada)
We present a level editing software tool that simplifies the creation of three dimensional models/scenes by concentrating only on the features specific to the arrangement of models and materials needed to create a three-dimensional environment/scene.

Motivation-Behavior Relations ; An empirical analysis for playing experience on social network games
Mijin Kim (Dongseo University, Korea)
* * This paper is aimed at analyzing the relationship between users' behaviors in relation to a SNG (Social Network Game), which mainly targets communities, and the motivations that give rise to such selective behaviors.

Foodie: Play with your food-Extend social cooking game with novel edible interface
Jun Wei (National Unverisity of Singapore & Keio-NUS CUTE CENTER, Singapore); Adrian Cheok (National University of Singapore, Singapore); Xavier Roman Martinez (Keio-NUS CUTE CENTER, National Unverisity of Singapore, Singapore); Remi Tache (Keio-NUS CUTE CENTER, National Unverisity of Singapore, Singapore); Qing Zhu (National Unverisity of Singapore, Singapore)
FoodGenie achieves synchronous printing of 3-dimensional edible food designed in digital format. It extends the digital cooking games to the real edible food, connecting digital playfulness with active participation in food preparation and eating experience.

An Innovative Interface Design with Smart Phone for Interactive Computer Game Applications
Wei Chin Huang (National Chiao Tung University, Taiwan); Tennyson Lu (National Chiao Tung University, Taiwan); Wai-Chi Fang (National Chiao Tung University, Taiwan)
This paper discusses the experiment of using a smart phone as a game controller. Through this attempt, we can get some idea and experience to develop controllers mainly used with computers or new game controllers.

Real-time FPGA Based 3D Camera Resectioning
Wai-Chi Fang (National Chiao Tung University, Taiwan); Daniel M Ho (National Chiao Tung University, Taiwan)
This paper describes an embedded system based framework for processing depth and RGB images. This work provides a FPGA accelerated real-time solution for the problem of resectoning image data from a 3D camera to the coordinates of an RGB camera.

Making the Mangle: Users, Artifacts, & Agency
Douglas Dechow (Chapman University, USA); Patricia Sobczak (Chapman University, USA)
Our work explores the ways in which the mangle informs and intersects with virtual worlds. The mangle offers a framework for understanding the relationship between users and game. Our work begins to construct Mangle 2.0.

Thursday, November 3. 15:00 – 16:15

Paper Session 4: Games for Learning, Training and Exercise
Room: D
Chair: Ross Smith (Microsoft Corporation, USA)

15:00 ***Integrating Radiation Transport Models in a 3D Video Game to Train Nuclear Detection Techniques***
James Winso (Spectral Labs Incorporated, USA); John Rolando (Spectral Labs Incorporated, USA); David Olivares (Spectral Labs Incorporated, USA); Henry Yu (Kalloc Studios, USA); Ronen Shaham (Kalloc Studios, USA); Cliff Halcom (Kalloc Studios, USA); Vythilingam Wijekumar (Indiana University of Pennsylvania, USA)
A new system, the Realistic and Adaptive Interactive Learning System (RAILS), has been developed by integrating radiation transport models into a PC based video game engine to facilitate training in the use of Nuclear Detection equipment by Law Enforcement Officers.

15:18 ***Realistic and Adaptive Interactive Learning System (RAILS) exploiting 3D Video Games***
James Winso (Spectral Labs Incorporated, USA); John Rolando (Spectral Labs Incorporated, USA); David Olivares (Spectral Labs Incorporated, USA)

A new system, the Realistic and Adaptive Interactive Learning System (RAILS), has been developed by integrating radiation transport models into a PC based video game engine to facilitate training in the use of Nuclear Detection equipment by Law Enforcement Officers.

15:36 ***IQube: a cube for learning***
Andrei Stancovici (Politehnica University of Timisoara, Romania); Ovidiu Szanto (Politehnica University of Timisoara, Romania); Viktor Ardelean (Politehnica University of Timisoara, Romania); Remus Barbatei (Politehnica University of Timisoara, Romania); Marius Marcu (Politehnica University of Timisoara & Lasting Software Timisoara, Romania)
This paper presents a new concept to be used, in primary education to address this problem: a learning cube, tangible, exploring and playing platform for children. ICube has a colored display on each of its sides, making it very customizable.

