



# Conference Program

14th ACM SIGGRAPH-Sponsored  
International Conference on Virtual Reality  
Continuum and Its Applications in Industry

October 30 – November 1, 2015  
Kobe Port Island Center  
Kobe, Japan

# Welcome!

Welcome to the 14th ACM SIGGRAPH International Conference on Virtual Reality Continuum and its Applications in Industry (VRCAI 2015), held from October 30th to November 1st, 2015, and co-located with SIGGRAPH ASIA 2015 in Kobe, Japan.

*Virtual Reality Continuum (VRC)* emphasizes the consistency of virtual worlds and the real world. Encompassing a wide range of info-communication environments, such as Virtual Reality (VR), Augmented Virtuality (AV), Augmented Reality (AR), and Mixed Reality (MR), VRC can provide us with a unified perspective on the definitions and mutual relationship specifications of these virtual worlds. In hope of advancing research and development in the VRC fields, the VRCAI conference series continues to serve as an international forum where related researchers and practitioners can come together and share their experiences, exchange new ideas, and motivate one another to develop a deeper understanding of this rapidly-growing area.

ACM VRCAI 2015 received sixteen full papers and sixteen short papers from ten countries in Asia, Europe, and North America. All the submissions were reviewed by fifty-two program committee members from seventeen countries, as well as eight external reviewers, with each paper receiving at least three reviews. Although every submitted paper had competitive, high-quality content, we accepted eight full papers and eight short papers for inclusion in these proceedings and presentation at the conference. The conference program consists of six paper sessions: simulation, rendering, geometry, virtual human, image and vision, and animation, all of which cover state-of-the-art research in these VRC areas.

The program also includes keynote speeches by two well-known Japanese researchers: Professor Hiroo Iwata from University of Tsukuba and Professor Shigeru Kuriyama from Toyohashi University of Technology.

Posters and demos are another important part of the conference. This year, we received thirty-one submissions from six countries. Based on the reviews from the committee representatives, we decided to accept all the submissions for presentation at the conference. We are also making our first attempt to interact with SIGGRAPH Asia. To do so, we arranged to have five posters from SIGGRAPH Asia 2015 presented in advance at VRCAI 2015 and three selected posters from VRCAI 2015 re-presented at SIGGRAPH Asia 2015. This collaboration took shape through intensive discussions at the ACM SIGGRAPH Small Conferences Meeting this August in Los Angeles.

We sincerely hope that you will enjoy the whole conference.

## **Conference Co-Chairs**

Issei Fujishiro, Keio University, Japan

Zhigeng Pan, Hangzhou Normal University, China

Nadia Magnenat-Thalmann, NTU, Singapore & MIRALab, University of Geneva, Switzerland

## **Program Co-Chairs**

Masaki Oshita, Kyushu Institute of Technology, Japan

Xubo Yang, Shanghai Jiao Tong University, China

Hyun Seung Yang, KAIST, Korea

## **Poster/Demo Chair**

Tomohiko Mukai, Tokai University, Japan

# Program at a Glance

## October 30th, Friday, 2015 (Day 1)

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15:00 - 17:30	Registration
15:45 - 17:15	Tour to RIKEN's K computer
17:15 - 19:30	Welcome Reception

## October 31st, Saturday, 2015 (Day 2)

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8:00 - 18:00	Registration
9:00 - 9:20	Opening
9:20 - 10:20	Keynote 1: Prof. Hiroo Iwata
10:20 - 10:40	Coffee Break
10:40 - 12:00	Session 1: Simulation
12:00 - 13:00	Lunch Break
13:00 - 14:10	Session 2: Rendering
14:10 - 14:30	Coffee Break
14:30 - 15:20	Session 3: Geometry
15:20 - 15:40	Coffee Break
15:40 - 16:30	Posters and Demos Fast Forward
16:30 - 17:40	Posters and Demos Session
19:00 - 21:00	Banquet

