

**Harvard Medical School/Harvard School of Dental Medicine
Format for the Curriculum Vitae**

Date Prepared: October 7, 2014
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Place of Birth: Kawasaki, Japan

Education

2002	B.S.	Engineering	The University of Tokyo, Japan
2004	M.S.	Information Science and Technology	The University of Tokyo, Japan
2007	Ph.D.	Information Science and Technology	The University of Tokyo, Japan

Postdoctoral Training

04/07-09/09	Postdoctoral Research Fellow	Radiology	Brigham and Women's Hospital
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Faculty Academic Appointments

10/09-01/14	Instructor	Radiology	Harvard Medical School
02/14-	Assistant Professor	Radiology	Harvard Medical School

Appointments at Hospitals/Affiliated Institutions

10/09-	Research Associate	Radiology	Brigham and Women's Hospital
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Professional Societies

2001-2007	International Society for Computer Assisted Surgery	
	2001-2007	Member
2008-	International Society of Magnetic Resonance in Medicine	
	2008-2009	Student Member
	2009-	Member
2008-	Medical Image Computing and Computer Assisted Intervention	
	2008, 2011, 2013-	Member
	2014-	Program Committee

Editorial Activities

NueroImage (Ad-hoc reviewer, 2007)

Medical Physics (Ad-hoc reviewer, 2008-)

IEEE Transactions on Medical Imaging (Ad-hoc reviewer, 2012)

IEEE Transactions on BioMedical Engineering (Ad-hoc reviewer, 2014-)

International Journal of Computer Assisted Radiology and Surgery (Ad-hoc reviewer, 2009-)

International Journal of Medical Robotics and Computer Assisted Surgery (Ad-hoc reviewer, 2010-)

Journal of Magnetic Resonance Imaging (Ad-hoc reviewer, 2013-)

Journal of Medical Imaging (Ad-hoc reviewer, 2014-)

Medical Image Computing and Computer Assisted Intervention (Ad-hoc reviewer, 2008-)

IEEE International Conference on Biomedical Robotics and Biomechatronics (Ad-hoc reviewer, 2010-)

IEEE International Conference on Robotics and Automation (Ad-hoc reviewer, 2010-)

International Conference on Information Processing in Computer Assisted Interventions (Ad-hoc reviewer, 2014-)

Honors and Prizes

2004-2007	Research Fellowship for Young Scientist	Japan Society for the Promotion of Science
2008	Presentation Award	Japan Society of Computer Aided Surgery
2010	Cum Laude Award, Education Exhibit	Radiology Society of North America
2011	3rd Place Poster Award in Interventional Imaging Category	International Society of Magnetic Resonance in Medicine
2013	Best Paper Award	Asian Conference on Computer Aided Surgery

Report of Funded and Unfunded Projects

Funding Information

Past

- 2004-2007 Real-time organ motion/deformation tracking for MRI-guided surgery
Japan Society of Promotion of Science / 16-11488
P.I.
The goal of this project is to develop and evaluate MRI-based real-time organ motion tracking method that allows treating abdominal organs that move with patient's respiration under MRI guidance.
- 2008-2011 Image Guided Therapy (PI: Ferenc A Jolesz)
NCI / 1P01CA67165
Postdoctoral Research Fellow
This project is to improve an existing infrastructure (scientific, medical, and technical) to support a coordinated, multifocused, multidisciplinary union of MRI and interventional procedures in some well-defined fields.
- 2010-2012 Time resolve 3D MR Perfusion with Motion and Compliance Analysis of the Lung (PI: Hiroto Hatabu)
AZE, LT.
Investigator
This project is to develop and software to analyze compliance of the lung from free-breathing time-series 3D MR perfusion images.
- 2010-2013 Robot Assisted Laparoscopic Prostatectomy Guided by Patient Specific Models
Center for Integration of Medicine and Innovative Technology (CIMIT) / 11-325
P.I.
This project is to develop and evaluate software to overlay a 3D patient specific model onto live stereo endoscopic image to highlight important anatomical structures during prostate surgery.
- 2010-2014 Computer-controlled needle insertion device for MRI-guided transthoracic needle aspiration (PI: Junichi Tokuda)
BWH-Siemens Medical Solutions,
P.I (\$2,500)
The Aims of this project is to: Develop a MRI-compatible needle insertion device to drive a biopsy needle and validate mechanism in phantom an animal tissue experiment.
- 2012-2014 A New Method for Improved Targeting in Image-Guided Abdominal Interventions (PI: Nobuhiko Hata)
NCI / R01CA138586
Investigator
This study aims to demonstrate the feasibility of this technology in an interventional radiology suite during image-guided abdominal interventions, without impact on the medical decision.