15:54 ***Neuroscience and Simulation Interface for Adaptive Assessment in Serious Games***
Thomas Parsons (USC Institute for Creative Technologies, USA); James Reinebold, III (University of Southern California & Institute for Creative Technologies, USA)
We present an iteration of the Virtual Reality Cognitive Performance Test (VRCPAT) that proffers a framework for adapting scenarios in the Virtual Battlespace 2 (VBS2) game engine based upon the user's neurocognitive and psychophysiological states
.

Thursday, November 3. 15:00 – 16:15

Paper Session 5: Design of Game

Room: D1
Chair: Alf Inge Wang (Norwegian University of Science and Technology, Norway)

15:00 ***Game Development Frameworks for SE Education***
Bian Wu (Norwegian University of Science and Technology, Norway); Alf Inge Wang (Norwegian University of Science and Technology, Norway)
This paper presents a literature survey about the method of creating/modifying a game on a game development framework (GDF) as an assignment to learn software engineering (SE) and share our recommendation for choosing appropriate GDFs.

15:18 ***Enabling Collaborative Learning with an Educational MMORPG***
Chengzhi Liu (Norwegian University of Science and Technology, Norway)
In order to provide interesting education,this paper presents a collaborative learning environment on the base of a multiplayer online game platform.The implemented educational game can be used as a supplementary tool for traditional classroom teaching.

15:36 ***Player Guiding in an Active Video Game***
Brian Winn (Michigan State University & Games for Entertainment and Learning Lab, USA); Wei Peng (Michigan State University, USA); Karin Pfeiffer (Michigan State University, USA)
The unique challenges in guiding players in an active video game (or exergame) using physical input devices are explored. The solutions discovered through the process of iterative design and multiple rounds of playtesting are discussed.

15:54 ***Remote Kenken: A Networked Real Hopping Game Based on Hopscotch***
Jun Munemori (Wakayama University, Japan); Hirotaka Yamashita (Nagoya Ryoju Estate Co., Ltd., Japan); Junko Itou (Wakayama University, Japan)
We proposed an exertainment support system named the "Remote Kenken." Victory or defeat is decided by the accuracy of the step and hourage. We can play with someone in a remote place using a network.

Thursday, November 3. 16:15 – 17:30

Paper Session 6: Interface Device, Location Awareness and Security

Room: D
Chair: Wen-Chung Kao (National Taiwan Normal University, Taiwan)

16:15 ***Motion Selection and Motion Parameter Control Using Data Gloves***
Nik Isrozaidi Nik Ismail (Kyushu Institute of Technology & Universiti Teknologi Malaysia, Japan); Masaki Oshita (Kyushu Institute of Technology, Japan)
This paper present a data gloves based interface, that can control many types of motion and its styles. We use user's hand positions to select a motion and finger angles to control the motion parameters.

16:33 *Face and Gaze Tracking as Input Methods for Gaming Design*
Florin Nanu (Tessera, Romania); Stefan Petrescu (Tessera, Romania); Peter Corcoran (National University of Ireland Galway, Ireland); Petronel Bigioi (Tessera & National University of Ireland, Galway, Ireland)
Real time face detection with eye-gaze tracking and face analysis provides new means of user input to gaming environments. Game designers can use facial information for UI and to provide smarter modes of player interaction.

16:51 *A Pervasive Game to Know Your City Better*
Bian Wu (Norwegian University of Science and Technology, Norway); Alf Inge Wang (Norwegian University of Science and Technology, Norway)
This paper presents a pervasive game on Android platform where players can play a knowledge competition tour in groups in the city of Trondheim, and gain better understanding of the city through solving different tasks.