## November 1st, Sunday, 2015 (Day 3)

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8:30 - 13:30	Registration
9:20 - 10:20	Keynote 2: Prof. Shigeru Kuriyama
10:20 - 10:40	Coffee Break
10:40 - 12:00	Session 4: Virtual Humans
12:00 - 13:00	Lunch Break
13:00 - 14:10	Session 5: Image and Vision
14:10 - 14:30	Coffee Break
14:30 - 15:20	Session 6: Animation
15:20 - 15:30	Closing

# Keynotes

## Keynote 1: Prof. Hiroo Iwata

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Professor, Graduate School of Systems and Information Engineering, University of Tsukuba, Japan



Device Art and Empowerment Informatics; New Frontiers in Virtual Reality

### Abstract

This talk introduces a new art form named “Device Art” in which interface devices, including virtual reality systems, become essence of expression. This concept challenges the traditional paradigm of art by its convergence of technology, art and design. In 2014, Iwata launched the Ph.D. program in Empowerment Informatics in the University of Tsukuba. Empowerment Informatics has three pillars; supplementation, harmony and extension of human. Virtual reality is a generic technology in these areas. More over Device Art greatly contribute to extension of human.

### Biography

Hiroo Iwata is a professor in the Graduate School of Systems and Information Engineering of the University of Tsukuba, where he is teaching human interface and leading research projects on virtual reality. His research interests include haptic interface, locomotion interface and spatially immersive display. He received B.S., M.S., and Ph.D. degree in engineering from the University of Tokyo in 1981, 1983 and 1986, respectively. He is a vice president of the Virtual Reality Society of Japan from 2010.

He exhibited his work at the Emerging Technologies venue of the SIGGRAPH every year from 1994 to 2007, as well as Ars Electronica Festival 96, 97, 99, and 2001. He was the general chair of the World Haptics Conference 2007 and Asia Haptics 2014.

## Keynote 2: Prof. Shigeru Kuriyama

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Professor, Department of Computer Science and Engineering, Toyohashi University of Technology, Japan



Style-Based Content Exploration for Aesthetic Media Informatics

### Abstract

The latest trends in contents creation are focusing on the styles of appearances, by integrating computer graphics technology with modern pattern classifications using machine learning or collective intelligence etc. Existing style-oriented methods focused on specific and definable features of shapes, shading, and motions; recent methods, however, face a challenge of exploring more generic and obscure features relying on aesthetic perceptions. This talk summarizes this new type of content management technologies and inspires the insight into a new horizon of media informatics, by presenting speaker's recent accomplishment, including the method awarded the best paper in CBMI 2015, about style-based retrieval of illustrational images.

### Biography

Shigeru Kuriyama is a professor in the Department of Computer Science and Engineering of the Toyohashi University of Technology, where he is directing projects related to a variety of visual media interactions: style-based image authoring, data-driven humanoid animations, image sensor communication with visual codes, and smart lighting systems etc. He received B.S., M.S., and Ph.D. degrees from Osaka University, and worked in Tokyo Research Laboratory of IBM and Hiroshima City University, from 1988 and 1994, respectively, and in current affiliation from 1998. He was a visiting researcher in the robotics institute of Carnegie Mellon University in 2004. He concurrently worked in Digital Human Research Center of AIST as the leader of a visualization team, from 2005 to 2009, and in the RISE of Waseda University as the adjunct researcher of CREST project from 2006 to 2008.



# Social Events

## Tour to RIKEN's K computer

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Date: October 30 (Day 1), Time: 15:45-17:15, Place: RIKEN AICS

K computer is one of the fastest supercomputers in the world. It ranked as the fastest supercomputer at TOP500 competition in 2011 and most recently the fourth-fastest in 2015. K computer is installed at RIKEN Advanced Institute for Computational Science (AICS) which is located at right next to the conference venue. RIKEN kindly offers us a special tour including exhibition of K computer, showing a making video and application to car aerodynamics simulation. Don't miss this opportunity to experience the top supercomputer! More details about K computer are found at RIKEN AICS website: <http://www.aics.riken.jp/en/k-computer/about/>



Please gather at the entrance hall in the conference venue where the registration desk is located by 15:45 on October 30 (Day 1). We will walk to the RIKEN AICS together. Please don't be late.

