

Takaaki Shiratori

Contact

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Research Interests

Computer graphics (computer animation, motion capture techniques, physical simulation), computer vision (video enhancement, structure from motion), robotics (motion optimization, entertainment robot), user interface (interfaces for graphics), biomechanics (slipping and tripping), music signal processing (auditory scene analysis).

Education

Ph.D. in Information Science and Technology, March 2007
The University of Tokyo, Tokyo, Japan
Dissertation: "Synthesis of Dance Performance Based on Analyses of Human Motion and Music"
Advisor: Prof. Katsushi Ikeuchi

M.I.S.T. in Information Science and Technology, March 2004
The University of Tokyo, Tokyo, Japan
Thesis: "Detecting Dance Motion Structure using Motion Capture and Musical Information"
Advisor: Prof. Katsushi Ikeuchi

B.E. in Information and Communication Engineering, March 2002
The University of Tokyo, Tokyo, Japan
Thesis: "Stabilization of Wearable Video"
Advisor: Prof. Kiyoharu Aizawa
Graduated with High Honors

Employment

Project Scientist April 2009 – Present
Robotics Institute, Carnegie Mellon University/Disney Research Pittsburgh
Pittsburgh, PA, USA

Postdoctoral Fellow April 2008 – March 2009
Robotics Institute, Carnegie Mellon University Pittsburgh, PA, USA
Supervisor: Prof. Jessica K. Hodgins

- Proposing and developing a motion capture system using video cameras.
- Proposing and developing models of balance recovery motion after tripping.

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| Consultant
Livri Games Inc.
- Consulting inertia sensor-based games. | January 2009 - Present
Redmond, WA, USA |
| Visiting Researcher
Robotics Institute, Carnegie Mellon University
Supervisor: Prof. Jessica K. Hodgins
- Developed user interfaces for a physically simulated character.
- Developed simulation of balance recovery motion after tripping. | April 2007 – March 2008
Pittsburgh, PA, USA |
| Research Intern
Visual Computing Group, Microsoft Research Asia,
Supervisors: Dr. Yasuyuki Matsushita and Dr. Sing Bing Kang
- Developed a method of video completion. | July 2005 – November 2005
Beijing, P. R. China |

List of Publications

Book Chapter

1. Takaaki Shiratori, Yasuyuki Matsushita, Sing Bing Kang, Xiaou Tang, "Video Completion by Motion Field Transfer", *Innovation Together: Microsoft Research Asia Academic Research Collaboration*, Lolan Song Ed., ISBN 978-0-387-87860-7, Chapter 3, Springer-Verlag, 2008.

Refereed Journal Articles

1. Takaaki Shiratori, Jessica K. Hodgins, "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", *ACM Transactions on Graphics*, Vol. 27, No. 5 (*Proc. SIGGRAPH Asia 2008*), December 2008.
2. Takaaki Shiratori, Katsushi Ikeuchi, "Synthesis of Dance Performance Based on Analyses of Human Motion and Music", *IPSJ Transactions on Computer Vision and Image Media*, Vol. 1, No.1 (also *IPSJ Online Transactions*, Vol.1, No. 0), pp.34-47, June 2008.
3. Manoj Perera, Takaaki Shiratori, Shunsuke Kudoh, Atsushi Nakazawa, Katsushi Ikeuchi, "Task Recognition and Person Identification in Dance Sequences with Multi Factor Tensor Analysis", *IEICE Trans. on Information and Systems*, Vol. E91-D, No.5, pp.1531-1542, May 2008.
4. Katsushi Ikeuchi, Takaaki Shiratori, Shunsuke Kudoh, Hirohisa Hirukawa, Shin'ichiro Nakaoka, Fumio Kanehiro, "Robots that Learn to Dance from Observation", *IEEE Intelligent Systems*, Vol. 23, No. 2, pp. 74-76, March 2008.
5. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Dancing-to-Music Character Animation", *Computer Graphics Forum*, Vol. 25, No. 3 (*Proc. Eurographics 2006*), pp. 449-458, September 2006.
6. Atsushi Nakazawa, Shinichiro Nakaoka, Takaaki Shiratori, Katsushi Ikeuchi, "Analysis and Synthesis of Human Motions using Motion Capture", *The Journal of Three Dimensional Images*, Vol. 17, No. 4, pp. 77-84, December 2003.

(in Japanese)

1. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Automatic Synthesis of Dance Performance Using Motion and Musical Features", *IEICE Transactions on Information and Systems D-II*, Vol. J88-D-II, No. 8, pp. 2242-2252, August 2007.
2. Katsushi Ikeuchi, Atsushi Nakazawa, Shunsuke Kudoh, Shinichiro Nakaoka, Takaaki Shiratori, "Reproducing Dance Performance with Humanoids Based on Learning From Observation Paradigm", *Japanese Journal of Biomechanics in Sports and Exercise*, Vol. 10, No.3, pp190-202, 2006.
3. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "The Structure Analysis of Dance Motions Using Motion Capture and Musical Information", *IEICE Transactions on Information and Systems D-II*, Vol. J88-D-II, No. 8, pp. 1583-1590, August 2005.
4. Katsushi Ikeuchi, Atsushi Nakazawa, Koichi Ogawara, Jun Takamatsu, Shunsuke Kudoh, Shinichiro Nakaoka, Takaaki Shiratori, "Digitally Archiving and Reproducing Japanese Folk Dance with a Humanoid Robot", *Journal of Virtual Reality Society of Japan*, Vol. 9, No. 2, pp. 14-20, June 2004.

