# Shuntaro Yamazaki

## Contact

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## Objective

To develop an easy-to-use system for modeling the shape, appearance, and motion in real-world scene, and presenting them in virtual environment.

## Education

03/2004 **Ph.D. in Computer Science**, the University of Tokyo, Tokyo, JAPAN
Dissertation: "Photo-realistic rendering of real-world objects based on insufficient measurement"
Supervisor: Dr. Katsushi Ikeuchi
GPA: 4.0

03/2001 **M.Sc. in Information Science**, the University of Tokyo, Tokyo, JAPAN
Thesis: "Solving the correspondence problem of high dimensional data"
Supervisor: Dr. Yoshihisa Shinagawa

03/1999 **B.Sc. in Information Science**, the University of Tokyo, Tokyo, JAPAN
Thesis: "Texture mapping on the homotopy model"
Supervisor: Dr. Yoshihisa Shinagawa

## Working Experience

08/2008-09/2008,

02/2008-03/2008,

07/2005-08/2007 **Visiting Research Scientist**
Robotics Institute, Carnegie Mellon University, PA

- High-speed projector-camera system:
  - Designed the optical system composed of a beam splitter, a DLP projector and a high-speed video camera that can acquire the images of moving and deforming objects at 10,000 frames per seconds under controlled illumination environment.
  - Proposed the algorithm of separating direct/indirect surface reflection components from acquired camera images.
  - Developed the image-processing software for high-speed image acquisition. (ongoing)
- Shape acquisition using shadow:
  - Designed the optical system for acquiring a large number of shadow images using a rear-projection screen, a SLR camera, and a point light source.
  - Proposed the algorithm of acquiring the visual hull of intricately-shaped objects using a large number of the shadow images.
  - Developed the software of shape-from-silhouette techniques. The accomplishments are presented at International Conference on Computer Vision (ICCV) 2007 and submitted to International Journal of Computer Vision.
  - Developed the software of high-accuracy calibration of camera intrinsic parameters. The accomplishments are used in my own projects, People Image Analysis (PIA) project, and Vision Sensor class in 2008 spring at Carnegie Mellon University, PA.

- Conducted experiments on physics-based modeling and rending of human hair fibers.

04/2004-present **Researcher**
Digital Human Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Tokyo, JAPAN

- Image-based modeling and rendering of human hair:
  - Designed the hardware for acquiring multi-view images of human hair under controlled lighting environment.
  - Proposed the method of modeling intricate shapes using volumetric shape representation.
  - Developed the software of image-based modeling system. The accomplishments are presented at Asian Conference on Computer Vision (ACCV) 2006.
- Digital watermarking for motion capture data:
  - Proposed the algorithm of embedding and extracting hidden messages into motion capture (MoCap) data in frequency domain.
  - Developed the watermarking system of motion capture data. The accomplishments are presented at International Conference on Computer Animation and Social Agents (CASA) 2005.

09/2002-02/2003,

03/2002-03/2003 **Student Fellow**
Microsoft Research Asia, Beijing China

- Radiometric camera calibration:
  - Proposed the algorithm of estimating radiometric response of digital still cameras from a single image.
  - Developed the software for calibrating radiometric response of a camera. The accomplishments are presented at International Conference on Computer Vision and Pattern Recognition (CVPR) 2004.
- Interactive system of image-based modeling and rendering:
  - Proposed the user interface that can effectively improve the quality of light field rendering from sparse data sets.
  - Developed the software for interactive image-based modeling and rendering. The accomplishments are published in ACM transactions on Graphics in 2004.

04/2001-03/2004 **Junior Research Associate**
RIKEN (The Institute of Physical and Chemical Research), Saitama, JAPAN

- Developed the software for interactive volume rendering.
- Developed the software for modeling, polygonizing and interactively rendering implicit surfaces. The accomplishments are presented at International Conference on Geometric Modeling and Processing (GMP) 2002.
- Developed the software for interactive visualization of implicit surfaces using graphics processing units (GPU). The accomplishments are presented at International Conference on Shape Modeling International (SMI) 2003.