Current

- 2007-2016 Enabling Technologies for MRI-Guided Prostate Interventions (PI: Clare Tempany)
 NCI / R01CA111288
 Investigator
 The overall objective of this Bioengineering Research Partnership (BRP) is to design, develop, and clinically test enabling technology for MRI-guided prostate interventions. These technologies will be applicable across a broad platform for both biopsy (diagnosis) and brachytherapy seed implants (therapy).
- 2008-2015 Image Guided Therapy Center (PI: Ferenc Jolesz)
 NIBIB / P41EB015898
 Investigator
 This project is to improve an existing infrastructure (scientific, medical, and technical) to support a coordinated, multifocused, multidisciplinary union of MRI and interventional procedures in some well-defined fields.
- 2013-2014 Development of a low-cost, graphics processor accelerator for 3D image registration (PI: Raj Shekhar)
 NCI / 5R42CA137886
 Investigator
 The goal of this study is to develop software for fast deformable 3D image registration that uses graphics processor.
- 2012-2015 Medical Robotics Project (PI: Nobuhiko Hata)
 Canon Inc.
 Investigator
 The objective of this project is to develop a robotic device and software tools to assist MR-guided liver tumor ablation.
- 2014-2015 A Robotic Needle Guide for MRI-guided Transperineal Prostate Interventions (PI: John Magill)
 NIH/Physical Sciences, Inc. / R41CA192446
 Site-PI
 Brigham and Women's Hospital will advise PSI, Inc. on the development of a new double template mechanism as an addition to the current Smart Template for MRI-guided targeted transperineal prostate biopsy

Current Unfunded Projects

Report of Local Teaching and Training

Teaching of Students in Courses

4/2003	Mechano-informatics Exercise Course 4 th year undergraduate students in Faculty of Engineering	The University of Tokyo, Japan Teaching Assistant
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Laboratory and Other Research Supervisory and Training Responsibilities

2008-2009	Supervise master students in the research group on software development	Daily consultation, 2 hours a week
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Formally Supervised Trainees

- 2007 Philip P. Mewes, M.S. / Ph.D. Student at the Friedrich-Alexander University Erlangen-Nuremberg
Published one conference paper as the first author, and one journal paper as a co-author.
- 2008-2009 Roland Gorlitz, B.S. / Master Student, University of Karlsruhe
Submitted two conference papers.
- 2010-2011 Laurent Chauvin, M.S. / Research Software Engineer at Brigham and Women's Hospital
Advise on development of software for neurosurgical navigation (co-mentor w/ Dr. Nobuhiko Hata, Ph.D.)
- 2010-2011 Christoph Ammann / Master student, Karlsruhe University, Germany
Research on image guidance for CT-guided liver ablation (co-mentor w/ Dr. Nobuhiko Hata, Ph.D.)
- 2011 Thomas Maier, Ph.D. / Ph.D. Candidate, Technical University of Munich
Advise on development of control software for MRI-guided prostate intervention (co-mentor w/ Dr. Nobuhiko Hata, Ph.D.)
- 2012 Tatsushi Mizutani M.D / M.D. Candidate, Nagoya University, School of Medicine
Advise on medical imaging and image-guided therapy.
- 2013-2014 Koichiro Murakami, M.D. Ph.D / Shiga University of Medical Science, Japan
- 2014- Soichiro Tani, M.D. / Shiga University of Medical Science, Japan

Local Invited Presentations

- 4/3/2007 4D Image-guided therapy using real-time registration and adaptive 4D scan / Speaker
Center for Pulmonary Functional Imaging, Department of Radiology, Brigham and Women's Hospital
- 8/7/2007 3D respiratory lung motion analysis using 128-channel parallel MR imaging / Speaker
Center for Pulmonary Functional Imaging, Department of Radiology, Brigham and Women's Hospital
- 5/15/2008 Respiratory organ motion tracking and navigated multiple breathing-phase 3D liver imaging / Speaker
BWH-Insightec Symposium on Focused Ultrasound Surgery, Department of Radiology, Brigham and Women's Hospital
- 11/3/2008 Systems and Architectures for MRI-guided Robotic Interventions / Speaker
Monthly First Monday Seminar, Department of Radiology, Brigham and Women's Hospital
- 9/10/2010 Developing a MRI-Compatible Needle Insertion Device to Drive a Biopsy Needle
Annual Radiology Research Retreat, Department of Radiology, Brigham and Women's Hospital
- 4/18/2012 Engineering Tools for MRI-guided Interventions
Weekly Meeting, Golby Lab, Brigham and Women's Hospital
- 5/22/2012 Image Overlay in Robotic Laparoscopic Prostatectomy
External Advisory Board Meeting, National Center for Image Guided Therapy, Brigham and Women's Hospital
- 4/4/2013 Software Tools for Image-Guided Abdominal and Cardiac Interventions

Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by outside entities.

Invited Presentations and Courses

Regional

- 10/2001 Digital Media for Knowledge Representation / Guest lecturer
Tokyo National University of Fine Arts and Music, Tokyo, Japan
- 4/8/2013 Advanced Imaging: Imaging in Neuroscience / Slicer 3D Hands-on-Tutorials
Harvard Catalyst, Sheraton Commander Hotel, Cambridge, MA

National

- 6/26/2007 Special Topic Breakout Session: Prostate / Organizer and speaker
NIH National Alliance for Medical Imaging 2007 Programming / Project Week, Boston, MA
- 6/23/2009 4D Imaging Breakout Session / Organizer and speaker
NIH National Alliance for Medical Image Computing 2009 Summer Project Week, Boston, MA
- 6/22/2010 OpenIGTLink Update / Speaker
NIH National Alliance for Medical Image Computing 2010 Summer Project Week, Boston MA
- 6/24/2010 OpenIGTLink Breakout Session / Organizer and speaker
NIH National Alliance for Medical Image Computing 2010 Summer Project Week, Boston MA
- 6/23/2011 OpenIGTLink Breakout Session / Organizer and speaker
NIH National Alliance for Medical Image Computing 2011 Summer Project Week, Boston MA
- 4/2/2014 OpenIGTLink: Interfacing Hardware and Software, Academic and Industry, and Research and Clinical Practice
Laboratory for Computational Sensing and Robotics (LCSR) Seminar, Whiting School of Engineering, Johns Hopkins University, Baltimore, MD

International

- 9/6/2008 Software and hardware integration strategy for image guided therapy using Open IGT Link, Workshop on Systems & Architecture for Computer Assisted Intervention / Speaker
11th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2008), New York, NY
- 9/10/2008 Software / Hardware Integration for MRI-guided Robotic Prostate Intervention using Open IGT Link, Prostate image analysis and computer-assisted intervention / Speaker
11th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2008), New York
- 10/15/2008–
10/16/2008 NA-MIC Kit Training / Instructor
The University of Western Ontario, London, Ontario, Canada

- 2/7/2009 Slicer and IGSTK integration: OpenIGTLink, A standardized communication protocol for image-guided surgery systems / Speaker
IGSTK User Group Meeting, SPIE, Kissimmee, FL
- 3/16/2010 Image Guided Therapy Research using 3D Slicer – Hands-on Workshop / Instructor
Tokyo Women’s Medical University, Tokyo, Japan
- 6/15/2011 Slicer Workshop / Instructor
Biomedical Imaging Research Centre at the University of Western Ontario
- 9/18/2011 OpenIGTLink Version 2 / Speaker
Systems and Architectures for Computer Assisted Interventions, 14th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2011), Toronto, Canada
- 4/9/2012 MRI-guided Robotic Interventions: From Engineering to Clinical Application
The 105th Open Seminar Lecturer, Global Center of Excellence for Mechanical System Innovation, The University of Tokyo, Tokyo, Japan.
- 6/30/2012 OpenIGTLink Tutorial / Instructor
Hands-on Workshop on Image Guided Therapy, Computer Assisted Radiology and Surgery, 26th International Congress and Exhibition, Pisa, Italy
- 6/30/2014 Research and Development of Advanced Computer-Aided Surgical Systems using Open Source Software – From Clinical Application to Academic-Industry Collaboration
The 2nd Seminar on Innovative Clinical Development and Research, Department of Surgery, Shiga University of Medical Science, Shiga, Japan
- 7/2/2014 Prostate Interventions using MRI Guidance and Robotics
Department of Radiology, The St. Marianna University School of Medicine, Kawasaki, Japan
- 8/26/2014 Modular Design and Communication Interface – OpenIGTLink
36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2014) Pre-conference Tutorial Event: Building Image-guidance System from Open-source Components, Sheraton Chicago Hotel and Tower, Chicago, IL
- 9/18/2014 Modular design and common interface – OpenIGTLink
Tutorial: Building Image-guidance System from Open-source Components, 17th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2014), Massachusetts Institute of Technology, Cambridge, MA