Refereed Conference Papers

1. Takaaki Shiratori, Brooke Coley, Rakiè Cham, Jessica K. Hodgins, "Simulating Recovery Responses to Trips Based on Biomechanical Principles", In *Proc. ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, 2009 (to appear)
2. Takaaki Shiratori, Atsushi Nakazawa, Shin'ichiro Nakaoka, Shunsuke Kudoh, Katsushi Ikeuchi, "Task Models of Upper Body Motion for a Dancing Humanoid Robot Based on Motion and Music Features", In *Proc. International Workshop on Art and Robots* (in conjunction with IROS 2008), September 2008.
3. Takaaki Shiratori, Shunsuke Kudoh, Shin'ichiro Nakaoka, Katsushi Ikeuchi, "Temporal Scaling of Upper Body Motion for Sound Feedback System of a Dancing Humanoid Robot", In *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2007)*, October 2007.
4. Manoj Perera, Takaaki Shiratori, Shunsuke Kudoh, Atsushi Nakazawa, Katsushi Ikeuchi, "Multilinear Analysis for Task Recognition and Person Identification", In *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2007)*, October 2007.
5. Miti Ruchanurucks, Shunsuke Kudoh, Koichi Ogawara, Takaaki Shiratori, Katsushi Ikeuchi, "Humanoid Robot Painter: From Object to Trajectory", In *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2007)*, October 2007.
6. Jun Takamatsu, Takaaki Shiratori, Shin'ichiro Nakaoka, Shunsuke Kudoh, Atsushi Nakazawa, Fumio Kanehiro, Katsushi Ikeuchi, "Entertainment Robot: Learning from Observation Paradigm for Humanoid Robot Dancing", In *Proc. International Workshop on Art and Robots* (in conjunction with IROS 2007), October 2007.
7. Miti Ruchanurucks, Shunsuke Kudoh, Koichi Ogawara, Takaaki Shiratori, Katsushi Ikeuchi, "Humanoid Robot Painter: Visual Perception and High-Level Planning", In *Proc. IEEE International Conference on Robotics and Automation 2007 (ICRA2007)*, April 2007.
8. Daisuke Miyazaki, Mawo Kamakura, Tomoaki Higo, Yasuhide Okamoto, Rei Kawakami, Takaaki Shiratori, Akifumi Ikari, Shintaro Ono, Yoshihiro Sato, Mina Oya, Masayuki Tanaka, Katsushi Ikeuchi, Masanori Aoyagi, "3D Digital Archive of the Burghers of Calais,"

- In *Proc. 12th International Conference on Virtual Systems and Multimedia (VSMM2006)*, Lecture Notes in Computer Science (LNCS), October 2006.
9. Manoj Perera, Takaaki Shiratori, Shunsuke Kudoh, Atsushi Nakazawa, Katsushi Ikeuchi, "Task Recognition and Style Analysis in Dance Sequences", In *Proc. IEEE Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI2006)*, September 2006.
 10. Takaaki Shiratori, Yasuyuki Matsushita, Sing Bing Kang, Xiaoou Tang, "Video Completion by Motion Field Transfer", In *Proc. IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR2006)*, June 2006.
 11. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Synthesizing Dance Performance Using Musical and Motion Features", In *Proc. IEEE International Conference on Robotics and Automation (ICRA2006)*, May 2006.
 12. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Detecting Dance Motion Structure using Motion Capture and Musical Information", In *Proc. International Conference on Virtual Systems and Multimedia (VSMM2004)*, November 2004.
 13. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Detecting Dance Motion Structure through Music Analysis", In *Proc. IEEE International Conference on Automatic Face and Gesture Recognition (FGR2004)*, May 2004.
 14. Atsushi Nakazawa, Shinichiro Nakaoka, Takaaki Shiratori, Katsushi Ikeuchi, "Analysis and Synthesis of Human Motions using Motion Capture", In *Proc. International Conference on Humans and Computers (HC2003)*, August 2003.
 15. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Rhythmic Motion Analysis using Motion Capture and Musical Information", In *Proc. IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI2003)*, July 2003.
 16. Atsushi Nakazawa, Shinichiro Nakaoka, Takaaki Shiratori, Katsushi Ikeuchi, "Analysis and Synthesis of Human Dance Motions", In *Proc. IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI2003)*, July 2003.

Conference Abstracts

1. Takaaki Shiratori, Brooke Coley, Rakiè Cham, Jessica K. Hodgins, "Modeling and Simulation of Balance Recovery Responses to Tripping", In *Proc. Annual Meeting for the American Society of Biomechanics*, 2009 (to appear)

Unrefereed Conference Papers

1. Takaaki Shiratori, Yasuyuki Matsushita, Sing Bing Kang, Xiaoou Tang, "Video Completion by Motion Field Transfer", In *Proc 2nd MS-IJARC Symposium*, November 2006.
2. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Structure Detection of Dance Sequence using Motion Capture and Musical Information", In *Proc. International Symposium on CREST Digital Archiving Project*, March 2005.

