

Prof YUMI IWASHITA, PhD

744 Motoooka Nishi-ku Fukuoka Japan
+81-90-9489-6287 (cell)
yumi@ieee.org
<http://robotics.ait.kyushu-u.ac.jp/~yumi>

Kyushu University

RESEARCH EXPERTISE

Computer vision for robotics and Intelligence, Surveillance, and Reconnaissance (ISR) applications. People tracking and 3D geometrical modeling using laser range finders. Experience with motion capture system using multiple cameras and people tracking system using cameras. Biometrics and pattern recognition for security systems, such as people recognition on both ground and aerial surveillance cameras. (Pioneer/co-inventor of shadow biometrics technology, which allows aerial recognition of people based on the dynamics of their body shadows.) Medical image processing for the purpose of a navigation system for a surgical robot. Range data processing for building a huge-scale structure with multiple robots and people tracking.

EDUCATION

Kyushu University, Japan Ph.D. Information Science and Electrical Engineering <i>"Motion Capture System Robust in Target Occlusion using Fast Level Set Method"</i>	2004-2007
Kyushu University, Japan M.S. Information Science and Electrical Engineering <i>"3D Shape Reconstruction using Fast Level Set Method"</i>	2002-2004

WORK HISTORY

Affiliate researcher, Robotics Section, Jet Propulsion Laboratory, USA	2011-PRESENT
Associate Professor, School of Information Science and Electrical Engineering, Kyushu University, Japan	2014-PRESENT
Assistant Professor, School of Information Science and Electrical Engineering, Kyushu University, Japan	2007-2014
Visiting researcher, Department of Electrical and Electronic Engineering, Imperial College London, UK	2007

RESEARCH EXPERIENCE

First-person activity recognition <i>Assistant Professor, Kyushu University</i> Research with Dr. Michael Ryoo. The goal is to recognize activities from first-person vision.	APR 2013-PRESENT
--	------------------

- People tracking from aerial images** OCT 2011-PRESENT
Affiliate researcher, Jet Propulsion Laboratory
 Research with Dr. Curtis Padgett and the Computer Vision for Aerial Applications Group. The goal is to track people from aerial images robustly to occlusion, noise, and parallax.
- People recognition from shadow biometrics** 2009-PRESENT
Assistant Professor, Kyushu University
Affiliate researcher, Jet Propulsion Laboratory
 Research began in collaboration with Dr. Adrian Stoica at JPL and has continued. The goal is to recognize people from their shadows for the purpose of wide area security operations.
- People recognition from gait** 2007-PRESENT
Visiting Researcher, Imperial College London (till Sep. on 2007)
Assistant Professor, Kyushu University
 Research began at Imperial College London in collaboration with Prof. Maria Petrou and has continued. The goal is to recognize people under various changes, such as appearance changes and walking on curved trajectories.
- 3D modeling of large-scale architectural structures with multiple robots** 2007-2011
Assistant Professor, Kyushu University
 Research was undertaken at Kyushu University with Prof. Kurazume. Developed an automatic 3-D laser measurement system of an environmental structure using the cooperation of multiple mobile robots.
- Classification of vehicles using a laser range finder** 2009-2010
Assistant Professor, Kyushu University
 Research was undertaken at Kyushu University with Prof. Kurazume. Developed a system to identify in real time the kind of the vehicles (car, bike, bus...) and in the special case of buses to read the company name.
- Target tracking using laser range finders** 2007-2010
Assistant Professor, Kyushu University
 Research was undertaken at Kyushu University with Prof. Kurazume. Developed a system to track multiple people with distributed laser range finders and cameras.
- 3D reconstruction of a femoral shape using 2D fluoroscopic images** 2007-2009
Assistant Professor, Kyushu University
 Research was undertaken at Kyushu University in collaboration with Prof. Sato at Osaka University. Developed a system to reconstruct precise 3D shapes of living organisms or bones from a few conventional 2D fluoroscopic images.
- Fast 2D-3D Registration for Navigation System of Surgical Robot** 2005-2006
Graduate student researcher, Kyushu University
 Research was undertaken at Kyushu University with Prof. Kurazume. Developed a system to superimpose a tumor model on an endoscopic image

2D-3D alignment based on geometrical consistency 2005-2006
Graduate student researcher, Kyushu University
 Research was undertaken at Kyushu University with Prof. Hara. The goal was to develop a system to align a 3D geometrical model to a 2D image, which is robust for initial registration errors, for reconstructing a realistic 3D model of indoor scene settings.

Motion capture system using multiple cameras 2003-2007
Graduate student researcher, Kyushu University
 Research was undertaken at Kyushu University with Prof. Kurazume. Reconstructed 3D models of multiple people in real-time. In this system the Fast Level Set Method was applied to stereo range data captured by multiple stereo cameras.