Report of Technological and Other Scientific Innovations

- OpenIGTLink Protocol Tokuda J, et al. Int J Robot 2009; 5(4):423-34.
<http://www.na-mic.org/Wiki/index.php/OpenIGTLink>
As part of activity at National Center for Image Guided Therapy (NCIGT) at BWH, I developed a standardized network communication protocol to interconnect devices and software that are used in image-guided therapy. I also developed a software library that helps developers to use the protocol from their software. The library, documentation and tutorials are open and available in public domain. The protocol has been used in 6 projects at NCIGT and by more than 3 external collaborators, since the project started in 2008.
- 3D Slicer / 4D Image Module <http://www.slicer.org/slicerWiki/index.php/Modules:FourDImage-Documentation-3.5>
<http://www.slicer.org/slicerWiki/index.php/Modules:FourDAnalysis-Documentation-3.5>

I have been developing a plug-in software module that adds capability to manipulate time-series 3D image to free open-source medical image processing and visualization software, 3D Slicer, which is originally developed by BWH. This module also offers function to perform pharmacokinetic model analysis for dynamic contrast-enhanced (DCE) MRI. The module is currently used by team at BWH and collaborators for DCE MRI analysis of lung and breast.

Interface for Medical Imaging Device

US Patent Application (Inventors: Junichi Tokuda, Li Pan, Christine Lorenz; Application Number: 2013/0314,085)

A system and method for modifying an imaging plane of a medical imaging device is presented. An electronic device includes a tilt sensor. The electronic device is configured to monitor a tilt of the electronic device. A computer is configured to receive an indication of the tilt of the electronic device, translate the indication of the tilt of the electronic device into a corresponding movement of the imaging plane of the medical imaging device, and transmit an instruction to the medical imaging device to cause the corresponding movement of the imaging plane. The medical imaging device may include an magnetic resonance imaging (MRI) system.

Needle placement manipulator with attachment for rf-coil

US Patent Application (Inventors: Kosuke Fujimoto, Yasumichi Arimitsu, Nobuhiko Hata, Sang-Eun Song, Junichi Tokuda; Application Number: 2014/0275,978)

A needle placement manipulator includes, a needle holder configured to hold a needle, a guide system configured to position the needle holder to a predetermined direction with respect to a subject of needle placement, an attachment including an attaching portion to which the guide system is attached and a setting portion on which an RF-coil is set. A base surface of the setting portion is configured to be disposed on the subject.

Needle placement manipulator with two rotary guides

US Patent Application (Inventors: Kosuke Fujimoto, Yasumichi Arimitsu, Nobuhiko Hata, Sang-Eun Song, Junichi Tokuda; Application Number: 2014/0275,979)

A needle placement manipulator includes, a pair of rotary guides arranged at a slanted angle with respect to each other, a needle holder which holds a needle along a needle holder axis, and a base body on which the guides are supported. The needle holder axis and each axis of the rotary guides cross at a single point located at or below the base body. The base body is configured to be attached to a patient or to an RF-coil.