Invited Articles

(in Japanese)

1. Takaaki Shiratori, Jessica K. Hodgins, "Interface for Controlling a Character: Designing and Evaluating Accelerometer-based User Interfaces", Image Lab, Japan Industrial Publishing Co., Ltd., January 2009.
2. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Digitizing Human Motion and its Application: Analyzing and Synthesizing Dance Motion Using Motion Capture and Musical Information", Image Lab, Japan Industrial Publishing Co., Ltd., March 2006.

Invited Talk

1. Takaaki Shiratori, Atsushi Nakazawa, Katsushi Ikeuchi, "Dancing-to-Music Character Animation", *Visual Computing / IPSJ SIG-CG Joint Symposium*, Japan, June 2006.

Seminar Talks

1. "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", Toppan Printing Co. Ltd., Host: Dr. Tomohito Masuda, July 2009
2. "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", OLM Digital, Inc., Japan, Host: Dr. Ken-ichi Anjyo, July 2009
3. "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", Osaka University, Japan, Host: Prof. Atsushi Nakazawa, July 2009
4. "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", The University of Tokyo, Japan, Host: Katsushi Ikeuchi, July 2009
5. "Controlling a Character with Sensors", Square Enix Co. Ltd., Japan, Host: Mr. Naoto Yoshioka, June 2009
6. "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", Carnegie Mellon University, USA, Host: Prof. Nancy S. Pollard, April 2009 (guest lecturer).
7. "Accelerometer-based User Interfaces for the Control of a Physically Simulated Character", The University of Tokyo, Japan, Host: Prof. Toshihiko Yamasaki, December 2008.
8. "User Interfaces for Capturing and Controlling a Human-like Character", Disney Research Pittsburgh, USA, Host: Prof. Jessica K. Hodgins, November 2008.
9. "Synthesis of Dance Performance Based on Analyses of Human Motion and Music", Carnegie Mellon University, USA, Host: Prof. Jessica K. Hodgins, June 2007.
10. "Dancing-to-Music Character Animation", Digital Human Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Japan, Host: Prof. Shigeru Kuriyama, August 2006.
11. "Detecting Dance Structure Using Motion Capture and Music Information", University of Aizu, Japan, Host: Prof. Minoru Ueda, 2004.5 (guest lecturer).

Patents

1. Co-inventor with Dr. Katsushi Ikeuchi, and Dr. Atsushi Nakazawa, "Method of Automatic Dance Performance Synthesis", Patent pending in Japan, 2005.
2. Co-inventor with Dr. Yasuyuki Matsushita, Dr. Sing Bing Kang and Dr. Xiaou Tang, "Video Completion by Motion Field Transfer", Patent pending in United States, 2006.

Ph.D. Dissertation

- Takaaki Shiratori, "Synthesis of Dance Performance Based on Analyses of Human Motion and Music", Ph.D. Dissertation, The University of Tokyo, Tokyo, Japan, March 2007.

Award

- Funai Award of the 5th Digital Contents Symposium as a co-author of the paper "Synthesizing dancing motion from motion capture and music and its evaluation".
- Research Fellowship for Young Scientists (DC2 & PD) by Japan Society for the Promotion of Science, April 2006 – March 2008.

Funding

- JSPS Research Promotion Fund for Young Scientists, "A Study on Analysis and Synthesis of Human Motion Using Sound Feedback Control", Principal Investigator: Takaaki Shiratori, April 2006 – March 2008, Amount funded: ¥1,900,000 (approx. \$19,000).

Professional Activities

- Program committee member for SCA 2009
- Reviewer for IEEE Transactions on Circuits and Systems for Video Technology 2009, Transactions on Virtual Reality Society of Japan 2009, Journal of Robotics Society of Japan 2007-2008, IEICE Transactions on Information and Systems 2007, SIGGRAPH Asia 2009, IEEE RO-MAN 2009, IEEE ICCV 2009, IEEE ICRA 2006, 2008, 2009, IEEE/RSJ IROS 2005-2007.
- A member of IEEE and ACM.

Technical Experiences

Programming language: C/C++, Java, STL, Qt, MFC, OpenCV, OpenGL, DirectX, Boost, SD/FAST.

Operating system: Windows and Unix.

Motion capture system: Vicon Motion Systems (optical), Ascension MotionStar with Kaydara Mocap4 (magnetic), Alias MotionBuilder7 (software for editing motion capture data).

Speaking Languages

English (fluent) and Japanese (native).

References

Dr. Katsushi Ikeuchi

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Dr. Atsushi Nakazawa

Assistant Professor
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Dr. Yasuyuki Matsushita

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Dr. Sing Bing Kang

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Dr. Yoichi Sato

Associate Professor
Institute of Industrial Science, The University of Tokyo
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April 1, 2009