17:09 *Dancing Game by Digital Textile Sensor, Accelerometer and Gyroscope*
Chang-Ming Yang (Ming Young Biomedical Corp., Taiwan); Jwu-Sheng Hu (National Chiao-Tung University, Taiwan); Ho Yang (Ming Young Biomedical Corp., Taiwan); Chih-Chung Wu (Ming Young Biomedical Corp., Taiwan); Narisa Chu (CWLab International, Ltd. & California Lutheran University, USA)
A novel dancing game, comprised of pressure sensors on socks with accelerometer and gyroscope on pants to detect the movement of the player, is presented. The firmware in microcontroller can judge the movement of the player with enough accuracy.

Thursday, November 3. 16:15 – 17:30

Paper Session 7: Education, Health and Training

Room: D1

Chair: Genaro Rebolledo-Mendez (University of Veracruz, Mexico)

16:15 *Power Defense: A Video Game for Improving Diabetes Numeracy*
Ereny Bassilious (Hospital for Sick Children, Canada); Aaron DeChamplain (University of Ontario Institute of Technology, Canada); Ian McCabe (University of Ontario Institute of Technology, Canada); Matthew Stephan (University of Ontario Institute of Technology, Canada); Bill Kapralos (University of Ontario Institute of Technology, Canada); Farid Mahmud (Hospital for Sick Children, Canada); Adam Dubrowski (University of Toronto, Canada)
Adolescents with Type 1 diabetes often have poor control of their disease. We have developed Power Defense, a highly interactive and engaging videogame aimed at improving one particular skill associated with managing diabetes - numeracy.

16:33 *Observations on Designing a Computer Science Curriculum Focusing on Game Programming Using Testimonials from Industry Leaders*
Graham Smallwood (CSULB, USA); Don Black (University of California, USA)
This paper will explain the IEEE standard for a computer science curriculum, and then compare those milestones with what the games industry wants using interviews with game professionals who are responsible for hiring decisions at top companies.

16:51 *SCETF: Serious Game Surgical Cognitive Education and Training Framework*
Brent Cowan (University of Ontario Institute of Technology, Canada); Hamed Sabri (University of Ontario Institute of Technolog, Canada); Bill Kapralos (University of Ontario Institute of Technology, Canada); Sayra Cristancho (University of Western Ontario, Canada); Fuad Moussa (Sunnybrook Health Sciences Centre, Canada); Adam Dubrowski (University of Toronto, Canada)
We present a multi-modal, serious game surgical procedure education and training framework (SPETF) that is currently being developed. Domain-specific surgical "modules" can then be built on top of the existing framework, utilizing common simulation elements/assets.

17:09 *A Breathing Game with Capacitive Textile Sensors*
Chang-Ming Yang (Ming Young Biomedical Corp., Taiwan); Ho Yang (Ming Young Biomedical Corp., Taiwan); Chih-Chung Wu (Ming Young Biomedical Corp., Taiwan); Narisa Chu (CWLab International, Ltd. & California Lutheran University, USA)
For an ordinary player, abdominal breathing gives more benefit to the human body than thoracic breath. Yoga, Qigong, Lamaze, and wind instrument players need to practice abdominal breathing. A computer game is provided to encourage breathing practice.

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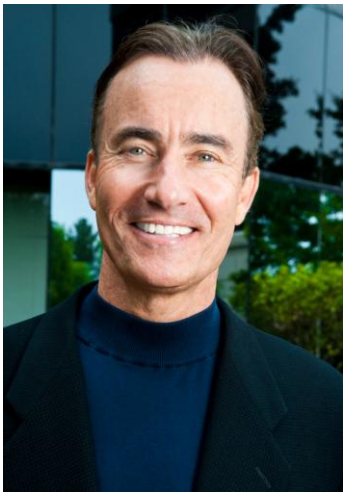

Starting this year, the International Games Innovation Conference Lifetime Achievement Award in recognition of visionary leadership and continued contributions to the games industry. This is the first award of it kind at the IGIC conference and will become an award granted periodically for extraordinary achievements. This year's Lifetime Achievement is sponsored by Rambus. To present this award, I would like to introduce Harold Hughes, President and CEO of Rambus and the General Chair of the 2011 IGIC conference who will present the first award winner of the Lifetime Achievement Award.

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