Report of Scholarship

Publications

Peer reviewed publications in print or other media

Research investigations

1. Morikawa S, Inubushi T, Kurumi Y, Naka S, Sato K, Tani T, Haque HA, **Tokuda J**, Hata N. New

- assistive devices for MR-guided microwave thermocoagulation of liver tumors. *Acad Radiol.* 2003;10(2):180-8.
2. Morikawa S, Inubushi T, Kurumi Y, Naka S, Sato K, Demura K, Tani T, Haque HA, **Tokuda J**, Hata N. Advanced computer assistance for magnetic resonance-guided microwave thermocoagulation of liver tumors. *Acad Radiol.* 2003;10(12):1442-9.
 3. **Tokuda J**, Morikawa S, Dohi T, Hata N. Motion tracking in MR-guided liver therapy by using navigator echoes and projection profile matching. *Acad Radiol.* 2004;11(1):111-20.
 4. Lesniak J, **Tokuda J**, Kikinis R, Burghart C, Hata N. A device guidance method for organ motion compensation in MRI-guided therapy. *Phys Med Biol.* 2007;52(21):6427-38.
 5. Hata N, **Tokuda J**, Hurwitz S, Morikawa S. MRI-compatible manipulator with remote-center-of-motion control. *J Magn Reson Imaging.* 2008;27(5):1130-1138.
 6. **Tokuda J**, Morikawa S, Haque HA, Tsukamoto T, Matsumiya K, Liao H, Masamune K, Dohi T. Adaptive 4D MR imaging using navigator-based respiratory signal for MRI-guided therapy. *Magn Reson Med.* 2008;59(5):1051-1061.
 7. Fischer GS, Iordachita I, Csoma C, **Tokuda J**, DiMaio SP, Tempny CM, Hata N, Fichtinger G. MRI-Compatible Pneumatic Robot for Transperineal Prostate Needle Placement. *IEEE / ASME Transactions on Mechatronics.* 2008;13(3):295-305.
 8. **Tokuda J**, Schmitt M, Sun Y, Patz S, Tang Y, Mountford CE, Hata N, Wald LL, Hatabu H. Lung motion and volume measurement by dynamic 3D MRI using a 128-channel receiver coil. *Acad Radiol.* 2009;16(1):22-7.
 9. **Tokuda J**, Fischer GS, Papademetris X, Yaniv Z, Ibanez L, Cheng P, Liu H, Blevins J, Arata J, Golby A, Kapur T, Pieper S, Burdette EC, Fichtinger G, Tempny CM, Hata N. OpenIGTLink: An Open Network Protocol for Image-Guided Therapy Environment. *Int J Med Robot.* 2009; 5(4):423-34.
 10. Morikawa S, Naka S, Murakami K, Kurumi Y, Shiomi H, Tani T, Haque HA, **Tokuda J**, Hata N, Inubushi T. Preliminary clinical experiences of a motorized manipulator for magnetic resonance image-guided microwave coagulation therapy of liver tumors. *Am J Surg.* 2009; 198(3):340-7.
 11. Oguro S, **Tokuda J**, Haker S, Kikinis R, Tempny CMC, Hata N. MRI signal intensity based B-Spline Non-rigid Registration for Pre- and Intra-operative Imaging during Prostate Brachytherapy. *J Magn Reson Imaging.* 2009; 30(5):1052-8.
 12. **Tokuda J**, Fischer GS, DiMaio SP, Gobbi DG, Csoma C, Mewes PW, Fichtinger G, Tempny CM, Hata N. Integrated navigation and control software system for MRI-guided Robotic Prostate Interventions, *Comput Med Imag Graphics*, 2010; 34(1):3-8.
 13. Arata J, Kozuka H, Kim HW, Takesue N, VladIMIROV B, Sakaguchi M, **Tokuda J**, Hata N, Chinzei K, Fujimoto H. Open Core Control software for surgical robots. *Int J Comp Assist Radiol and Surg.* 2010; 5(3):211-20.
 14. **Tokuda J**, Mamata H, Gill RR, Hata N, Kikinis R, Padera RF, Lenkinski RE, Sugarbaker DJ, Hatabu H. Impact of Non-rigid Motion Correction Technique on Pixel-wise Pharmacokinetic Analysis of Free-breathing Pulmonary Dynamic Contrast-Enhanced MR Imaging, *J Magn Reson Imaging* 2011; 33(4):968-973.
 15. Seifabadi R, Song SE, Krieger A, Cho NB, **Tokuda J**, Fichtinger G, Iordachita I. Robotic system for MRI-guided prostate biopsy: feasibility of teleoperated needle insertion and ex vivo phantom