## Welcome Reception

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Date: October 30 (Day 1), Time: 17:15-18:45, Place: 1st Floor Cafeteria at Kobe Port Island Center

Welcome reception will be held at the venue just after the tour to RIKEN. We will offer some light meals and drinks. Meet your colleague and catch up over drinks and snacks!

We will go to the welcome reception right after the tour to RIKEN. If you cannot join the tour to RIKEN but can attend the welcome reception, please go to the 1st floor cafeteria in the conference venue.



## Banquet

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Date: October 31 (Day 2), Time: 19:00-21:20, Place: Dinner Cruise in Kobe Bay

Boarding Luminous Kobe-2, the biggest bay cruiser in Japan, you will be able to enjoy fantastic food with gorgeous night views of illuminated Kobe city and rainbow-colored Akashi-Kaikyo Bridge, the largest bridge in the world, from the deco cabin at the top of the ship. Chartered bus service between the venue and the pier close to Kobe downtown will be available.

The chartered bus to the pier leaves from the entrance of the conference venue at 18:10 on October 31 (Day 2). Please don't be late.



# Conference Program

Full papers have 28 min. presentation (23 min. talk and 5 min. Q&A)

Short papers have 18 min. presentation (15 min. talk and 3 min. Q&A)

## October 31st, Saturday, 2015 (Day 2)

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9:00 - 9:20

### Opening

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9:20 - 10:20

### Keynote 1: Prof. Hiroo Iwata

Chair: Issei Fujishiro (Keio University)

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10:40 - 12:00

### Session 1: Simulation

Chair: Yoshinori Dobashi (Hokkaido University)

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Adsorptive SPH for Directable Bleeding Simulation (Full)

Kazuhide Ueda, Issei Fujishiro (Keio University, Japan)

Particle-based Ice Freezing Simulation (Full)

Yunbin Miao, Shuangjiu Xiao (Shanghai Jiao Tong University, China)

Fluid Absorption and Diffusion in and between Porous Materials (Short)

Xin Shi, Shuangjiu Xiao (Shanghai Jiao Tong University, China)

13:00 - 14:10

### Session 2: Rendering

Chair: Yuriko Takeshima (Tokyo University of Technology)

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A Wavelet Based All-frequency Environment Lighting Rendering Method (Full)

Fengquan Zhang, Jianfei Wan, Huiwai Wang (North China University of Technology, China)

Controllable Region via Texture Projection for Stylized Shading (Short)

Muhammad Arief (Tokyo University of Technology, Japan), Hideki Todo (The University of Tokyo / JST CREST, Japan), Kunio Kondo, Koji Mikami (Tokyo University of Technology, Japan), Yasushi Yamaguchi (The University of Tokyo / JST CREST, Japan)

Real-time Human Vision Rendering Using Blur Distribution Function (Short)

Ning Tang, Shuangjiu Xiao (Shanghai Jiao Tong University, China)

14:30 - 15:20

### Session 3: Geometry

Chair: Takashi Kanai (The University of Tokyo)

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WebVis\_BIM: Real Time Web3D Visualization of Big BIM Data (Full)

Xiaojun Liu, Ning Xie, Jinyuan Jia (Tongji University, China)

A Sketch-based System for Cloud Volume Retrieval from Simulated Dataset for Realistic Image Synthesis (Short)

Kei Suzuki (Hokkaido University, Japan), Yoshinori Dobashi (Hokkaido University/UEI Research/JST CREST, Japan), Tsuyoshi Yamamoto (Hokkaido University, Japan)

15:40 - 17:40

### Posters and Demos Session

Chair: Tomohiko Mukai (Tokai University)

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## November 1st, Sunday, 2015 (Day 3)