AWARDS and HONORS

Postdoctoral Fellowships for Research Abroad, Japan Society for the Promotion of Science 2011-2013
 Jet Propulsion Laboratory, USA

T.J.Tarn Best Paper in Robotics, 2010 IEEE Int. Conf. on Robotics and Biomimetics (ROBIO 2012), China 2010

Best Oral Presentation Award , Int. Conf. on Emerging Security Technologies (EST 2010), UK 2010

Best Oral Presentation Award, Image and Vision Computing New Zealand 2008

Postdoctoral Fellowships for Young Scientists, Japan Society for the Promotion of Science 2007
 Imperial College London, UK

IEEE Robotics and Automation Society Japan Chapter Young Award 2005

GRANT

[G1] **JGC-S Research Foundation** 2014-2015
Principal Investigator
Eearly Gait Recognition using parametric shape and walking models

[G2] **Grant-in-Aid for Scientific Research (C), Japan Society for the Promotion of Science** 2011-2014
Principal Investigator
Gait Recognition System using Invisible Lights

[G3] **Grant-in-Aid for Scientific Research (B), Japan Society for the Promotion of Science** 2011-2014
Researcher
Development of 3D Scanning System using Multiple Robots

- [G4] **Grant-in-Aid for Scientific Research (B), Japan Society for the Promotion of Science** 2010-2012
Researcher
Supporting Robotic Activities in Informationally Structured Environment
- [G5] **Project for Future Generation Robots, New Energy and Industrial Technology Development Organization** 2010-2012
Researcher
Development of Informationally Structured Environment for Robots
- [G6] **Grant-in-Aid for Scientific Research (B), Japan Society for the Promotion of Science** 2009-2010
Principal Investigator
Motion Capture System using Parametric 3D Shape Model
- [G7] **Grant A-Step, Japan Science and Technology Agency** 2009
Principal Investigator
Gait Recognition Robust to Appearance Changes using 4D Gait Database
- [G8] **Project for Intelligent Medical Robots, New Energy and Industrial Technology Development Organization** 2007-2010
Researcher
Development of Endoscopic Operation Robot

PUBLICATIONS

Journals

- [J1] Y. Iwashita, K. Ogawara, and R. Kurazume, "Identification of people walking along curved trajectories", *Pattern Recognition Letters*, InPress, 2014 2014
- [J2] Y. Iwashita, K. Uchino, and R. Kurazume, "Gait-based person identification robust to changes in appearance", *Sensors*, Vol. 13, No.6, pp.7884-7901, 2013 2013
- [J3] Y. Iwashita, A. Stoica, and R. Kurazume, "Gait identification using shadow biometrics", *Pattern Recognition Letters*, Vol.33, pp.2148-2155, 2012 2012
- [J4] Y. Tobata, R. Kurazume, Y. Noda, K. Lingemann, Y. Iwashita, T. Hasegawa, "Laser-based geometrical modeling of large-scale architectural structures using co-operative multiple robots", *Autonomous Robot*, Vol.32, No.1, pp. 49-62, 2012 2012
- [J5] S. Oishi, R. Kurazume, Y. Iwashita, T. Hasegawa, "Smoothing Range Image using Trilateral Filter and Reflectance Image", *Journal of the Institute of Electrical Engineering of Japan*, Vol.132, No.2, Sec.C, pp.291-298, 2012 (in Japanese) 2012
- [J6] J. Yongjin, Y. Iwashita, R. Kurazume, "Study on CPS-SLAM Improvement of Measurement Precision and Application for Tunnel Shape Measurement System", *Journal of the Robotics Society of Japan*, Vol.30, No.2, pp.180-187 2012 (in Japanese) 2012