- study. *Int J Comp Assist Radiol and Surg*, 2011; *Int J Comput Assist Radiol Surg*. 2012 Mar;7(2):181-90. PMID: 21698389
16. Egger J, **Tokuda J**, Chauvin L, Nimsy C, Kapur T, Wells W, Integration of the OpenIGTLink Network Protocol for Image-Guided Therapy with the Medical Platform MeVisLab, *Int J Med Robot*; *Int J Med Robot*. 2012 Sep;8(3):282-90. PMID: 22374845.
 17. Mamata H, **Tokuda J**, Gill RR, Padera RF, Lenkinski RE, Sugarbaker DJ, Butler JP, Hatabu H. Clinical application of pharmacokinetic analysis as a biomarker of solitary pulmonary nodules: Dynamic contrast-enhanced MR imaging. *Magn Reson Med*. 2012 Nov;68(5):1614-22. PMID: 22231729.
 18. Song SE, Hata N, Iordachita I, Fichtinger G, Tempny C, **Tokuda J**. A workspace-orientated needle-guiding robot for 3T MRI-guided transperineal prostate intervention: evaluation of in-bore workspace and MRI compatibility. *Int J Med Robot*. 2013 Mar;(9):67-74. PMID: 22492680.
 19. Fedorov A, Tuncali K, Fennessy FM, **Tokuda J**, Hata N, Wells WM, Kikinis R, Tempny CM. Image registration for targeted MRI-guided transperineal prostate biopsy. *J Magn Reson Imaging*. 2012 Oct;36(4):987-92. PMID: 22645031.
 20. **Tokuda J**, Song SE, Fischer GS, Iordachita II, Seifabadi R, Cho NB, Tuncali K, Fichtinger G, Tempny CM, Hata N. Preclinical evaluation of an MRI-compatible pneumatic robot for angulated needle placement in transperineal prostate interventions. *Int J Comput Assist Radiol Surg*. 2012 Nov;7(6):949-57. PMID: 22678723.
 21. Seifabadi R, Cho NB, Song SE, **Tokuda J**, Hata N, Tempny CM, Fichtinger G, Iordachita I. Accuracy study of a robotic system for MRI-guided prostate needle placement. *Int J Med Robot*. 2012 Jun 8. doi: 10.1002/rcs.1440. PMID: 22678990.
 22. **Tokuda J**, Tuncali K, Iordachita I, Song SE, Fedorov A, Oguro S, Lasso A, Fennessy FM, Tempny CM, Hata N. In-bore setup and software for 3T MRI-guided transperineal prostate biopsy. *Phys Med Biol*. 2012 Sep 21;57(18):5823-40. PMID: 22951350.
 23. Song S, **Tokuda J**, Tuncali K, Tempny CM, Zhang E, Hata N. Development and Preliminary Evaluation of a Motorized Needle Guide Template for MRI-guided Targeted Prostate Biopsy. *IEEE Trans Biomed Eng* 2013 Nov;60(11):3019-27. PMID: 23335658.
 24. Wang W, Dumoulin CL, Viswanathan AN, Tse ZT, Mehrtash A, Loew W, Norton I, **Tokuda J**, Seethamraju RT, Kapur T, Damato AL, Cormack RA, Schmidt EJ. Real-time active MR-tracking of metallic stylets in MR-guided radiation therapy. *Magn Reson Med*. 2014; Jun 5. doi: 10.1002/mrm.25300. PMID: 24903165.
 25. Tauscher S, **Tokuda J**, Schreiber G, Neff T, Hata N, Ortmaier T. OpenIGTLink Interface for state control and visualisation of a robot for image-guided therapy systems. *Int J Comput Assist Radiol Surg*. 2014 Jun 13. PMID: 24923473.
 26. Penzkofer T, Tuncali K, Fedorov A, Song SE, **Tokuda J**, Vangel M, Kibel AS, Fennessy FM, Mulkern R, Wells W, Hata N, Tempny CMC, Transperineal in-bore 3T MRI-guided prostate biopsy: A prospective clinical observational study, *Radiology* 2014 (accepted)
 27. Su H, Shang W, Cole G, Li G, Harrington K, Camilo A, **Tokuda J**, Tempny CM, Hata N, Fischer GS. Piezoelectrically Actuated Robotic System for MRI-Guided Prostate Percutaneous Therapy. *IEEE/ASME Trans Mechatronics*. 2014 (accepted).
 28. Tilak G, Tuncali K, Song SE, **Tokuda J**, Olubiye O, Fennessy F, Fedorov A, Penzkofer T,

Tempany C, N Hata. 3T MR Guided in bore transperineal prostate biopsy: A Comparison of robotic and manual needle-guidance templates. *J Magn Reson Img* (accepted).