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9:20 - 10:20

**Keynote 2: Prof. Shigeru Kuriyama**

**Chair: Tomohiko Mukai (Tokai University)**

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10:40 - 12:00

**Session 4: Virtual Humans**

**Chair: Zhigeng Pan (Hangzhou Normal University)**

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CHASE: Character Animation Scripting Environment (Full)

Christos Mousas (Dartmouth College, USA), Christos-Nikolaos Anagnostopoulos (University of the Aegean, Greece)

Exploitation of Novel Multiplayer Gesture-based Interaction and Virtual Puppetry for Digital Storytelling to Develop Children's Narrative Skills (Full)

Hui Liang (Bournemouth University, UK / Communication University of China, China), Jian Chang, Shujie Deng (Bournemouth University, UK), Can Chen (Changzhou University, China), Ruofeng Tong (Zhejiang University, China), Jian Zhang (Bournemouth University, UK)

Key Pose Deformations In Changing The 3D Character Motion Style (Short)

Ismahafezi Ismail, Mohd Shahrizal Sunar (Universiti Teknologi Malaysia, Malaysia), Masaki Oshita (Kyushu Institute of Technology, Japan)

13:00 - 14:10

**Session 5: Image and Vision**

**Chair: Yuki Morimoto (Tokyo Denki University)**

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Automatic Face Caricatures Synthesis and Exaggeration (Full)

Wenli Zhang, Shuangjiu Xiao, Yinglin Li, Xin Huang (Shanghai Jiao Tong University, China)

Efficient Color-to-Gray Conversion for Digital Images in Gradient Domain (Short)

Xiuyu Zheng, Jie Feng, Bingfeng Zhou (Peking University, China)

Line-based Single View 3D Reconstruction in Manhattan World for Augmented Reality (Short)

Suncheon Park, Hyeopwoo Lee, Suwon Lee, Hyun S. Yang (KAIST, Korea)

14:30 - 15:20

**Session 6: Animation**

**Chair: Suguru Saito (Ochanomizu University)**

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Real Traffic Data-Driven Animation Simulation (Full)

Xin Yang, Wanchao Su, Jian Deng (Dalian University of Technology, China), Zhigeng Pan (Hangzhou Normal University, China)

The Study of Real-Time Animation of Forest Scene in Wind Projection (Short)

Jiaqi Fan, Shuangjiu Xiao (Shanghai Jiao Tong University, China)

15:20 - 15:30

**Closing**

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# Posters and Demos

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Each poster has 60 second oral presentation at the Fast Forward session, and poster presentation / live demo at the Posters and Demos session.

## VR & AR Systems

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1. "Lights, Camera, Action!": Ambient Lighting Extending Photospherical Display  
Naoki Tsukida, Bektur Ryskeldiev, Michael Cohen (University of Aizu, Japan)
2. Rendering Spatial Audio Through Dynamically Reconfigurable Smartphone Loudspeaker Arrays  
Bektur Ryskeldiev, Michael Cohen, Julian Villegas (University of Aizu, Japan)
3. Multimodal VR System Providing Insect Crawling Sensation  
Shota Ekuni, Koichi Murata (University of Tsukuba, Japan)
4. Design and Prototyping of Tactile MEMS Device for Finger Tactile Sensation  
Takehiro Adachi, Yasuyoshi Matsumoto, Taiki Inomata, Youichi Hoshi (Tokyo Polytechnic University, Japan), Shuji Tanaka (Tohoku University, Japan), Junji Sone (Tokyo Polytechnic University, Japan)
5. KANSEI Multimedia Display That Uses Air to Express a Sense of Touch and the Application of a Virtual Fan  
Rei Shu, Kazuo Kurata, Akira Tomono (Tokai University, Japan)
6. Methods of Studying Idioms Using KANSEI Multimedia  
Akira Tomono, Koichi Hirano, Ryuta Enomoto (Tokai University, Japan)
7. Augmented Reality in Musical Expression Systems  
Seiko Myojin, Nobutaka Shimada (Ritsumeikan University, Japan)