- [J7] A. Tamura, K. Morooka, R. Kurazume, Y. Iwashita, "Trachea and Esophagus Classification by AdaBoost", *Journal of the Institute of Electronics, Information and Communication Engineers*, Vol.J92-D, No.12, pp.2249-2260, 2010 (in Japanese) 2010
- [J8] R. Kurazume, H. Yamada, K. Sokabe, K. Murakami, Y. Iwashita, T. Hasegawa, "Simultaneous Tracking of Multiple Targets Using SIR/MCMC Particle Filters by Distributed Cameras and Laser Range Finders", *Journal of the Robotics Society of Japan*, Vol.27, No.1, pp.65-76, 2010 (in Japanese) 2010
- [J9] R. Kurazume, K. Nakamura, O. Okada, Y. Sato, N. Sugano, T. Koyama, Y. Iwashita, T. Hasegawa, "3D reconstruction of a femoral shape using a parametric model and two 2D fluoroscopic images", *Computer Vision and Image Understanding*, vol.113, no.2, pp.202-211, 2009 2009
- [J10] Y. Kabashima, K. Hara, R. Kurazume, Y. Iwashita, K. Morooka, S. Uchida, T. Hasegawa, "2D/3D Registration by Back Projection and Geometrical Constraints", *Journal of the Institute of Electronics, Information and Communication Engineers*, Vol.J91-D, No.5, pp.1380-1392, 2008 (in Japanese) 2008
- [J11] Y. Iwashita, R. Kurazume, K. Konishi, M. Nakamoto, N. Aburaya, Y. Sato, M. Hashizume, T. Hasegawa, "Fast Model-Image Registration using 2D Distance Map for Surgical Navigation System", *Advanced Robotics*, Vol.21 No.7, pp.751-770, 2007 2007
- [J12] Y. Iwashita, R. Kurazume, K. Hara, S. Uchida, K. Morooka, T. Hasegawa, "Fast 3D Shape Reconstruction of Moving Objects by Parallel Fast Level Set Method", *Journal of the Institute of Electronics, Information and Communication Engineers*, Vol.J90-D, No. 8, pp.1888-1899, 2007 (in Japanese) 2007
- [J13] Y. Iwashita, R. Kurazume, T. Tsuji, K. Hara, T. Hasegawa, "3D Tracking of Multiple Moving Objects using Fast Level Set Method", *Journal of the Robotics Society of Japan*, Vol.23, No.7, pp.813-820, 2005 (in Japanese) 2005
- [J14] Y. Iwashita, R. Kurazume, S. Konishi, M. Nakamoto, M. Hashizume, T. Hasegawa, "Fast Alignment of 3D Geometrical Models and 2D Grayscale Images Using 2D Distance Maps", *Journal of Institute of Electronics, Information and Communication Engineers*, Vol.J88-D-II, No.9, pp.1889-1899, 2005 (in Japanese) 2005
- [J15] R. Kurazume, S. Yui, T. Tsuji, Y. Iwashita, K. Hara, T. Hasegawa, "Fast Level Set Method and Realtime Tracking of Moving Objects in a Sequence of Images", *Journal of the Information Processing Society of Japan*, Vol.44, No.8, pp.2244-2254, 2003 (in Japanese) 2003
- [C1] **Selected Refereed Conference Papers (15 papers out of 38 papers)**
Y. Iwashita, A. Takamine, R. Kurazume, M. S. Ryoo, "First-Person Animal Activity Recognition from Egocentric Videos", International Conference on Pattern Recognition (ICPR) 2014. 2014

- [C2] Y. Iwashita, M. Ryoo, T. Fuchs, C. Padgett, "Recognizing Humans in Motion: Trajectory-based Aerial Video Analysis", *British Machine Vision Conference (BMVC)*, 2013. 2013
- [C3] Y. Iwashita, K. Ogawara, R. Kurazume, "Expanding gait identification methods from straight to curved trajectories", *IEEE Workshop on the Applications of Computer Vision (WACV)*. 2013. 2012
- [C4] Y. Iwashita, R. Baba, K. Ogawara, R. Kurazume, "Method for gait-based biometric identification robust to changes in observation angle", *International Conference Image and Vision Computing New Zealand*. 2011 2011
- [C5] R. Kurazume, Y. Iwashita, K. Murakami, and T. Hasegawa, "Introduction to the Robot Town Project and 3-D Co-operative Geometrical Modeling Using Multiple Robots". *International Symposium on Robotics Research*. 2011 2011
- [C6] Y. Tobata, R. Kurazume, Y. Iwashita, and T. Hasegawa, "Automatic laser-based geometrical modeling using multiple mobile robots", *IEEE International Conference on Robotics and Biomimetics (ROBIO 2010)*, pp.363-369 2010 2010
- [C7] Y. Iwashita, A. Stoica, R. Kurazume, "Person Identification using Shadow Analysis", *British Machine Vision Conference*, pp.35.1--10, 2010 2010
- [C8] Y. Iwashita, R. Baba, K. Ogawara, R. Kurazume, "Person identification from spatio-temporal 3D gait", *Int. Conf. on Emerging Security Technologies*, pp.30-35. 2010 2010
- [C9] Y. Iwashita, R. Kurazume, T. Mori, M. Saito and T. Hasegawa, "Model-based motion tracking system using distributed network cameras", *IEEE Int. Conf. on Robotics and Automation*, pp.3020-3025, 2010. 2010
- [C10] Y. Iwashita and R. Kurazume, "Person identification from human walking sequences using affine moment invariants", *IEEE Int. Conf. on Robotics and Automation*, 2009 2009
- [C11] Y. Iwashita and M. Petrou, "Person identification from spatio-temporal volumes", *Int. Conf. Image and Vision Computing New Zealand*, 2008 2008
- [C12] Y. Iwashita, R. Kurazume, K. Hara, S. Uchida, K. Morooka, and T. Hasegawa, "Fast 3D Reconstruction of Human Shape and Motion Tracking by Parallel Fast Level Set Method", *IEEE Int. Conf. on Robotics and Automation*, pp.980-986, 2008 2008
- [C13] R. Kurazume, H. Yamada, K. Murakami, Y. Iwashita, and T. Hasegawa, "Target Tracking Using SIR and MCMC Particle Filters by Multiple Cameras and Laser Range Finders", *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp.3838-3844, Sep. 2008 2008
- [C14] Y. Iwashita, R. Kurazume, K. Hara, T. Hasegawa, "Robust Motion Capture System against Target Occlusion using Fast Level Set Method", *IEEE Int. Conf. on Robotics and Automation*, pp.168-174, 2006 2006
- [C15] Y. Iwashita, R. Kurazume, K. Konishi, M. Nakamoto, M. Hashizume, T. Hasegawa, "Fast 2D-3D Registration for Navigation System of Surgical 2005 2005