Other peer-reviewed publications

29. **Tokuda J**, Morikawa S, Dohi T, Hata N. Ultra-fast image registration embedded in intraoperative MR imaging. In: *In Proc. of the 16th International Congress and Exhibition, Computer Assisted Radiology and Surgery*; June 2002; Paris, France. 2002. p. 69-73.
30. Hata N, **Tokuda J**, Morikawa S, Dohi T. Projection Profile Matching for Intraoperative MRI Registration Embedded in MR Imaging Sequence. In: *Proc. 5th International Conference on Medical Image Computing and Computer-Assisted Intervention - MICCAI 2002*; September 25 – 28, 2002; Tokyo, Japan. 2002. p. 164-9.
31. **Tokuda J**, Hirano M, Tsukamoto T, Dohi T, Hata N. Integration of Projection Profile Matching into Clinical MR Scanner System for Real-time Organ Tracking and Image Registration. In: *In Proceedings of The 6th Annual International Conference on Medical Image Computing and Computer Assisted Intervention - MICCAI 2003*; November 6-18, 2003; Montreal, Canada, 2003. p. 311-8.
32. Hata N, Hashimoto R, **Tokuda J**, Morikawa S. Needle Guiding Robot for MR-guided Microwave Thermoablation of Liver Tumor using Motorized Remote-Center-of-Motion Constraint. In: *Proceedings of the IEEE International Conference on Robotics and Automation - ICRA 2005*; April 18 – 22, 2005; Barcelona, Spain. 2005. p. 1664-1668.
33. **Tokuda J**, Morikawa S, Haque HA, Tsukamoto T, Matsumiya K, Liao H, Masamune K, Dohi T. Adaptive 4-D scan for real-time intraoperative MRI. In: *Proceedings of 20th International Congress and Exhibition, Computer Assisted Radiology and Surgery*; June 28 – July 1, 2006; Osaka, Japan. 2006. p. 290-292.
34. **Tokuda J**, Morikawa S, Haque HA, Tsukamoto T, Matsumiya K, Liao H, Masamune K, Dohi T. New 4-D imaging for real-time intraoperative MRI: adaptive 4-D scan. In: *In Proc of 9th International Conference on Medical Image Computing and Computer Assisted Intervention - MICCAI 2006*; October 1 – 6, 2006; Copenhagen, Denmark. 2006. p. 454-61.
35. Mewes PW, **Tokuda J**, DiMaio SP, Fischer G, Csoma C, Gobbi DG, Tempany C, Fichtinger G, Hata N. An Integrated MRI and Robot Control Software System for an MRI-compatible Robot in Prostate Intervention. In: *2008 IEEE International Conference on Robotics and Automation*, May 19-23, 2008; Pasadena, California. 2008.
36. Fischer GS, Iordachita I, Csoma C, **Tokuda J**, Mewes PW, Tempany CM, Hata N, Fichtinger G. Pneumatically Operated MRI-Compatible Needle Placement Robot for Prostate Interventions. In: *2008 IEEE International Conference on Robotics and Automation*, May 19 – 23, 2008; Pasadena, California. 2008.
37. Morikawa S, Hata N, **Tokuda J**. Clinical Use of Robot Assistance in MR Image-guided Microwave. In: *16th Scientific Meeting and Exhibition of International Society of Magnetic Resonance in Medicine*, May 19 – 23, 2008; Toronto, Canada. 2008.
38. **Tokuda J**, DiMaio S, Fischer G, Csoma C, Gobbi D, Fichtinger G, Hata N, Tempany C. Real-time MR Imaging Controlled by Transperineal Needle Placement Device for MRI-guided Prostate Biopsy. In: *16th Scientific Meeting and Exhibition of International Society of Magnetic Resonance in Medicine*, May 19 – 23, 2008; Toronto, Canada. 2008.
39. **Tokuda J**, Schmitt M, Sun Y, Tang Y, Patz S, Mountford CE, Hata N, Wald LL, Hatabu H. Lung

Volume and Motion measured by Dynamic 3D MRI using a 128-channel Receiver Coil. In: 16th Scientific Meeting and Exhibition of International Society of Magnetic Resonance in Medicine May 19 – 23, 2008; Toronto, Canada. 2008.