## Rendering & Visualization

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8. Real-time Glittery Surfaces Rendering  
Namo Podede, Yoshinori Dobashi, Tsuyoshi Yamamoto (Hokkaido University, Japan)
9. Is Spectral Lighting Environment Necessary for Photorealistic Rendering?  
Megumi Miura, Takahiro Okabe (Kyushu Institute of Technology, Japan), Imari Sato (National Institute of Informatics, Japan)
10. Acceleration of Hologram Generation by Optimizing Arrangement of Wavefront Recording Planes  
Naotaka Hasegawa, Tomoyoshi Shimobaba, Takashi Kakue, Tomoyoshi Ito (Chiba University, Japan)
11. Pmomo: Projection Mapping on Movable 3D Object  
Yi Zhou, Shuangjiu Xiao, Ning Tang (Shanghai Jiao Tong University, China)
12. Projection Mapping by the Portability Type Screen Using a Papercraft  
Daisuke Hiyama, Atsushi Shiraki (Chiba University), Tomoya Omae (Kisarazu National College of Technology, Japan), Hirota Nakayama, Takashi Kakue, Tomoyoshi Shimobaba, Tomoyoshi Ito (Chiba University, Japan)

13. A Visualization for High-Dimensional Regression Analysis  
Chie Suzuki, Takayuki Itoh (Ochanomizu University, Japan)

14. On Clustering and Coloring Methods for Heatmap-based High-dimensional Time-varying Data Visualization  
Satsuki Kumatani, Takayuki Itoh (Ochanomizu University, Japan), Masahiro Takatsuka (The University of Sydney, Australia)

## Image & Modeling

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15. Tiny Parts Identification Using the Fingerprint of Ink Dots  
Yuta Kudo, Toru Takahashi, Rui Ishiyama (NEC Corporation, Japan)
16. A Prototype of Parts Traceability System Using "Fingerprint of Things"  
Toru Takahashi, Yuta Kudo, Rui Ishiyama (NEC Corporation, Japan)
18. Face Cartoon Generation based on Parts-by-parts Morphing  
Akiko Komatsu, Takayuki Itoh (Ochanomizu University, Japan)
19. Fast, Exact and Robust Set Operations Using Localized CSG Trees  
Xudong Jiang, Bin Sheng (Shanghai Jiao Tong University, China), Enhua Wu (Chinese Academy of Sciences, China)

## Animation

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20. Animating Detailed Hairs for Game Characters using Enhanced Secondary Motion Graph  
Chenlei Wu, Takashi Kanai (The University of Tokyo, Japan)
22. Difference of the Facial Feature Point Loci in Turn Around Motions between 3DCG and Japanese Hand-drawn Animation  
Ai Miyata, Suguru Saito (Ochanomizu University, Japan)
23. Motion-based Limited Animation using Rigid Deformation  
Yuki Morimoto, Atsuko Makita, Tokiichiro Takahashi (Tokyo Denki University, Japan)
24. Visualization of Motion Features for Sports Training System Using Kinect  
Takumi Inao, Masaki Oshita (Kyushu Institute of Technology, Japan), Tomohiko Mukai (Tokai University, Japan), Shigeru Kuriyama (Toyoashi University of Technology, Japan)
25. Improved Ant Colony Algorithms for Multi-agent Path Planning in 3D Environment  
Fengting Yan, Ning Xie, Jinyuan Jia (Tongji University, China)
26. Crowd Simulation in a Dense Population  
Ahmad Zakwan Azizul Fata, Mohd Shafry Mohd Rahim (Universiti Teknologi Malaysia, Malaysia), Masaki Oshita (Kyushu Institute of Technology, Japan), Sarudin Kari (Universiti Teknologi Malaysia, Malaysia)

## Interaction

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27. Shape Changing Tangible Interface Designed for Supporting Exploratory Learning: A Flower on a Pot  
Matthieu Tessier, Masahiro Ura, Kazunori Miyata (JAIST, Japan)



28. Modeling Hand Interaction with Fluid Simulation in Virtual Environment

Mohd Khalid Mokhtar, Mohd Shahrizal Sunar, Farhan Mohamad (Universiti Teknologi Malaysia, Malaysia), Masaki Oshita (Kyushu Institute of Technology, Japan)