06/1999-03/2001 **Student Researcher**
RIKEN (The Institute of Physical and Chemical Research), Saitama, JAPAN

- Proposed the algorithms of extracting contours of range images captured by electron microscope.

04/1997-03/1999 **Part-time Software Engineer**
Crayfish Co., Ltd, Tokyo, JAPAN

- Developed the systems of Common Gateway Interfaces (CGI) for web-based application service providers.
- Developed in-house software libraries for AJAX technology.

## Awards

Representative of the graduating students, in Graduate School of Information Science and Technology, The University of Tokyo in 2004.

Junior Research Associate, received from RIKEN (The Institute of Physical and Chemical Research) in 2001. Awarded a scholarship of total $60,000.

Student Fellowship, received from Microsoft Research Asia in 2002. Awarded a scholarship of total $6,000.

Internship, received from Microsoft Research Asia in 2003. Awarded a scholarship of total $1,000.

## Patents

Co-inventor with Dr. Takeo Kanade, and Dr. Masaaki Mochimaru,
"Method of Watermarking Human Motion Data",
Patent pending in JAPAN, 2004

Co-inventor with Dr. Katsushi Ikeuchi, Dr. Hiroshi Kawasaki and Dr. Ryusuke Sagawa,
"Rendering intricately-shaped objects using view-dependent microfacets",
Patent granted in JAPAN, United States and EU, 2002

Co-inventor with Dr. Kiwamu Kase and Dr. Katsushi Ikeuchi,
"Methods and programs for representation and rendering non-manifold implicit surfaces",
Patent granted in JAPAN, United States and EU, 2002

Co-inventor with Dr. Kiwamu Kase and Dr. Katsushi Ikeuchi,
"Methods and programs for volume rendering",
Patent granted in JAPAN, 2001

Co-inventor with Dr. Kiwamu Kase,
"Methods and system for contour generation",
Patent granted in JAPAN, United States and EU, 2001

Co-inventor with Dr. Kiwamu Kase, Dr. Yoshinori Teshima, Shugo Usami and Dr. Takeshi Makinouchi,
"Methods and programs for converting three dimensional data into cell data",
Patent granted in JAPAN, United States and EU, 2001

## Speaking Languages

English and Japanese (native)

## Programming Languages

Strong programming background and experience in C/C++, Java, OpenGL and DirectX.
Broad experience in shader programming using Cg and DirectX HLSL.
Experience in C#, Visual Basic, Perl, Pascal, Scheme, Lisp, Prolog and ML.

## References

**Dr. Katsushi Ikeuchi**
Professor
Interfaculty Initiative in Information Studies, The University of Tokyo
4-6-1 Komaba, Meguro-ku, Tokyo 153-8505, JAPAN
E-Mail: ki@cvl.iis.u-tokyo.ac.jp

**Dr. Takeo Kanade**
Professor

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**Dr. Heung-Yeung Shum**
Vice President
Microsoft Corp.
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**Dr. Srinivasa G. Narasimhan**
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Robotics Institute, Carnegie Mellon University
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## Selected Publications

### Refereed Journal Articles

[1] Shuntaro Yamazaki, Srinivasa Narasimhan, Simon Baker, and Takeo Kanade.
The theory and practice of coplanar shadowgram imaging for acquiring visual hulls of intricate objects.
*International Journal of Computer Vision (to appear)*, 2008.

[2] Hubert Shum, Taku Komura, and Shuntaro Yamazaki.
Interaction patches for multi-character animation.
*ACM Transactions on Graphics*, 27(5), dec 2008.

[3] Shuntaro Yamazaki, Katsushi Ikeuchi, and Yoshihisa Shinagawa.
Plausible image matching: Determining dense and smooth mapping between images without a priori knowledge.
*International Journal of Pattern Recognition and Artificial Intelligence*, 19(4):1–19, 2005.