Robot", *IEEE Int. Conf. on Robotics and Automation*, pp.909-915, 2005

PROFESSIONAL ACTIVITIES

Associate Editor

- [AE1] International Conference on Intelligent Robots and Systems (IROS 2012) 2012
- [AE2] Symposium on Image Recognition and Understanding 2011 (Japanese) 2011

Executive Committee

- [EC1] General Chair of International Conference on Emerging Security Technologies (EST) 2014
- [EC2] Technical Committee on Biometrics (BioX), IEICE 2013-PRESENT
- [EC3] Chair of Computer Vision Workshop, International Conference on Emerging Security Technologies (EST) 2012, 2013
- [EC4] IEEE Japan Council Women in Engineering 2010-PRESENT

Program Committee

- [PC1] The 12th Asian Conference on Computer Vision 2014
- [PC2] IEEE Int. Conf. Space Mission Challenges for Information Technology (SMC-IT) 2014
- [PC3] Int. Conf. Pattern Recognition (ICPR 2014) 2014
- [PC4] The 11th World Congress on Intelligent Control and Automation 2014
- [PC5] International Conference Image and Vision Computing New Zealand 2013
- [PC6] International Conference on Emerging Security Technologies (EST) 2013
- [PC7] European Conference on Modelling and Simulation (ECMS) 2013
- [PC8] International Conference Image and Vision Computing New Zealand 2012
- [PC9] IEEE International Conference on Robotics and Biomimetics (ROBIO) 2012
- [PC10] International Workshop on Depth Image Analysis 2012
- [PC11] International Conference on Emerging Security Technologies (EST) 2012
- [PC12] IEEE International Conference on Robotics and Biomimetics (ROBIO) 2011
- [PC13] International Conference on Intelligent Robotics and Applications (ICIRA) 2011
- [PC14] China-Japan-Korea Joint Workshop on Pattern Recognition (CJKPR2010) 2010
- [PC15] International Conference on Intelligent Robotics and Applications (ICIRA) 2010
- [PC16] Asian Conference on Computer Vision (ACCV) 2010
- [PC17] IEEE International Conference on Robotics and Biomimetics (ROBIO) 2010
- [PC18] Advanced Technologies for Enhanced Quality of Life (AT-EQUAL) 2010
- [PC19] International Conference on Emerging Security Technologies (EST) 2010
- [PC20] International Workshop on Human Behavior Sensing (HBS) 2010
- [PC21] ECSIS Symposium on Learning and Adaptive Behavior in Robotic Systems 2010

Reviewer for Journals

- [RJ1] Elsevier, Image and Vision Computing 2014
- [RJ2] Elsevier, Pattern Recognition 2013-PRESENT
- [RJ3] Elsevier, Engineering Applications of Artificial Intelligence 2012
- [RJ4] Journal of the Institute of Electronics, Information and Communication Engineers 2008-PRESENT
- [RJ5] Journal of Control, Measurement, and System Integration 2012
- [RJ6] Advanced Robotics 2010-PRESENT
- [RJ7] IEEE Trans. On Systems, Man and Cybernetics - Part B 2010
- [RJ8] Elsevier, Medical Image Analysis 2010

Reviewer for Conferences

- [RC1] IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'14) 2014
- [RC2] IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'13) 2013
- [RC3] International Conference on Robotics and Automation (ICRA'13) 2013
- [RC4] International Conference on Robotics and Automation (ICRA'12) 2012

- [RC5] IEEE International Conference on Pattern Recognition (ICPR'12) 2012
- [RC6] International Conference on Robotics and Automation (ICRA'11) 2011
- [RC7] Asian Conference on Computer Vision (ACCV'10) 2010
- [RC8] Asian Conference on Computer Vision (ACCV'09) 2009