30. Interaction with Virtual Shadows by Real Shadows based on Shadow Simulations

Hiroko Iwasaki, Momoko Kondo, Rei Ito, Saya Sugiura, Yuka Oba, Shinji Mizuno (Aichi Institute of Technology, Japan)

31. Being and Thing become Space - Interactive Mirroring

June Kim, Tomasz Bednarz (Queensland University of Technology, Australia)

**Invited Posters from SIGGRAPH Asia 2015 Posters session**

As a part of the collaboration between VRCAI 2015 and SIGGRAPH Asia 2015, five posters are invited from SIGGRAPH Asia 2015 Posters session to be presented at VRCAI 2015 Posters and Demos session too.

Note: these invited posters are not regarded as multiple submissions, because VRCAI posters are not formal publications. Moreover, the abstracts of the invited posters are not included in the VRCAI 2015 proceedings.

32. Automatic Facial Animation Generation System of Dancing Characters Considering Emotion in Dance and Music

Wakana Asahina, Narumi Okada, Naoya Iwamoto, Taro Masuda (Waseda University, JST CREST, Japan), Tsukasa Fukusato (Waseda University, Japan), Shigeo Morishima (Waseda Research Institute for Science and Engineering, JST CREST, Japan)

33. 3-D Crystal Exhibiting Multiple 2-D Images with Directivity

Ryuji Hirayama, Hirotaka Nakayama, Atsushi Shiraki, Takashi Kakue, Tomoyoshi Shimobaba, Tomoyoshi Ito (Chiba University, Japan)

34. Wrinkles Individuality Representing Aging Simulation


Pavel A. Savkin, Daiki Kuwahara, Masahide Kawai, Takuya Kato (Waseda University, Japan), Shigeo Morishima (Waseda Research Institute for Science and Engineering, Japan)

35. 3D Display that Uses Transparent Cones

Kazuhisa Yanaka, Masayuki Yamada (Kanagawa Institute of Technology, Japan)

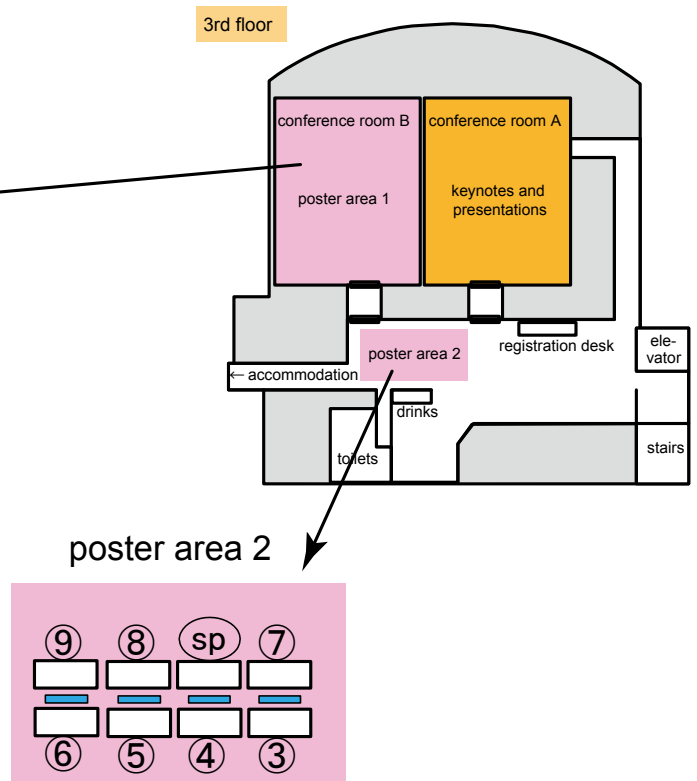
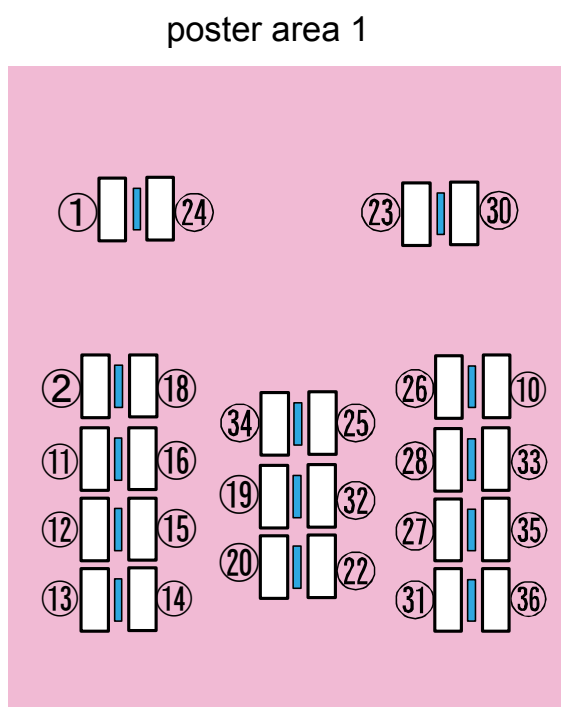
36. Real-Time Electro-Holography with Parabolic Mirrors for Projecting Floating 3D Motion Pictures