40. **Tokuda J**, Fischer GS, Csoma C, DiMaio SP, Gobbi DG, Fichtinger G, Tempany CM, Hata N. Software Strategy for Robotic Transperineal Prostate Therapy in Closed-Bore MRI. In: Med Image Comput Comput Assist Interv; September 6 – 10, 2008; New York, NY. 2008. p. 701-709.
41. Arata J, Kozuka H, Kim HW, Takesue N, Vladimirov B, Sakaguchi M, **Tokuda J**, Hata N, Chinzei K, Fujimoto H. An open source control software using virtual fixture for surgical robots, In: Proceedings of 23th International Congress and Exhibition, Computer Assisted Radiology and Surgery; June 23 – 27, 2009; Berlin, Germany. ;2009.
42. Song S, Cho NB, Iordachita I, Fischer GS, **Tokuda J**, Hata N, Fichtinger G, Tempany C. Development of a Pneumatic Robot for MRI-guided Transperineal Prostate Intervention, 18th Scientific Meeting and Exhibition of International Society of Magnetic Resonance in Medicine, May 1 – 7, 2010, Stockholm, Sweden, 2010.
43. **Tokuda J**, Mamata H, Gill RR, Patz S, Hata N, Lenkinski RE, Sugarbaker DJ, Hatabu H. Free-Breath DCE MRI for Solitary Pulmonary Nodule with Motion Correction Based On Non-Rigid Image Registration, 18th Scientific Meeting and Exhibition of International Society of Magnetic Resonance in Medicine, May 1 – 7, 2010, Stockholm, Sweden, 2010.
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Books/Textbooks for the medical or scientific community

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2. Panych LP, **Tokuda J**. Real-Time and Interactive MRI. Jolesz FA Ed. Intraoperative Imaging and Image-Guided Therapy. Springer New York. pp 193-209, 2014

Professional educational materials or reports, in print or other media

1. Malik, H, Gill RR, Mamata H, **Tokuda J**, Hatabu H, Advances in Magnetic Resonance Evaluation of the Chest: Perfusion and Diffusion-weighted Imaging, 96th Scientific Assembly and Annual Meeting, Radiological Society of North America, 2011 (Electric poster in Education Exhibit)
2. Tokuda, J, 3D Slicer Tutorial: OpenIGTLink.
<http://www.slicer.org/slicerWiki/index.php/Documentation/4.3/Training>

Thesis

2007 Visualization of organ motion by using intraoperative MRI. Ph.D. Thesis, The University of Tokyo. (Supervisor: Professor Takeyoshi Dohi, Dr. Eng)

Narrative Report (limit to 500 words)

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The goal of my research career is to contribute to biomedical research field by developing novel computer technologies to assist in diagnosis and treatment. To achieve this goal, I will pursue a career with a good balance of science, engineering and clinical implementation using my unique background in medical imaging and medical robotics. I devote 100% of my time for research and dissemination activities.

Area of Excellence

My primary area of interest is the development of technologies for image-guided therapy and their clinical implementation. My research career began in 2001 at the University of Tokyo, where I focused on MRI-guided liver therapy. Specifically, I worked on novel MRI-based real-time organ motion tracking [3] and four-dimensional MRI [6] to address the issue of organ motion. Besides those scientific works, I worked on development and clinical application of planning/navigation software [2] and robotic device [5, 10] to support MRI-guided procedures. The collaboration with a group of surgeons resulted in clinical application of the software in more than 100 cases and the robotic device in 20 cases as of today. After I joined the National Center for Image Guided Therapy (NCIGT) at Brigham and Women's Hospital (BWH), I continue to pursue my interest in technologies for MRI-guided therapy, particularly in MRI-guided prostate interventions. I have been playing a major role in clinical application of image-guided software and robotic device in MRI-guided prostate biopsy program [12, 15, 18-22]. The study was selected for the poster award in interventional category in the 19th annual meeting of the International Society for Magnetic Resonance in Medicine in May 2011.

Training and Education

I have been dedicating myself to dissemination of technologies I developed through my research. I participated as an instructor in several workshops held by National Alliance for Medical Image Computing in the U.S., Canada and Japan; my research on motion-compensated DCE-MRI of lung [8, 14] was presented as part of educational exhibit at 96th annual meeting of Radiological Society of North America and selected for the Cum Laude award.

Significant Supporting Activities

The software tools, which I have been developing at the NCIGT, have been distributed in the research community with extensive documentation and tutorials. Already, since the release of their initial version in 2008, they have been used in more than 9 projects in the research community, resulting publications by collaborators [13,15,16,21,30,35,39-41,49]. I have been working with BrainLAB AG, Nothorn Digital Inc. and Siemens Corporation to incorporate the network communication software library developed as outcome of my research [9, 12] into their products.

In the upcoming years, my short-term goal is to establish myself as an independent researcher. Currently, I am receiving two local seed grants to develop preliminary studies for future NIH grant proposal. At the same time, I am leading a collaborative project between Departments of Radiology and Surgery at BWH on robot-assisted prostatectomy. The project has become a part of the NCIGT beginning in 2010.