[4] Kiwamu Kase, Yoshinori Teshima, Shugo Usami, Masaya Kato, Shuntaro Yamazaki, Masao Ito, and Akitake Makinouchi.
Volume CAD: CW-complexes based approach.
*International Journal of Computer-Aided Design*, 37(14):1509–1520, 2005.

[5] Heung-Yeung Shum, Jian Sun, Shuntaro Yamazaki, Li Yin, and Chi-Keung Tang.
Pop-up light field.
*ACM Transactions on Graphics*, 23(2):143–162, 2004.

### Refereed Conference Presentation

[1] Srinivasa G Narasimhan, Sanjeev Jagannatha Koppal, and Shuntaro Yamazaki.
Temporal dithering of illumination for fast active vision.
In *Proc. European Conference on Computer Vision*, October 2008.

[2] Hubert Shum, Taku Komura, and Shuntaro Yamazaki.
Simulating interactions of avatars in high dimensional state space.
In *Proc. ACM Symposium on Interactive 3D Graphics and Games*, pages 131–138, February 2008.

[3] Shuntaro Yamazaki, Srinivasa Narasimhan, Simon Baker, and Takeo Kanade.
Coplanar shadowgrams for acquiring visual hulls of intricate objects.
In *Proc. International Conference on Computer Vision*, October 2007.

[4] Hubert Shum, Taku Komura, and Shuntaro Yamazaki.
Simulating competitive interactions using singly captured motions.
In *Proc. ACM Symposium on Virtual Reality Software and Technology*, pages 65–71, November 2007.

[5] Shuntaro Yamazaki, Masaaki Mochimaru, and Takeo Kanade.

Inverse volume rendering approach to 3D reconstruction from multiple images.
In *Proc. Asian Conference on Computer Vision*, volume 1, pages 408–413, January 2006.

[6] Shuntaro Yamazaki, Masaaki Mochimaru, and Takeo Kanade.
Watermarking motion clips.
In *Proc. Computer Animation and Social Agent*, pages 171–176, October 2005.

[7] Stephan Lin, Jinwei Gu, Shuntaro Yamazaki, and Heung-Yeung Shum.
Radiometric calibration from a single image.
In *Proc. Computer Vision and Pattern Recognition*, volume 2, pages 938–945, 2004.

[8] Shuntaro Yamazaki, Katsushi Ikeuchi, and Yoshihisa Shingawa.
Determining plausible mapping between images without a priori knowledge.
In *Proc. Asian Conference on Computer Vision*, pages 408–413, January 2004.

[9] Shuntaro Yamazaki.
Watermarking motion data.
In *Proc. Pacific Rim Workshop on Digital Steganography*, pages 177–185, November 2004.

[10] Shuntaro Yamazaki, Kiwamu Kase, and Katsushi Ikeuchi.
Hardware-accelerated visualization of volume-sampled distance fields.
In *Proc. Shape Modeling International*, pages 264–271, May 2003.

[11] Shuntaro Yamazaki, Kiwamu Kase, and Katsushi Ikeuchi.
Non-manifold implicit surfaces based on discontinuous implicitization and polygonization.
In *Proc. Geometric Modeling and Processing*, pages 138–146. IEEE, June 2002.

[12] Kiwamu Kase Shuntaro Yamazaki and Katsushi Ikeuchi.
Interactive visualization of non-manifold implicit surfaces using pre-integrated volume rendering.
In *Proc. Pacific Graphics*, pages 475–476, October 2002.

[13] Shuntaro Yamazaki, Ryusuke Sagawa, Hiroshi Kawasaki, Katsushi Ikeuchi, and Masao Sakauchi.
Microfacet billboarding.
In *Proc. Eurographics Workshop on Rendering*, pages 175–186, June 2002.

Tokyo, Japan, September 25, 2008