Takashi Kakue, Takashi Nishitsuji, Tetsuya Kawashima, Tomoyoshi Shimobaba, Tomoyoshi Ito (Chiba University, Japan)

**Collaboration between VRCAI 2015 and SIGGRAPH Asia 2015** 

This year we have are making our first attempt to interact with SIGGRAPH Asia. To do so, we arranged to have five posters from SIGGRAPH Asia 2015 presented in advance at VRCAI 2015. Moreover, three selected posters from VRCAI 2015 will be re-presented at SIGGRAPH Asia 2015 Posters session. This collaboration took shape through intensive discussions at the ACM SIGGRAPH Small Conferences Meeting this August in Los Angeles. We hope this kind of attempt will lead to more collaborations between SIGGRAPH main conferences and co-located special conferences.

**Poster Layout**



# Venue

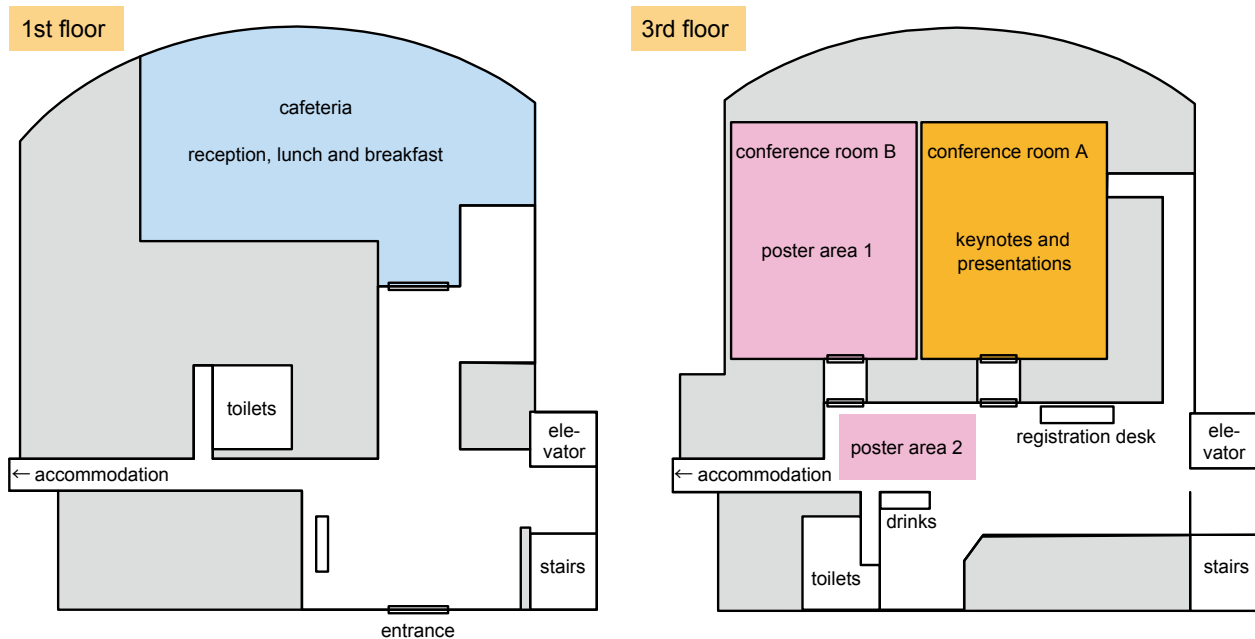
## Nichii Gakkan Kobe Port Island Center

7-1-5 Minatojima-minami-machi, Chuo-ku, Kobe, Hyogo, 650-0047, Japan

[http://www.nichiigakkan.co.jp/kobe\\_pi/index.html](http://www.nichiigakkan.co.jp/kobe_pi/index.html) (Japanese)

Phone: +81.78.304.5991 (available during 9:00 and 17:00, only Japanese)

E-mail: [pi-project@nichiigakkan.co.jp](mailto:pi-project@nichiigakkan.co.jp)



All presentations including keynotes are conference room A on the 3rd floor. The posters will be presented at the conference room B and the hall on the 3rd floor. Welcome reception, lunch and breakfast are served at the cafeteria on the 1st floor. Accommodation facilities are directly accessible from the building.

All rooms are non-smoking. Smoking is permitted in designated area only.

Accommodation is available for the registrants and requires pre-booking.

Room facilities: Alarm clock, LCD TV, desk & chair, hanger, LAN port (bring your LAN cable, no WiFi), unit bath, and telephone (extension only). No refrigerator, hairdryer, nor electric pot.

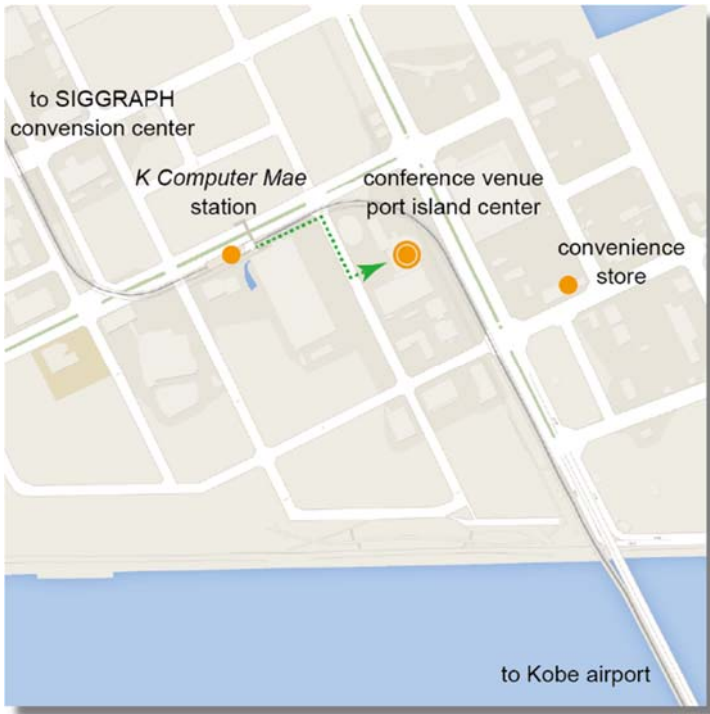
Room amenities: Face towel, bath towel, body soap, shampoo, conditioner, tooth brush, razor, slippers, and yukata (Japanese nightwear).

Laundry room is available (bring your own detergent).



# Access and Local Map

The conference venue is within 5 minutes' walk from *K computer Mae* station of Port Liner (local train).



## Sponsored by



## In Cooperation with



## Supporters





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**VRCAI 2015**